

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

Sabine Perl^{1,2*}, David Zweiker^{1,2}, Ella Niederl^{1,2}, Ewald Kolesnik^{1,2}, Gudrun Zweiker³, Elisabeth Kraler^{1,2}, Ingrid Stoff^{1,2}, Heinz Haberfeld⁴, Wolfgang Dichtl⁵, Christian Koppelstätter⁵, Karl Lhotta⁶, Herbert Ederer⁷, Csilla Putz-Bankutti⁸, Thomas Beaney⁹, Xin Xia⁹, Neil R. Poulter⁹, and Thomas Weber¹⁰

¹Division of Cardiology, Medical University Graz, Auenbruggerplatz 15, Graz, 8036, Austria;

²Austrian Society of Hypertension, Wels, Austria;

³General Practitioner, Straden, Austria;

⁴Österreichische Apothekerkammer, Spitalgasse 31, Wien, 1091, Austria;

⁵University Hospital Innsbruck, Anichstraße 35, 6020 Innsbruck, Austria;

⁶Hospital Feldkirch, Carinagasse 47, Feldkirch 6807, Austria;

⁷Primary Health Care Center, Weiz, 8160, Austria;

⁸Hospital Barmherzige Brüder, Bergstraße 27, Graz 8020, Austria;

⁹Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK; and

¹⁰Hospital Wels-Grieskirchen, Wels, Austria

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 programs worldwide. An opportunistic cross-sectional survey of volunteers aged ≥ 18 was carried out in May 2017. Blood pressure measurement, the definition of hypertension (HTN), and statistical analysis followed the standard MMM protocol. In total, 2711 individuals (58.6% female) were screened during MMM17 in 56 centres. After multiple imputation, 1704 (62.9%) had HTN ($\geq 140/90$ mmHg). Of individuals not receiving antihypertensive medication, 764 (43.2%) were hypertensive. Of individuals receiving antihypertensive medication, 597 (63.5%) had uncontrolled BP. MMM17 was one of the largest BP screening campaigns undertaken in Austria. A large number of undiagnosed hypertensives was found and connected to a therapeutic strategy. An alarming number of uncontrolled but treated hypertensives should attract the attention of doctors and health care system in Austria.

Introduction

Arterial hypertension (HTN) is one of the most common diseases in Austria and worldwide. Arterial HTN was shown to be the biggest contributor to the global burden of disease and to global mortality.^{1,2} Although arterial HTN is easy to diagnose and very clear strategies for lifestyle advice and antihypertensive therapy are provided,³ only a small number of hypertensive patients have their blood pressure (BP)

controlled.⁴⁻⁶ The low levels of awareness and poor screening for elevated BP seems to be an important contributing factor.⁴⁻⁶

To improve screening and awareness in Austria, the Austrian Society of Hypertension decided to join the May Measurement Month 2017 (MMM17).⁷

Methods

In May 2017, the cross-sectional survey MMM17 was initiated by the International Society of Hypertension (ISH). All

*Corresponding author. Tel: 0043 316 385 12544, Fax: 0043 316 385 13733, Email: sabine.perl@medunigraz.at

provided materials were translated into German and volunteer staff were recruited. Sites were set up in a wide range of locations, including public places, shopping malls, pharmacies, fitness centres, and primary and secondary health care facilities. Target participants were volunteer adults (≥ 18 years), who ideally had not had their BP measured in the previous year.

Following oral consent to participate in MMM17, participants were allowed a rest for 3–5 min. Meanwhile, they were asked to fill out a paper questionnaire including questions about epidemiology and the past medical history. Afterwards, three seated measurements were recorded by trained staff with automated devices. Intervals between measurements were 1 min. Blood pressure values were also recorded on the paper questionnaire.

Hypertension was defined as being on BP-lowering treatment or having a systolic BP ≥ 140 mmHg or a diastolic BP ≥ 90 mmHg or both; mean BP calculated from the second and third readings was used for analyses. In participants on treatment, controlled BP was defined as both a systolic BP < 140 mmHg and a diastolic BP < 90 mmHg. Individuals who had elevated BP were provided with printed evidence-based dietary and lifestyle advice and tailored to locally available facilities or included into a specific Austrian structured educational program for patients with HTN (Herz.Leben).⁸

Paper questionnaires were entered into a study specific internet based electronic case report form. Data cleaning and analyses were done centrally by the ISH, using Stata version 14.2. The mean of the second and third BP readings was used for the analyses. Linear regression models were run separately for systolic and diastolic BP.⁷

Results

A total of 2711 participants were measured in May 2017 in 56 centres in Austria. A complete list of centres can be found in the Appendix. Mean age of all participants was 54.8 ± 18.0 years and more women than men were screened—1588 (58.6%) were female. Ethnicity was almost exclusively white (99.3%). 940 (34.7%) of 2711 participants were on antihypertensive medication.

