

May Measurement Month 2017-2019: an analysis of blood pressure screening results from Ukraine

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Hypertension is a key cardiovascular disease risk factor leading to premature mortality worldwide. The purpose of the May Measurement Month (MMM) campaign in Ukraine is to improve awareness of hypertension at the individual and population level. Adults (≥ 18 years) were screened at sites in Ukraine. Data from the MMM17 (19 sites), MMM18 (1 site), and MMM19 (5 sites) campaigns are included in the present analysis. Ideally, three blood pressure (BP) measurements were taken for each participant, and data on lifestyle factors and comorbidities were collected. Hypertension was defined as systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg (based on the mean of the second and third readings) or being on antihypertension medication. Multiple imputation was used to estimate participants' mean BP where readings were missing. Linear regression models were used to evaluate associations between BP and participant characteristics. Of all 46 549 screenees, 33 307 (71.6%) had hypertension, and 82.6% of whom were on antihypertensive medication. Of all those on medication, 31.4% were controlled to BP $< 140/90$ mmHg, and of all 33 307 participants with hypertension, 25.9% had controlled BP. Of all participants, 6.6% took statins and 11.2% took aspirin. The analysis of the MMM 2017, 2018, and 2019 campaigns has shown a high proportion of hypertension, insufficient level of awareness, and critically low level of effective BP control in Ukraine. Further MMM screening is needed to increase awareness of high BP and to help improve diagnosis, management, and treatment of hypertension.

Introduction

In the last 20 years, cardiovascular diseases (CVDs) have taken the leading position among the causes of death

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worldwide. High blood pressure (BP) is a major risk factor and the largest contributing factor to the global burden of disease and global mortality. Ukraine is a country of very high cardiovascular risk. CVD causes about 60% of deaths in Ukraine. As a result, average life expectancy is much lower than in other European countries—72 years (men—66.3 years, women—76.3 years).¹ As of 2019, Ukraine was among the countries with the highest stroke morbidity and mortality level on the planet.² The incidence of stroke in Ukraine in 2019 was 289.4 per 100.000 and stroke mortality—231.1 per 100.00, and these figures are significantly higher than in Central Europe.³

The prevalence of hypertension in 2014, according to the results of a large-scale study of cardiovascular risk in the urban population of Ukraine, was 45.7%, and its progression was established with increasing age of respondents—from 31.5% at 30–39 years, increasing to 55.6% at 50–59 years old to a maximum level of 68.6% at the age of 60–69 years.⁴

According to the STEPwise survey (STEPS) study, in 2019, 34.8% of the population aged 18–69 in Ukraine had a high BP or arterial hypertension, and 34.4% of patients received antihypertensive drugs, of which only 14.4% patients reached the target level of BP.¹

According to the results of a comprehensive analysis of global trends in the prevalence, detection, treatment, and control of hypertension, published in *The Lancet* in 2021, Ukraine ranks 134th among men and 124th among women in achieving hypertension control among 184 countries.⁵

The May Measurement Month (MMM) campaign, initiated by the International Society of Hypertension (ISH), is a step in the right direction for raising awareness of the disease that is rightfully considered the ‘silent killer’. Ukraine has been an active participant in this campaign since 2017.

Methods

Data from 2017, 2018, and 2019 MMM campaigns are included in the present analysis. MMM17 was conducted in 19 Ukrainian cities (coordinated by O. Yevstigneeva and Yu. Sirenko), in 2018 (coordinated by T. Khomazyuk) in Dnipro, in 2019 (coordinated by L. Mishchenko) in Kyiv (1 site), Dnipro (2 sites), Ivano-Frankivsk (1 site), and Ternopil (1 site).

The investigators (medical students, nurses, physicians) were well trained in BP measurement. Automatic and semi-automatic devices for BP measurement were used. Participants had three

BP measurements taken in a seated position. Hypertension was defined as systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg (the mean of the second and third readings was used in analyses) or on antihypertension medication. MMM campaigns were supported by ISH and Servier Ukraine Limited Liability Company.

