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REVIEW

Effectiveness of treatment of arterial hypertension in Central Europe from 1972 to 2022

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ABSTRACT

BACKGROUND: Hypertension is a leading cause of cardiovascular disease. This review examines the literature on hypertension control in the Czech Republic from 1972 to 2022 addressing limited data on its effectiveness.

METHODS: A literature review was conducted covering the period from 1972 to 2022, utilizing MEDLINE (PubMed), Web of Science, and Scopus databases. Articles were selected based on title and abstract evaluations, with full-text reviews performed as needed. Thirteen studies involving 44,990 participants were included in this review.

RESULTS: Control rates increased from 2.8% (men) and 5.2% (women) in 1985 to 32.3% (men) and 37.4% (women) from 2015 to 2018. Women showed better blood pressure control. Specialised centres achieved higher success (48%) than general practitioners (18.4%). Diabetic patients had a lower percentage (29.1%) of patients meeting their target values (<130/80 mmHg) compared to non-diabetic patients, who had a higher percentage (60.6%) meeting their target values (<140/90 mmHg).

CONCLUSION: Hypertension treatment success rate in the Czech Republic improved significantly over the last 50 years and is currently comparable to that of other European countries with similar healthcare resources. However, it still remains suboptimal and lags behind the countries with the most successful treatment outcomes *(Tab. 3, Fig. 1, Ref. 37)*. Text in PDF *www.elis.sk*

KEY WORDS: hypertension, treatment, effectiveness, Czech Republic, blood pressure.

Introduction

Hypertension is a leading risk factor for all clinical manifestations of atherosclerosis, including coronary heart disease, stroke, peripheral arterial disease, and heart failure. Cardiovascular disease is the major cause of death in the Czech Republic, accounting for 45.0% of all deaths (1). Although hypertension control rates have improved significantly worldwide in the past 50 years, especially in high and middle-income countries, they are still suboptimal in most countries (2). This review aims to analyse the literature on hypertension control rates in the Czech Republic in the past 50 years as no such review exists yet. Before 1989 the Czech Republic was part of the Czechoslovak Socialist Republic, in 1990 and 1992 it was part of the Czech and Slovak Federative Republic. Thus, the search criteria were created accordingly.

Patients, materials and methods

This review is reported in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement for the reporting of systematic reviews and meta-analyses (3).

A comprehensive literature review in MEDLINE (PubMed), Web of Science, and Scopus databases, spanning from 1st of January 1972 to 31st December 2022, was performed by 5 researchers (A.T., J.B., P.K., B.B., J.M.) using the following keywords: "hypertension", "control'', "Czech Republic'','' Czechia", "Czechoslovakia'', "Czech'' "Czechoslovak Socialist Republic", "Czech and Slovak Federative Republic", Česká republika" "Česká",

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”Ćesko”, ”Ćeskoslovenská republika”, “Ćeskoslovenská”. The original studies focused on the results of hypertension control in the Czech Republic written in English and Czech were included only. Exclusion criteria were case studies, studies that were not performed on humans, studies that included only children and adolescents, clinical trials assessing the effectiveness of pharmacological treatment regimes, reviews, and conference papers.

Titles and abstracts of relevant articles were evaluated by O.P., P.H., L.B., L.F. and J.U. (with the full text being scrutinized where further clarity was needed) to include appropriate studies. Additionally, the reference lists from the retrieved articles and reviews were reviewed manually to identify any further articles of relevance.

Goals of treatment

It is important to acknowledge that older studies assessing the success of treatment of arterial hypertension have used different target values than those used today. Therefore, it is necessary to include this section to update and re-evaluate the current standards. By doing so, we hope to provide context and a better understanding of the limitations of previous research and highlight the importance of considering updated target values when assessing the effectiveness of treatment.

In 2018, the European Society of Cardiology (ESC) released updated guidelines for managing arterial hypertension (4). These guidelines suggest that the initial goal when using antihypertensive medication should be to lower blood pressure to below 140/90 mmHg for all patients. If treatment is well tolerated most patients should aim for a target blood pressure of 130/80 mmHg or lower. However, it is important to note that the target for treated systolic blood pressure (SBP) should not fall below 120 mmHg, and diastolic blood pressure (DBP) below 70 mmHg. For individuals with hypertension and diabetes, the recommended target blood pressure is below 130/80 mmHg (4).

In the early 1970s, hypertension was defined as BP higher than 160/95. Treatment was guided by the diastolic BP and target values were below 90 mmHg. In 1993, hypertension was redefined as BP higher than 140/90 mmHg. The Czech Republic followed the international recommendations and their changes accordingly (5). Therefore, it is important to note that before 1993 the official target values were different (<160/90 mmHg) and physicians treated hypertension with a different goal in mind.

