

Hypertension in the Polish elderly: Insights into prevalence, awareness, treatment, and control from the NOMED-AF study

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ABSTRACT

Background: Hypertension is a significant global health issue, disproportionately affecting the elderly population. In Poland, the rapid aging of the population underscores the need for updating data on the epidemiology of hypertension in the elderly.

Aims: This study aimed to investigate the prevalence, awareness, treatment, and control of hypertension among individuals aged 65 and older in Poland.

Methods: The NOMED-AF study, a cross-sectional survey conducted from March 2017 to March 2018, enrolled a representative sample of 3014 participants aged 65 and over, using a multistage, stratified, and clustered sampling method. Data collection included standardized questionnaires and physical measurements carried out by trained nurses. Hypertension was diagnosed per the 2018 European Society of Hypertension/European Society of Cardiology guidelines.

Results: The study showed a hypertension prevalence of 82.5% in females and 78.3% in males aged 65 and older. Awareness of hypertension was high across all age and sex groups, with 86.2% of women and 83.4% of men being aware of their condition. Treatment rates were 84.8% in women and 80.5% in men. Optimal control of blood pressure among those treated was achieved in 40.3% of women and 45.6% of men. Women over 80 achieved optimal blood pressure control less frequently than men.

Conclusions: The results highlight the high prevalence and suboptimal control of hypertension in Poland's elderly population, pointing to a significant public health challenge. Despite high rates of treatment, management of hypertension remains inadequate, which emphasizes the need for enhanced strategies in hypertension care, particularly for elderly women.

Key words: blood pressure control, elderly, epidemiology, hypertension, Poland

INTRODUCTION

Hypertension, or high blood pressure (BP), is a prevalent health issue that affects nearly a third of the adult population worldwide [1]. In 2017, it contributed to 10.4 million deaths and 218 million disability-adjusted life-years globally [2]. The prevalence of hypertension increases with age, affecting over 60% of individuals aged 60 years and older [3]. Poor

control of BP can lead to a multitude of health issues, including stroke, heart attack, heart failure, valvular heart disease, peripheral artery disease and aortic syndromes, kidney disease, and cognitive decline [4–12].

In Poland, it is crucial to understand the prevalence, awareness, and control of hypertension, especially in the elderly population, due to the rapid aging of the population.

WHAT'S NEW?

Our research provides insight into hypertension management in Poland's elderly population, emphasizing its growing prevalence, especially in individuals over 80, which surpasses prior estimates. Notably, while awareness and treatment of hypertension are commendably common, optimal control of the condition remains unsatisfactory for a significant portion of the treated population. This challenge is particularly pronounced among elderly women, who, despite being the most treated-for-hypertension demographic, show suboptimal control rates. Our findings suggest a pressing need for targeted interventions to enhance hypertension management in this vulnerable group, potentially involving more effective treatment strategies, patient education, and adherence support. These insights not only contribute to a deeper understanding of the impact of hypertension on the elderly in Central and Eastern Europe but also underline the importance of tailored approaches to managing chronic conditions within aging societies.

However, current knowledge of the epidemiology of hypertension in the Polish elderly population remains limited.

Our study aimed to address this gap by investigating the prevalence, awareness, and management of hypertension in elderly patients in Poland between 2017 and 2018.

METHODS

The NOMED-AF study lasted from March 2017 to March 2018. It was approved by the Local Bioethical Committee of the Silesian Medical Board (26/2015) and adhered to the Declaration of Helsinki. The study was registered on ClinicalTrials.gov (NCT03243474), and details about its design were previously published [13]. Respondents provided written informed consent to participate in the study.

Participant selection involved a multi-stage, stratified, and clustered sampling approach. The study sample consisted of 3014 randomly chosen individuals, and a weighted oversampling of older age groups was employed to ensure accurate estimates. All presented data were weighted to reflect the demographic structure (age and sex) of the Polish society in 2017. The exact sampling procedure was described previously [14].

During 3 visits (on day 1, day 10, and day 30 of the study), BP readings were obtained three times using a validated A&D UA 787 Plus fully automatic oscillometric BP monitor. The readings were taken from the participants' right upper arm while seated and at intervals of 2 minutes after a resting period of at least 5 minutes. The average heart rate and BP values were recorded with an accuracy of 1 bpm and 1 mm Hg, respectively. To assess average BP, the first and second measurements from the first and third visits were used. Hypertension was diagnosed according to the 2018 European Society of Hypertension/European Society of Cardiology guidelines [15] and the 2023 European Society of Hypertension guidelines [16]. These guidelines require an average BP to be equal to or higher than 140 mm Hg (systolic blood pressure [SBP]) and/or 90 mm Hg (diastolic blood pressure [DBP]) during two separate visits. Patients taking hypotensive drugs for 2 weeks before the measurements also met the criteria. Controlled hypertension was defined as a mean SBP of less than 140 mm Hg and a DBP of less than 90 mm Hg in patients with arterial hypertension (AH).

