

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

Marius Miglinas<sup>1,2\*</sup>, Violeta Ševčenko<sup>1</sup>, Aistė Račaitė<sup>1</sup>, Urtė Žakauskienė<sup>1,2</sup>,  
Alvita Vickienė<sup>1,2</sup>, Vilma Miglinė<sup>3</sup>, Wei Wang<sup>4</sup>, Thomas Beaney<sup>4,5</sup>,  
Neil R. Poulter<sup>4</sup>, and Ernesta Macionienė<sup>1,2</sup>

<sup>1</sup>Institute of Clinical Medicine, Faculty of Medicine, Vilnius University, Universiteto g. 3, Vilnius LT-01513, Lithuania; <sup>2</sup>Nephrology Center, Vilnius University Hospital Santaros Klinikos, Santariskiu g. 2, Vilnius LT-08661, Lithuania; <sup>3</sup>Community Well-Being Center, Mykolas Romeris University, Ateities g. 20, Vilnius LT-08303, Lithuania; <sup>4</sup>Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK; and <sup>5</sup>Department of Primary Care and Public Health, Imperial College London, St Dunstan's Road, London W6 8RP, UK

## KEYWORDS

May Measurement Month;  
Hypertension;  
Screening;  
Treatment;  
Control;  
Pharmacies

In 2017, Lithuania joined the global May Measurement Month (MMM) campaign which aims at raising awareness of raised blood pressure worldwide. Presented here are the data arising from the 2017, 2018, and 2019 campaigns. An opportunistic cross-sectional survey of individuals aged  $\geq 18$  years was carried out in Lithuania in 2017, 2018, and 2019. Two thousand nine hundred and nineteen participants were recruited in the MMM campaigns in response to the media engagement and interactions with the study team. The mean age of participants was 46.1 years (SD 16.3) years, 58.9% were females. Blood pressures were measured using electronic devices provided by Omron according to the MMM protocol. Of the 2919 screened participants, 1308 (44.8%) had hypertension. Of all hypertensive participants, the awareness rate, the treatment rate, and the control rates ( $<140/90$  mmHg) were 79.5%, 41.0%, and 14.2%, respectively. Of those on antihypertensive medication, the control rate was 34.8%. The high percentage of participants with hypertension was either untreated (59.0%) or treated but uncontrolled (65.2%) suggests the usefulness of such screening programmes to improve awareness of hypertension control in Lithuania.

## Introduction

Cardiovascular disease (CVD) is the leading cause of death in Lithuania. It accounted for 52.7% of all deaths in 2020 (9.8% more than in 2019).<sup>1</sup> Mortality from coronary heart disease is the highest among EU countries (34.9%), exceeding the EU average by four-fold. Mortality from stroke accounts for 13% of all deaths.<sup>2</sup> The prevalence of kidney disease reaches up to 7% of the adult population.<sup>3</sup> Recent changes in the *ESC Guidelines on cardiovascular disease prevention in*

*clinical practice* demonstrate the complexity of the situation.<sup>4</sup> Lithuania has climbed a step higher in 2021 becoming one of the very high-risk countries for CVD.<sup>5</sup>

Cardiovascular, cerebrovascular and renal mortality and morbidity is mostly related to clinical risk factors, including high blood pressure (BP), dyslipidaemia, smoking, overweight, or diabetes. According to Lithuanian nationwide data, age-adjusted mean BP in the population increases over time.<sup>6</sup> The recent Health Interview Survey 2019 showed that 30% of the population (women, 33%; men, 26%) had arterial hypertension and that the prevalence of arterial hypertension increased by 2% from 2014 to 2019 both in males and females.<sup>3</sup> A large-scale middle-aged population primary prevention program

\*Corresponding author. Tel: +37068782579, Fax: +37052365111, Email: [marius.miglinas@santa.lt](mailto:marius.miglinas@santa.lt)

**Table 1** Total participants and percentages 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
2919	44.8	79.5	41.0	34.8	14.2