Evidence of a strong association between cardiovascular risk and systolic blood pressure values (6), as well as results of intervention studies which indicated that cardiovascular events more closely correlate with achieved systolic than diastolic blood pressure values (7), led to the therapeutic goal for arterial hypertension that we know today (<140/90 mmHg).

The 1993 Joint National Committee (JNC) 5 report recommended lower BP targets during the treatment of adults with diabetes (<130/85 mmHg) when compared with the treatment of non-diabetic hypertensive patients since diabetic patients were known to be especially vulnerable to cardiovascular complications (8). The target value for BP control in hypertensive patients with diabetes which is used in clinical practice nowadays (<130/80 mmHg) was recommended in the 2003 JNC 7 report due to sufficient evidence that the treatment of high blood pressure in diabetic patients reduces microalbuminuria, slows the decline in renal function, and delays the development of diabetic nephropathy (9).

Results

The search process is described in Figure 1. No previous review of literature on hypertension control in the Czech Republic was found.

We found 13 studies devoted to the control of arterial hypertension in the Czech Republic. The oldest was performed in 1985 the most recent in 2018, and only 2 studies were performed before 1989 (Tab. 2). In the Czech Republic, 1989 marked an important revolutionary point due to the fall of the Iron Curtain.

We recognize that over time, target values for the treatment of hypertension have been revised to reflect updated evidence and

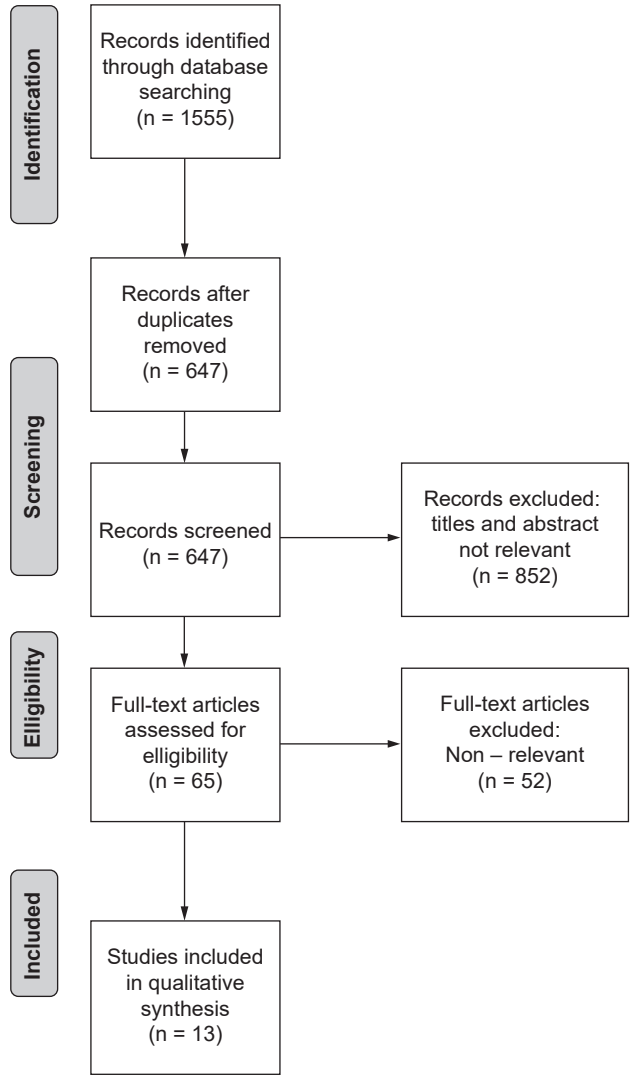

Fig. 1. PRISMA flow diagram.

expert consensus. Therefore, it is important to acknowledge that the interpretation of "success" in our study is based on the target values that were used in the studies at the time of their publication.

The results were divided by the age groups into the following categories: 25–64 years, 45–64 years and above 45 years and then organized chronologically.

Studies focused on people aged 25–64

Cífková et al (2) analysed three cross-sectional studies of cardiovascular risk factors from the 1980s and 1990s. Their results were not published separately and are therefore discussed together. The studies were conducted in six Czech districts in 1985 (n=2570), 1988 (n=2768) and 1992 (n=2343) in a 1% sample of the population aged 25–64 randomly selected from the National Population Register, stratified by age and sex (10). The studies demonstrated adequate control of hypertension in only 2.8% of men and 5.2% of women in 1985, 5.2% of men and 9.2% of women in 1988, and 2.8% of men and 6.1% of women in 1992.

Cífková et al (11) analysed the results of a nationwide cross-sectional study conducted to monitor cardiovascular risk factors in nine districts of the Czech Republic in the years 1997/1998. It included a 1% random sample of the Czech population aged 25–64 (n=3208). Of all persons treated for hypertension, 14.2% of men and 25.1% of women achieved BP target values. In females, control of diastolic BP was achieved more frequently (55%) than systolic BP (less than 40%). In the male group, the difference in reaching the goal for SBP or DBP was less significant.