In addition to the physical measurements, laboratory tests, and a questionnaire survey were conducted to gather information on participants' awareness of AH and comorbidities. To evaluate awareness of hypertension, participants' response to the following question was recorded: "Has a doctor ever diagnosed you with hypertension?". Diabetes mellitus was diagnosed based on medical records, a glycated hemoglobin level higher than 6.5%, or confirmation of the diagnosis by the patient who reported taking antidiabetic medications in the prior 2 weeks. Hypercholesterolemia was identified based on a total cholesterol level of at least 190 mg/dl and/or use of lipid-lowering therapy in the prior 2 weeks. Heart failure diagnosis was confirmed through medical records or the patient's confirmation of the diagnosis. A history of cardiovascular disease and interventions, such as percutaneous coronary intervention or coronary artery bypass grafting, was established based on the patient's medical records or their declaration. The diagnosis of ischemic stroke relied on medical records. Chronic kidney disease was identified based on medical records or a glomerular filtration rate less than 60 ml/min/1.73 m², or a glomerular filtration rate higher than 60 ml/min/1.73 m² accompanied by a urine albumin-to-creatinine ratio of 30 mg/g or more. To assess the thromboembolic risk, the CHA₂DS₂-VASc score was calculated for each participant based on the data provided by respondents as described above.

Statistical analysis

Continuous variables were presented as means and standard deviations, and for non-normally distributed data, medians along with interquartile ranges; the first (Q1) and third (Q3) quartiles were reported. Categorical data were expressed as numbers and percentages. The χ^2 test was used for analysis of categorical data. The normality of distribution for continuous variables was confirmed using the Kolmogorov–Smirnov test. To compare the mean of normally distributed variables, Student's t-test was employed. For non-normally distributed variables, the Mann–Whitney U test was used. The results for the entire population of elderly Polish adults and for two main age groups (65–79 years old and 80 years and older) were weighted to account for respondents' age, sex, and place

Table 1. Study participants' characteristics

Characteristics and comorbidities of the study population					
		All	Hypertensives (HT)	Normotensives (NT)	P-value
Females	% (95% CI)	60.6 (59–62.3)	61.9 (60.0–63.7)	55.3 (51.2–59.3)	0.003
Age	Mean (95% CI)	74.6 (74.4–74.9)	75.0 (74.7–75.3)	73.1 (72.5–73.7)	<0.001
Arterial hypertension	% (95% CI)	80.9 (79.4–82.2)	100%	–	
Atrial fibrillation	% (95% CI)	19.2 (17.9–20.5)	20.6 (19.2–22.2)	12.9 (10.5–15.8)	<0.001
BMI, kg/m ²	Mean (95% CI)	28.3 (28.1–28.5)	28.8 (28.6–29)	26.4 (26–26.7)	<0.001
Diabetes	% (95% CI)	28.2 (26.7–29.9)	32.6 (30.7–34.6)	9.8 (7.9–12.1)	<0.001
Hypercholesterolemia	% (95% CI)	79.7 (78.3–81.1)	79.7 (78.1–81.2)	79.8 (76.6–82.6)	0.96
Smoking	% (95% CI)	14.1 (12.8–15.5)	11.9 (10.5–13.3)	23.6 (20.0–27.7)	<0.001
Heart failure	% (95% CI)	17.5 (16.2–18.9)	19.5 (18.0–21.2)	9.0 (7.2–11.1)	<0.001
Chronic coronary syndrome or acute coronary syndrome or PTCA or CABG or PAD or stroke	% (95% CI)	41.5 (39.7–43.3)	45.2 (43.1–47.4)	25.7 (22.4–29.3)	<0.001
Chronic kidney disease	% (95% CI)	27.6 (26.1–29.1)	29.8 (28.0–31.6)	18.4 (15.8–21.2)	<0.001
Ischemic stroke	% (95% CI)	6.2 (5.5–7.1)	6.6 (5.8–7.6)	4.5 (3.0–6.7)	0.12
CHA ₂ DS ₂ -VASc Score	Median (IQR)	4.0 (2.0)	4.0 (2.0)	2.0 (1.0)	0.20

Abbreviations: BMI, body mass index; CABG, coronary artery bypass graft; CI, confidence interval; IQR, interquartile range; PAD, peripheral artery disease; PTCA, percutaneous transluminal coronary angioplasty

of residence. This was done to reflect the structure of the Polish population in 2017. In-depth data on hypertension prevalence, treatment, and control were analyzed in five-year age groups, separately for women and men; these age-group results were not weighted. The 95% confidence intervals (CI) were reported. A *P*-value of less than 0.05 was deemed statistically significant.