(LitHiR) suggested a 52.9% prevalence of hypertension.<sup>7</sup> Low physical activity, high alcohol consumption<sup>6</sup> and high salt intake<sup>8</sup> have been identified as the most important contributors to arterial hypertension in Lithuania. Overall, middle-aged subjects in Lithuania show a high-risk profile: almost nine out of 10 have established dyslipidaemia, every second one has established arterial hypertension, and four out of 10 are obese.<sup>7</sup>

These data suggest an urgent need for better management of arterial hypertension and other risk factors to improve outcomes. Thus, the May Measurement Month (MMM) initiative has had strong support from the Lithuanian Society of Hypertension, which ran campaigns in 2017, 2018, and 2019. The campaign provides non-invasive, inexpensive and a fast way to detect individuals who need specialist consultation and further examination for cardiovascular pathology. In addition, MMM helps to educate the public and raise awareness about the importance of BP measurement and hypertension. The first author of this article (M.M.) is a National MMM coordinator and President of the Lithuanian Society of Hypertension.

## Methods

This publication provides the Lithuanian data of MMM 2017, 2018, and 2019. The study was approved by the Lithuanian Bioethics Committee (158200-18/5-1038-534 and 2019/4-1122-614) and was carried out under the principles of the Declaration of Helsinki. Over 20 community-based screening sites were set-up and included public events, primary and secondary care facilities, public health centers, workplaces, and pharmacies. One screening site was set-up in the Parliament of the Republic of Lithuania in 2017. Lithuanian Society of Hypertension recruited and trained site leader physicians and assistants. All three MMM campaigns started in May and lasted for approximately 50 days, there was limited funding from pharmaceutical companies. MMM activities were endorsed by the Lithuanian Society of Hypertension and promoted in the mass media, newspapers, social networks, and by word of mouth. Upper arm cuff devices kindly donated by OMRON were used for BP measurement. BP was screened on individuals aged 18 years and older. Hypertension was defined as systolic BP  $\geq 140$  mmHg or diastolic BP  $\geq 90$  mmHg, or both, or on the basis of receiving antihypertensive medication. BP was measured three times after 5 min of rest in the seated position. Awareness and screening site type were only recorded in 2018 and 2019. Data were collected using the MMM App/excel file or hard copy. The data were transferred and analysed centrally by the MMM project management team. Multiple imputation was performed to impute the mean of readings two and three where this was missing, based on remaining available global MMM data.<sup>9,10</sup> Linear regression

was used to measure the associations between systolic and diastolic BP with participant risk factors.

## Results

In total, 2919 adults were screened in the three years of the MMM campaigns in Lithuania: 2019, 378 and 522 in the MMM 2017, MMM 2018 and MMM 2019, respectively. The mean age of participants was 46.1 years (SD 16.3). In total, 58.9% were woman and 39.2% were men; 30.8% of participants were white, 69.2% were identified as unknown; 5.7% of participants were taking aspirin while 10.7% were taking statins from the 2019 data. Of the combined screenees, following multiple imputation, 1308 (44.8%) individuals had hypertension, and 41.0% of those reported using antihypertensive treatment. Of 536 participants on medication, 34.8% had controlled BP ( $<140/90$  mmHg). Of all those who were hypertensive, 14.2% had controlled BP. Of 372 participants with hypertension in the 2018 and 2019 data, when awareness was collected, 79.5% were aware of their condition (Table 1). Of those screened in 2018 or 2019, 141 (15.7%) had never had their BP measured. Among associations of participant factors with mean BP from linear regression in the 2018 and 2019 data, participants who were fasting during the MMM period showed significantly higher systolic and diastolic BP (3.2 mmHg,  $P < 0.03$ ; 2.8 mmHg,  $P < 0.001$ ). Participants who were obese also had significantly higher mean systolic and diastolic BP than those of a healthy weight (6.0 mmHg,  $P < 0.001$ ; 3.0 mmHg,  $P < 0.001$ ).

