

May Measurement Month 2017: an analysis of blood pressure screening results in Armenia—Europe

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Elevated blood pressure (BP) is a growing burden worldwide, leading to over 10 million deaths each year. May Measurement Month (MMM) is a global initiative aimed at raising awareness of high BP and to act as a temporary solution to the lack of screening programmes worldwide. An opportunistic cross-sectional survey of volunteers aged ≥ 18 was carried out in May 2017. Blood pressure measurement, the definition of hypertension and statistical analysis followed the standard MMM protocol. The study was conducted in public areas (14 sites in Yerevan and 18 in regions), both indoor and outdoor, as well as in 42 primary care centres. A total of 9199 individuals were screened during MMM17 of which 9186 had three BP measurements available. The mean age of screened individuals was 50 ± 16.7 years, 57.3% was female. At the time of screening 17.9% were on antihypertensive medication. After imputation, a percentage of participants with hypertension was 33.9%, and 52.9% of them were on treatment. Of those treated, 77.0% had uncontrolled BP. MMM17 was the largest BP screening campaign undertaken in Armenia. We found that in Armenia, untreated hypertension is common, as is not adequately treated hypertension.

Introduction

The mortality structure of most common non-communicable diseases (NCDs) in Armenia is very similar to that in the European region. According to the National Health Information-Analytical Center, in 2016 the mortality burden due to the most prevalent NCDs comprised 80%, with cardiovascular diseases (CVD) being the lead cause (48%). The NCD-related premature mortality rate was 29%, with almost 25% of deaths occurring in the 35–65 age group. Eight out of ten major causes of the increase in the lost disability-adjusted life years in Armenia are NCDs, four of which belong to the CVD group.^{1,2}

Elevated blood pressure (BP) is a growing burden worldwide, leading to over 10 million deaths each year.³ However, the awareness of their condition is reportedly only about 50% among those with hypertension, and control rates in treated hypertensive patients remains intolerably low especially in low-income countries.⁴ May Measurement Month (MMM) is a global initiative, set up by the International Society of Hypertension, aimed at raising awareness of high BP and to act as a temporary solution to the lack of screening programmes worldwide.⁵

Methods

This cross-sectional survey was conducted among the adult population (≥ 18 years) in the capital city Yerevan and regions of Armenia. The study coordinator was Professor

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Parounak Zelveian. All ethical issues were clarified and approvals received according to local requirements of conducting cross-sectional studies from the ethical committee of the National Institute of Health. The campaign was promoted internationally by ISH and WHL and locally by the Armenian Medical Association, Yerevan Municipality and Center of Preventive Cardiology.

The study was conducted in public areas (14 sites in Yerevan and 18 in regions), both indoor and outdoor, as well as in 42 primary care centres. Indoor sites were situated mainly in Yerevan subway stations. Outdoor sites were located in the most crowded areas of the city. About 70 volunteers were engaged in the study for the public part, and about 80 healthcare specialists were involved in primary care centres. All volunteers were trained for basic knowledge about hypertension and measurement techniques. Staffs were recommended to use automated BP devices, but training on both automated and manual sphygmomanometers was provided because equipment varied at different sites.

Recruitment of the screeners was volunteer-based, and they were asked to participate in the study after a short introduction about the programme. The total duration of the study was 60 days starting from the middle of May.

Three measurements of BP were conducted in sitting position, with 1 min intervals between readings when the pulse rate was recorded. Certified Omron Healthcare and A&D BP machines were used in most of the sites. BP was calculated from the mean of the second and third readings, and hypertension was defined as a systolic BP (SBP) of ≥ 140 mmHg or a diastolic BP (DBP) ≥ 90 mmHg (or both). We considered hypertension patients to be receiving treatment if they reported currently using an antihypertensive medication and we regarded a BP less than 140/90 mmHg as indicating that the hypertension was controlled.

A questionnaire was used to collect a limited amount of additional data from each participant. The data collection was via App and on paper forms, which were transferred to spreadsheets. Data were cleaned and analysed centrally by the MMM project team.

Results

A total of 9199 individuals were screened of which 9186 had three BP measurements available. The mean age of screened individuals was 50 ± 16.7 , 57.3% was female; and 99.6% of participants were white. Of these, 972 (10.6%) participants reported having diabetes, 1112 (12.1%) reported a history of myocardial infarction (MI), and 656 (7.1%) reported a history of stroke. Of these, 2668 (29.0%) respondents were current smokers, 2230 (24.2%) reported alcohol consumption once or more per week. The mean body mass index of respondents was 27.3 kg/m^2 (Supplementary material online, *Table S1*).