RESULTS

The study group had a weighted average age of 74.6 years and a crude average of 77.5 years. Participants were divided into 6 age brackets: 65–69, 70–74, 75–79, 80–84, 85–89, and 90 or older. The number of women and men in each age group were, respectively, 281, 325, 268, 273, 195, 135 and 291, 307, 317, 255, 247, 118. Hypertensive participants were significantly more often burdened with atrial fibrillation, increased body mass index, diabetes, heart failure and cardiovascular diseases, and chronic kidney disease (Table 1). Rates of hypertension prevalence, awareness, treatment, and control according to sex and age are provided in Table 2. Supplementary data provide detailed results for 5-year subgroups (Supplementary material, Tables S1 and S2).

For all participants aged 65 or older, mean BP was: 142.5 mm Hg SBP in women (95% CI, 141.6–143.5 mm Hg) and 141.1 mm Hg SBP in men (95% CI, 140.2–142.1 mm Hg); 79.3 mm Hg DBP in women (95% CI, 78.7–79.8 mm Hg) and 77.6 mm Hg DBP in men (95% CI, 77.0–78.1 mm Hg). Mean SBP did not differ significantly between sexes for participants under 80 but was higher in women compared to men for those aged 80 and older. DBP decreased with age and was significantly lower in males than in females.

Hypertension prevalence was 82.5% in females (95% CI, 80.6%–84.5%) and 78.3% in males (95% CI, 76.0%–80.4%). The prevalence increased significantly in women aged 80 and older in comparison to those aged 65–79 years (90.5% and 79.1%, respectively; *P* < 0.001), while it re-

mained relatively stable in men regardless of their age. Hypertension awareness was high across all age and sex groups, with 86.2% (95% CI, 84.1%–88.0%) of women and 83.4% (95% CI, 81.1%–85.4%) of men being aware of their condition. Treatment rates for hypertension were also high, with 84.8% of women (95% CI, 82.7%–86.8%) and 80.5% of men (95% CI, 78.2%–82.6%) receiving treatment. Proper control of AH (BP < 140/90 mm Hg) was observed in 37.9% of women (95% CI, 35.3%–40.7%) and in 40.8% of men (95% CI, 37.8%–43.9%). Among those treated, 40.3% of women (95% CI, 37.4%–43.4%) and 45.6% of men (95% CI, 42.4%–48.9%) had well-controlled hypertension. Women over 80 achieved optimal blood control significantly less often than men.

DISCUSSION

The prevalence of hypertension in the elderly population in Poland is significant, as highlighted by our findings. According to data from the Polsenior survey conducted between 2007 and 2011, the estimated prevalence of hypertension in the adult Polish population aged 65 years or more was 70.1% in men and 78.2% in women [17]. Our study indicates an increase in hypertension prevalence in elderly patients in Poland, with a shift towards people over 80 compared to septuagenarians in the Polsenior study. Although unsatisfactory, a noticeable increase in BP control in treated individuals is also noteworthy (31%–38% in the Polsenior study and 40%–45% in NOMED-AF).

Treating hypertension in older adults, especially those over 80, is a complex issue that requires careful consideration of the potential benefits and risks of treatment. Research shows that lowering BP in older adults may reduce not only the rate of cardiovascular events but also all-cause mortality [18]. Our results suggest that in Poland this is particularly important for elderly women. This group has the highest prevalence of hypertension and is most frequently receiving treatment for hypertension. However, only one in

Table 2. Mean systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse rate, and pulse pressure. Prevalence, awareness, treatment, and control of hypertension