## Discussion

The Health Interview Survey 2019 in Lithuania estimated a national prevalence of hypertension of 30%.<sup>11</sup> Results from MMM 2017, 2018, and 2019 confirmed a high percentage of hypertension in Lithuania. Almost half (44.8%) of our participants had hypertension. The higher hypertension percentage observed in MMM 2017/2018/2019 can be explained by the older age group of those screened and sampling of MMM, some of which were performed in health care facilities. Interestingly, the majority (79.5%) of hypertensive participants were aware of their hypertension. Two-fifths (41%) of hypertensives were on treatment but only about one-third (34.8%) of those on treatment had controlled BP. In addition, amongst all those with hypertension, less than a fifth (14.2%) had controlled BP. Overall, Lithuanian MMM data show a similar proportion of hypertensives compared with overall European data (44.8% vs. 43.6%) and

similar levels of awareness (79.5% vs. 71.5%) However, those who were identified as hypertensive in Lithuania had significantly lower levels of BP control when taking antihypertensive medication(s) (34.8% vs. 47.9%).<sup>7</sup> Lithuanian MMM data are in line with regional MMM reports from Poland and Hungary, where 55.4% and 46.5% of participants were found to have hypertension. However, a larger proportion of treated individuals had uncontrolled hypertension in Lithuania compared with Poland and Hungary.<sup>12,13</sup> This indicates a low health literacy and ineffective therapy, possibly involving improperly selected regimens and doses or poor medication adherence.

There were some limitations in interpreting the results of the MMM screening campaign because the subjects were selected in a non-random manner and therefore the samples are not representative of the country as a whole. However, the MMM screening campaign shows large proportions of participants with untreated and uncontrolled hypertension. It poses a challenge for Lithuania's healthcare system. Comprehensive interventions are needed to improve awareness of high BP, the associated risks, and control of hypertension in Lithuania.

In conclusion, MMM results will assist policy makers and other public health stakeholders in designing strategies to identify raised BP and improve BP control rates in Lithuania and could help offset the burden of high BP on the health system.

## Acknowledgments

The authors would like to thank Lauryna Pranė, Ieva Kašauskaitė-Petrauskienė, Audronė Leleikienė, Laura Bielskė, Asta Valatkevičienė, Loreta Vareikienė, Sigita Anisko, Ilona Rudminienė, Diana Sukackienė, Agnė Laučytė-Cibulskienė, Miglė Gudynaitė, Karolis Pilvenis, Laurynas Rimševičius, Ugnė Čėsnienė, Indrė Maliukevičiūtė, Roberta Staučė, Jurgita Brauklytė, Artūras Vinikovas, Marta Monika Janušaitė, Eleonora Avižienytė, Karolina Bagdonavičiūtė, Emilija Biekšaitė and all local investigators, volunteers, and the Lithuanian Society of Hypertension to support the campaign.

## Funding

Financial support of the project was ensured by the Lithuanian Society of Hypertension and pharmaceutical companies.