Of all screened persons, 168 (6.2%) reported having diabetes, 104 (3.8%) reported a history of myocardial infarction, and 85 (3.1%) reported a history of stroke. A total of 395 (14.6%) participants reported a history of smoking, 1934 (71.3%) reported alcohol consumption once or more per week, and 13 women reported being pregnant. The mean body mass index of all individuals was 25.6 ± 4.3 kg/m².

Of 2698 respondents with three BP readings, BP decreased on average by 3.9/1.7 mmHg between the first and third reading (Supplementary material online, *Table S1*).

After imputation, 1704 of 2711 participants (62.9%) had a systolic BP ≥ 140 and/or a diastolic BP ≥ 90 mmHg. A total of 764 (43.2%) participants out of 1771, who were not receiving antihypertensive treatment, were hypertensive. Among participants who were receiving antihypertensive medication, 597 (63.5%) out of 940 had uncontrolled BP.

After adjustment for age and sex, significantly higher systolic and diastolic BPs were seen in individuals receiving antihypertensive medication (Supplementary material online, *Figure S1*). Systolic and diastolic BPs were significantly lower in those with previous myocardial infarction, after adjusting for age, sex and antihypertensive treatment. Furthermore, systolic BP was shown to be significantly higher on the right arm compared to the left arm. A non-significant tendency to higher systolic BP was seen in participants with diabetes.

Systolic and diastolic BP increased with body weight, and was significantly higher in overweight and obese people compared to underweight people (Supplementary material online, *Figure S2*).

Finally, systolic and diastolic BPs were significantly higher on Saturdays (systolic BP difference 3.75 mmHg, diastolic BP difference 2.62 mmHg). Compared with Mondays, diastolic BP was also significantly higher on Fridays (BP difference 2.62 mmHg).

Discussion

The present study is one of the largest screening projects for HTN ever performed in Austria. During the study period, 2711 volunteers over 18 years of age had their BP measured. Out of them, 62.9% were found to have a BP equal or higher than 140/90 mmHg. Among screenees without known elevated BP, 43.2% (764 individuals) were newly detected with HTN. Furthermore, an alarmingly high number of participants were found to have uncontrolled HTN despite taking antihypertensive medication (63.5%).

Another Austrian screening study in pharmacies showed comparable results. In this study, patients who entered the pharmacy with a prescription for an antihypertensive agent had their BP measured by their pharmacists. Only 41% were shown to be normotensive (systolic BP < 140 mmHg and diastolic BP < 90 mmHg).⁹

In the European Study on Cardiovascular Risk Prevention and Management in Usual Daily Practice (EURIKA), a cross-sectional study conducted simultaneously in 12 European countries between May 2009 and January 2010, the prevalence of HTN in elderly patients (mean age 61.9 years) free from cardiovascular disease was 71.6% in Austria.¹⁰

In the current analysis, BP readings were higher from the right arm than from the left arm, in keeping with the global results.⁷

Participants with a history of myocardial infarction had a significantly lower BP than remaining patients, which might be explained by patients being closely monitored by medical specialists after myocardial infarction in Austria. There is also a non-significant trend seen towards lower BPs in participants with a history of stroke, which is not seen in the world-wide analysis.⁷ This may be due to a superior post-stroke care in patients with a history of cerebrovascular events in Austria.

There is no clear explanation regarding the variation in BP by day of the week, which is highest on Saturday and lowest on Wednesday, but may relate to higher alcohol intake at the weekend.

There are some limitations: although all volunteers were either very experienced or had received a detailed training how to measure BP correctly, environmental factors (such as heat and noise at the location) might have influenced the result of standardized BP measurements. This could have led to a proportion of participants receiving false-positive hypertensive BP readings. As the project was not planned as an epidemiological study but a screening project to raise awareness on high BP, it was not our intention to assess the exact prevalence of HTN in Austria. Instead, we tried to find people at high risk for arterial HTN to refer them to further exploration at their doctor's office and/or to give advice on lifestyle interventions.

To summarize, the number of uncontrolled BP readings in Austria was found to be among the highest in the world, although our country provides an excellent health care system free of charge. We think that further projects, which drive awareness on high BP, can help to get more people identified and controlled.

Appendix

List of centres as follows:

1. Austrian Society of Hypertension, Wels, Austria
2. Medical University Graz, Department of Cardiology, 8010 Graz, Austria
3. ProDoc Ärztezentrum Graz Eggenberg, 8020 Graz, Austria
4. Primary Health Care Center Weiz, Weiz, Austria
5. Österreichische Apothekerkammer, 1091 Wien, Austria, (Austrian Pharmacies St. Ruprecht, Weiz, Hartberg, Baden)
6. Gesundheitszentrum Lifestyle, Weiz, Austria
7. Dr. Gudrun Zweiker, Straden Austria
8. University Hospital Innsbruck, 6020 Innsbruck, Austria
9. Hospital Feldkirch, 6807 Feldkirch, Austria
10. Hospital Barmherzige Brüder, 8020 Graz, Austria
11. Dr. Michael Hirschl, Zwettl, Austria
12. Dr. Sabine Rumppler-Krainner, 8230 Hartberg, Austria

Supplementary material

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

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