Blood pressures and heart rate in the NOMED-AF study participants					
	Women		Men		P-value
SBP, mm Hg					
65–79 years	141.1 (140.0–142.3)		141.7 (140.5–142.8)		0.47
≥80 years	145.8 (144.2–147.4)		139.4 (137.9–140.9)		<0.001
DBP, mm Hg					
65–79 years	80.3 (79.7–81.0)		78.8 (78.2–79.5)		<0.001
≥80 years	76.9 (76.1–77.8)		72.9 (72.2–73.7)		<0.001
Pulse rate, bpm					
65–79 years	71.2 (70.5–71.9)		70.5 (69.9–71.1)		0.06
≥80 years	70.7 (69.9–71.5)		68.6 (67.9–69.2)		0.002
Pulse pressure, mm Hg					
65–79 years	60.8 (59.8–61.8)		62.8 (62.0–63.7)		0.002
≥80 years	68.9 (67.5–70.3)		66.5 (65.3–67.7)		0.08
Hypertension prevalence in the NOMED-AF study participants					
	Women		Men		P-value
Prevalence	%	95% CI	%	95% CI	
65–79 years	79.1	76.5–81.4	78.1	75.3–80.6	0.59
≥80 years	90.5	88.2–92.4	79.0	75.6–82.0	<0.001
Awareness, treatment, and control of hypertension (blood pressure <140/90 mm Hg) in the NOMED-AF study participants					
	Women		Men		P-value
Awareness	%	95% CI	%	95% CI	
65–79 years	85.7	82.9–88.1	83.6	80.9–86.0	0.26
≥80 years	87.2	84.2–89.6	82.4	79.0–85.3	0.02
Treatment	%	95% CI	%	95% CI	
65–79 years	84.0	81.0–86.5	80.5	77.7–83.0	0.08
≥80 years	86.6	83.6–89.1	80.6	77.1–83.7	0.006
Control (all participants with hypertension)	%	95% CI	%	95% CI	
65–79 years	39.4	35.9–43.0	39.9	36.2–43.6	0.86
≥80 years	35.1	31.0–39.3	44.4	40.7–48.2	0.001
Control (all treated hypertensives)	%	95% CI	%	95% CI	
65–79 years	42.6	38.8–46.4	45.1	41.0–49.2	0.35
≥80 years	35.9	31.5–40.6	47.3	43.4–51.4	<0.001

Abbreviations: bpm, beats per minute; CI, confidence interval

three female patients achieve proper control rates. Similar findings have been described in the most recent NHANES study results, where a decline in BP control was noted in American women and adults over 75 in the years 2009–2012 and 2017–2018 [19]. The reason is not clear. A cohort study analyzing prescription data has found that 22.9% of women had poor adherence to hypertension treatment with contributing factors including multimorbidity, use of fewer classes of antihypertensive medications, and depressive symptoms [20]. This insufficient BP control in women could lead to further sex-associated health disparities. The link between elevated BP and the likelihood of a stroke or heart failure is more pronounced in women than in men, as observed in both the Original Framingham Heart Study and the Framingham Offspring Study [21–23]. Intensive efforts are therefore necessary to improve hypertension control, especially in older women.

Our study is one of a few large, population-based, and cross-sectional studies in Central and Eastern Europe

on the epidemiology of hypertension in older people, including those over 80. Data from Central and Eastern Europe is scarce and mainly focuses on the 65–79 age group. The SEPHAR III study (2016) [24] reported a rate of hypertension prevalence of 75.1% and a control rate of 17.8% in respondents aged 65–79 in Romania. The Hungarian ABPM Hungary Registry (2021–ongoing) [25] recently published data on hypertension epidemiology in adults aged 18–100 years, suggesting a hypertension prevalence of 69% and a control rate of approximately 32% in the general population. Conversely, the DEGS1 study (2008–2011) reported a hypertension prevalence of 71% in patients aged 65–79 in Germany, with proper hypertension control achieved in 71.0% of treated men and 67.8% of treated women [26]. The more recent KORA-Age 1 study reported a prevalence of hypertension of 73.8% and a proper BP control rate of 53.7% in Germans aged 65–94 [27]. According to a 2023 meta-analysis of 112 cohort studies [28], high SBP is the leading risk factor for cardiovascular

disease and death worldwide, with the greatest impact observed in Central and Eastern Europe. The disparity in achieving optimal BP control between Eastern and Western Europe is concerning, especially considering that hypertension can double or triple the risk of stroke in patients with concurrent atrial fibrillation, a condition that affects 19.2% of the population aged 65 years or older according to the findings of the NOMED-AF study [14].

The strengths of our study include a large, nationally representative dataset and accurate clinical measurements taken by trained nurses. BP was meticulously measured using optimal techniques, including selecting a correct cuff size based on the arm circumference. Additionally, a weighted analysis compensated for the clustered sampling approach, enhancing the accuracy of the hypertension prevalence estimates. Despite our study's comprehensive nature, several limitations must be acknowledged. The overall response rate was 44%, which may be partly due to the NOMED-AF study's intricate and lengthy processes involving questionnaires and physical assessments across 3 home visits. Additionally, focusing on the geriatric demographic resulted in a significant number of participants opting out. Therefore, while we attempted to ensure representativeness, our findings may not fully capture the nuances of hypertension prevalence and control in the entire elderly population due to potential selection bias in participant recruitment.

In conclusion, our study underscores the high prevalence and suboptimal control of hypertension in the elderly population in Poland. Despite notable levels of awareness and treatment, the effectiveness of hypertension management remains inadequate. This highlights the need for improved prevention and treatment approaches, such as adopting single-pill combination therapies, intensifying dosage without unnecessary delays, and improving patient education for more effective hypertension management.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

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