**Conflict of interest:** None declared.

## Data availability

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

## References

- Causes of death 2020. Health information Centre of the Institute of Hygiene, Vilnius; 2021. Available from: [https://stat.hi.lt/default.aspx?report\\_id=259](https://stat.hi.lt/default.aspx?report_id=259). Last accessed on 5th of January, 2022
- OECD/European Observatory on Health Systems and Policies (2021), Lithuania: Country Health Profile State of Health in the EU, OECD Publishing, Paris. Available from: [https://www.oecd-ilibrary.org/social-issues-migration-health/lithuania-country-health-profile-2021\\_20b64b36-en](https://www.oecd-ilibrary.org/social-issues-migration-health/lithuania-country-health-profile-2021_20b64b36-en). Last accessed on 5th of January, 2022.
- Digital publication Health of Population of Lithuania, ISSN 2669-1566. Statistics Lithuania, 2020. Available from: <https://osp.stat.gov.lt/en/lietuvos-gyventoju-sveikata-2020/kai-kuriu-letiniu-ligu-ir-bukliu-paplitimas>. Last accessed on 5th of January, 2022.
- Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, Benetos A, Biffi A, Boavida JM, Capodanno D, Cosyns B, Crawford C, Davos CH, Desormais I, Di Angelantonio E, Franco OH, Halvorsen S, Hobbs FDR, Hollander M, Jankowska EA, Michal M, Sacco S, Sattar N, Tokgozoglul L, Tonstad S, Tsioufis KP, van Dis I, van Gelder IC, Wanner C, Williams B; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur J Prev Cardiol* 2022;29:5-115. PMID: 34558602.
- Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, Benetos A, Biffi A, Boavida JM, Capodanno D, Cosyns B, Crawford C, Davos CH, Desormais I, Di Angelantonio E, Franco OH, Halvorsen S, Hobbs FDR, Hollander M, Jankowska EA, Michal M, Sacco S, Sattar N, Tokgozoglul L, Tonstad S, Tsioufis KP, van Dis I, van Gelder IC, Wanner C, Williams B; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice: Developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies With the special contribution of the European Association of Preventive Cardiology (EAPC). *Eur Heart J* 2021;42:3227-3337.
- Tamosiunas A, Klumbiene J, Petkeviciene J, Radisauskas R, Vikhireva O, Luksiene D, Virviciute D. Trends in major risk factors and mortality from main non-communicable diseases in Lithuania, 1985-2013. *BMC Public Health* 2016;16:1-10.
- Laucevičius A, Rinkūnienė E, Skorniakov V, Petruilionienė Z, Kasilevičius V, Jatužis D, Rylškytė L, Badariėnė J, Klumbienė J, Slapikas R, Kizlaitis R. Steering Committee of the LitHiR programme. High-risk profile in a region with extremely elevated cardiovascular mortality. *Hellenic J Cardiol* 2013;54:441-447.
- Zakauskienė U, Macioniene E, Sukackiene D, Bratickoviene N, Karosiene D, Linkeviciute A, Banys V, Zabuliene L, Miglinas M. Sodium, potassium and iodine consumption of the Lithuanian population estimated by 24-hour urine collection. *BMC Cardiovasc Disord* 2022. submitted.
- Beaney T, Schutte AE, Stergiou GS, Borghi C, Burger D, Charchar F, Cro S, Diaz A, Damasceno A, Espeche W, Jose AP, Khan N, Kokubo Y, Maheshwari A, Marin MJ, More A, Neupane D, Nilsson P, Patil M, Prabhakaran D, Ramirez A, Rodriguez P, Schlaich M, Steckelings UM, Tomaszewski M, Unger T, Wainford R, Wang J, Williams B, Poulter NR, on behalf of MMM Investigators. May Measurement Month 2019: the global blood pressure screening campaign of the International Society of Hypertension. *Hypertension* 2020;76:333-341.
- Beaney T, Burrell LM, Castillo RR, Charchar FJ, Cro S, Damasceno A, Kruger R, Nilsson PM, Prabhakaran D, Ramirez AJ, Schlaich MP, Schutte AE, Tomaszewski M, Touyz R, Wang JG, Weber MA, Poulter NR; MMM Investigators. May Measurement Month 2018: a pragmatic global screening campaign to raise awareness of blood pressure by the International Society of Hypertension. *Eur Heart J* 2019;40(25):2006-2017. Erratum in: *Eur Heart J*. 2019 Oct 1; 40(37):3109. PMID: 31041440; PMCID: PMC6600128.
- OECD/European Observatory on Health Systems and Policies. *Lithuania: Country Health Profile 2019, State of Health in the EU*. Paris/Brussels: OECD Publishing/European Observatory on Health Systems and Policies; 2019. Available from: [https://read.oecd-ilibrary.org/social-issues-migration-health/lithuania-country-health-profile-2019\\_35913deb-en](https://read.oecd-ilibrary.org/social-issues-migration-health/lithuania-country-health-profile-2019_35913deb-en). Last accessed on 5th of January, 2022
- Sęk-Mastej A, Banach M, Mastej M, Jankowski P, Małyszko J, Filipiak KJ, Nowicki MP, Tomasik T, Windak A, Olszanecka A, Tomaszewski M. May Measurement Month 2019: an analysis of blood pressure screening results from Poland. *Eur Heart J Suppl* 2021;23:B124-B127.
- Nemcsik J, Páll D, Nemes-Nagy Z, Bacskai M, Kovács T, Benczúr B, Kiss A, Ábrahám G, Barna I, Beaney T, Clarke J. May Measurement Month 2019: an analysis of blood pressure screening results from Hungary. *Eur Heart J Suppl* 2021;23:B70-B72.