The protocol for MMM17 did not include questions regarding the site of screening; last BP measurement, awareness, fasting status, and participant age were not collected due to the specifics of the campaign in Ukraine in 2017. Hence, analyses of these variables are based on data from 2018 and 2019 years. Additionally, information about the number of antihypertensive medications, aspirin, and statin, hypertension in pregnancy was not collected during the 2017–2018 MMM campaigns. Data were collected on hard copies. Data were entered locally in Microsoft Excel by site investigators. State data were analyzed centrally by the MMM project management team, and multiple imputation was performed to impute the mean of the second and third readings where this was missing, based on remaining available MMM data.^{6,7,8} Linear regression models were used to evaluate associations between systolic/diastolic BP and participant characteristics.

Results

In the three MMM campaigns, 46 549 people were screened. In MMM17, 45 394 adults were screened over a 3-month period, and in 2018 and 2019, 418 and 737 people were examined, respectively, during May. The mean (SD) age of participants was 46.6 (17.0) years, and 27781 (59.7%) screenees were women.

Based on the 2019 data, 74.9% of all respondents were not taking antihypertensive therapy, 7.9% were taking monotherapy, 8.5 and 5.0% were taking two and three classes of agents, respectively, and only 1.2%—four and more antihypertensive drug classes. The screened cohort was ethnically homogeneous—98.1% were White. About half of the participants (50.8%) had not had their BP measured in the last 12 months. Only 6.6% of participants reported taking statins regularly, and 11.9% were taking aspirin.

After multiple imputation, of all 46 549 persons, 33 307 (71.6%) had hypertension. Awareness of hypertension (in 2018–2019 only, where data were available) was 55.9%. A high proportion of hypertensives across all 3 years (82.6%) reported taking antihypertensive medication, and 31.4% of those on medication reached effective BP control (BP $< 140/90$ mmHg) (*Table 1*). The high percentage of hypertensives on medication and discrepancy between the percentage on medication and the percentage

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

Total participants	Percentage (%) with hypertension	Percentage (%) of hypertensives aware	Percentage (%) of hypertensives on medication	Percentage (%) of those on medication with controlled BP	Percentage (%) of all hypertensives with controlled BP
46 549	71.6	55.9 ^a	82.6	31.4	25.9

^aAwareness estimates use data from 2018 and 2019 only.