Blood pressure was measured on the left arm in 5465 (59.4%) respondents. Of 9186 respondents with three BP readings, BP decreased on average by $2.3/1.8$ mmHg between the first and third readings (Supplementary material

online, *Table S2*). The mean values of the second and third readings were $127.9/80.2$ mmHg.

At the time of screening 17.9% (1649) was on antihypertensive medication. After imputation, the percentage of participants with hypertension was 33.9% (denominator 9199). The number of participants receiving treatment but with uncontrolled BP was 1269 (77% with denominator 1649) after imputation (Supplementary material online, *Table S3*).

After adjustment for age and sex, statistically significantly higher SBP and DBP were apparent in groups on BP-lowering treatment compared with those not on treatment. A statistically higher level of SBP was observed among people with diabetes, with a previous history of stroke, and among smokers compared with relevant comparator groups. Statistically significant higher levels of DBP were also observed, in those on treatment, with diabetes, previous MI, and smokers (Supplementary material online, *Figure S1*).

Statistically significant higher levels of SBP and DBP were observed among the overweight and obese participants (Supplementary material online, *Figure S2*).

After adjusting for age, sex, and antihypertensive medication, BP varied significantly by day of the week, with the highest values recorded on Saturdays and the lowest on Sundays (Supplementary material online, *Figure S3*).

Discussion

In response to the call of the MMM Program of the ISH and the Lancet Commission on Hypertension,⁶ Armenia joined the MMM initiative in 2017 (MMM17).

Before 2017, there were studies conducted to evaluate the prevalence, awareness and control of hypertension in the Armenian adult population.⁷⁻⁹ Some of the first data related to hypertension in Armenia came from a cross-sectional study conducted in 2004.⁷ The overall prevalence of hypertension was 27.4% in 748 observed citizens, and among hypertensives, only 61% were aware of their condition. The treatment rate was 64% among those who were aware. The hypertension control rate was only 8.8%. Another publication⁹ states almost the same prevalence and hypertension control rate in 2005 in spite of fact that the age group was not the same as in previous study⁷ (35-84 vs. 18-90 year olds). The prevalence was 28.8% (2961 observed), and control rate was 8.6% in age group 35-49 years old. The latest data related to hypertension is available in the Health system performance assessment 2016 report, where hypertension prevalence in >15 years old population was 28.6%.¹ The control rate is high in comparison to data of studies from 2004 to 2005, 29.7%.^{1,7,9}

At the time of MMM17 screening in this group of the Armenian population, about one-third (33.9%) had hypertension, and 52.9% of them were on antihypertensive medication. Of those treated, 77.0% were uncontrolled and did not achieve the goal of BP control.

The main limitations of this study include that, by design, they were not intended to be based on a representative sample and hence true prevalence of hypertension and

the proportions of hypertensives whose high BP is treated or controlled cannot be reported. Second, information about treatment was received from a question with a self-reported «yes-no» answer and we had no information about the frequency of use of medications. Consequently, the proportion of hypertensives being treated may have included those taking antihypertensive medications less than daily and this may have resulted in an underestimate of the proportion whose BP was controlled. Meanwhile, MMM17 was a massive BP screening campaign based on convenience sampling in Armenia.

Conclusion

In conclusion, we found that untreated and treated but uncontrolled hypertension is common in Armenia, which maybe an important contributor to the growing burden of NCDs. Since hypertension is the leading risk factor associated with morbidity and mortality from NCDs, greater efforts should be devoted to improving effective hypertension control.

Similarly, poor control rates among treated patients has important implications for medical and public health authorities and should be considered when formulating and implementing programmes for controlling hypertension, as well as for promoting a healthy lifestyle, as priority issues of the government agenda.

We believe that MMM is a handy and reasonably inexpensive tool to improve public awareness in the general population, and potentially among health policymakers, and to help thereby address the burden of disease caused by hypertension. It is hoped that MMM should continue on an annual basis as long as large numbers of people with increased BP can be identified and treated effectively.

Supplementary material

Supplementary material is available at *European Heart Journal - Supplements* online.

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