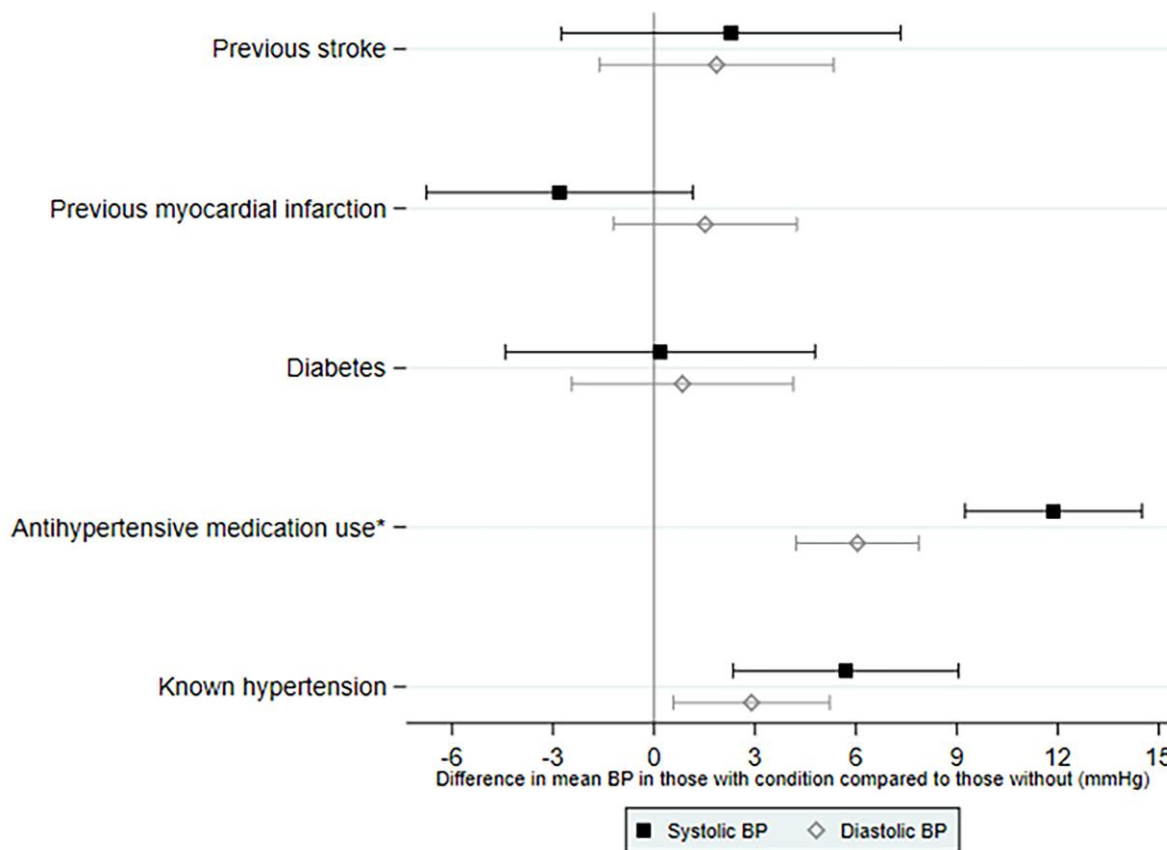


Figure 1 Difference in mean systolic/diastolic blood pressure according to individual characteristics from linear regression models adjusted for age, sex, and antihypertensive medication.

aware explained by peculiarities of data collection in 2017—the screening was mostly done in hospitals/clinics and awareness was not estimated. In 2018/2019, only 36.4 and 21.7% were screened at hospital or clinic.

Of all 33 307 participants with hypertension, 25.9% had controlled BP. Of 19 040 participants not on antihypertensive medication, 5798 (30.5%) were detected to have hypertension.

The associations of BP with age, BMI, previously known hypertension, and antihypertensive medication use were similar to the global data of MMM 2017-2019.^{6,7,8} Systolic and diastolic BP levels were not strongly associated with diabetes, previous myocardial infarction, stroke (*Figure 1*), or alcohol intake. However, participants who were fasting had significantly lower systolic BP (9.27 mmHg lower; $P < 0.001$), and smokers had a higher average diastolic BP (1.96 mmHg higher; $P = 0.018$). Unlike the global trends, there were no significant differences in mean diastolic BP levels in pregnant women compared with non-pregnant women or in women with compared to women without a history of hypertension during pregnancy.

Discussion

A combined analysis of three years of the MMM survey in Ukraine shows that a high percentage of 71.6% of

screenees were found to have hypertension. This is double the number of hypertensives (34.8%) in the recent Ukrainian epidemiological survey STEPS. Just over half of hypertensive patients (55.9%) were aware of their hypertension status, and one quarter (25.9%) had a BP controlled to $< 140/90$ mmHg. The STEPS survey found an awareness half that from our study (27.7%) as well as lower BP control (14.4%) among all hypertensives.¹ The significant difference between MMM and STEPS data could be explained by the influence of the 2017 MMM screening, which was not randomly sampled and mostly took place in hospitals or clinics according to the investigator's information (information about the site of screening was not collected in 2017).

This may also be the reason for the difference between the Ukrainian and global MMM results in an overall proportion of people with hypertension: 71.6% in Ukraine vs. 33.4, 34.9, and 34.0% globally in 2017, 2018, and 2019.^{6,7,8} Although, the rates of awareness among hypertensives were comparable: 55.9% in Ukraine and about 59% in the global MMM survey. The rate of effective BP control ($< 140/90$ mmHg) in Ukraine is substantially lower (25.9%) in comparison to the global MMM results 2017-2019, even in 2019, when the figure was the lowest at 31.7%.⁸

Considering the high prevalence of hypertension, insufficient level of awareness, and critically low level of

effective BP control, plus high stroke morbidity and mortality in Ukraine, it is essential to attract the population's attention to detection, management, and control of hypertension and also to study dynamics of hypertension prevalence, awareness, and BP control. The MMM screening is an effective instrument for this purpose.

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Conflict of interest: None declared.

Data availability

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

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