Another nationwide cross-sectional study conducted by Cífková et al (11), in 2000/2001 (n=3320), with a design identical to the 1997/1998 study, found 16.4% of men and 25.4% of women achieved sufficient control of hypertension.

Cífková et al (2) also conducted a nationwide cross-sectional study in 2007/2008 in nine districts of the Czech Republic (n=2246). Effective control of hypertension was found in 24.4% of men and 24.9% of women with hypertension. An additional cross-sectional study, with a similar design to the 2007/2008 study, was carried out in 2015–2018 (n=2621). 32.3% of men and 37.4% of women treated for hypertension reached the BP target values (12).

Žejglicová et al (13) explored information regarding the effectiveness of arterial hypertension treatment provided by the EHES study conducted in 2014 in persons aged 25–64 (n=1212). Two outputs were published from the study. In the first, the group was divided into two age groups, 25–44 and 45–64. Target values were reached in the younger group in 71.4% of men and 79.9% of women and in the older group in 42.9% of men and 67.7% of women.

Vejtasová et al (14) published another output of the above-mentioned EHES study (n=1170). The aim was to compare the effectiveness of the treatment of arterial hypertension in the nondiabetic and diabetic study population (8.2% of participants). The BP target values (defined for both groups as <140/90mmHg) were achieved in 47.3% of patients with diabetes, vs 60.6% of individuals without diabetes, but without statistical significance. Only 29.1% of patients with diabetes achieved the recommended BP target values for the treatment of arterial hypertension specifically in the diabetic population (i.e. <130/80 mmHg). When comparing target values for diabetic patients (<130/80 mmHg) and non-diabetic patients (<140/90 mmHg), the difference is statistically significant at the expense of patients with diabetes (29.1% vs 60.6% of patients in target values, p<0.001).

Jozífová et al (15) provided further insight into the success of treatment of arterial hypertension in the mentioned age range in the Czech Republic. They compared the results of the treatment of hypertension in patients of general practitioners (n=622) in 2000/2001 (2) with hypertensive patients treated in 2001 at the specialized Department of Preventive Cardiology at the Institute of Clinical and Experimental Medicine (PPK IKEM) (n=691). BP target values were achieved by 75.1% of patients from PPK IKEM and 38.1% of patients treated by general practitioners (p<0.001).

Studies focused on people aged 45–64

Matějka et al. (16) examined the results of an ecological study with a random sample of men aged 45–64 years selected from the city of Pardubice (n=191), which evaluated the control of arterial hypertension in the Czech Republic in 1995. Hypertension control was achieved in 9% of the treated and 4% of all hypertensive subjects.

Studies focused on people over the age of 45

Widimský et al. (17) investigated the incidence and control of hypertension in general practitioner offices. The data came from the STOP CMP survey (determination of risk factors for the occurrence of stroke) conducted in 2002 among unselected outpatients aged 45 and over (18). The survey involved 150 general practitioners who examined data from 15 consecutive patients in one day, regardless of the purpose of their visit (n=2207).

The results showed effective control of arterial hypertension in 18.4% of hypertensive subjects. Control of hypertension particularly in the risky population (patients with ischemic heart disease) was not significantly higher, only 21.3% of them were effectively treated. The same result was observed in patients with a history of stroke or transient ischemic attack. (17)

Souček et al (19) compared the data on the control of hypertension in general practitioner offices from the STOP CMP survey (18) with the data from a national multicentre non-interventional cross-sectional registry to analyse the care of patients with hypertension in 123 outpatient specialist offices (internal medicine and cardiology) (n=19821). 48% of patients treated by specialists achieved the target values, significantly more than in the study aimed at evaluating BP control in hypertensive patients treated in general practitioners' offices – 18.4%. The work further analysed BP control in diabetic patients with pharmacologically treated hypertension. Target values <130/80 mmHg were achieved by 11% of patients with diabetes treated by specialists, while only 4.7% of those treated by general practitioners.

Discussion

A comparison of the above-mentioned studies shows that over the years, treatment outcomes in the general population have

improved significantly from 2.8% of men and 5.2% of women successfully treated in 1985 (2) to 32.3% of men and 37.4% of women in the latest study from 2015–2018 (12). The summary of the study results is described in Table 1.

Tab. 1. Graphical representation of the improvement of BP control.

Year	1985	1988	1992	1997/1998	2001/2002	2007/2008	2015–2018
BP target*	<160/95 mmHg			<140/90 mmHg			
BP target§	<140/90 mmHg						
Men	2.8%	5.2%	2.8%	14,2%	16,4%	24,4%	32.3%
Women	5.2%	9.2%	6.1%	25,1%	25,4%	24,9%	37.4%

*BP target recommendation valid in a given year; §BP target for the study analysis

It is clear that BP control in the 1980s and early 1990s was relatively poor taking into consideration that the target BP value was much higher. Several factors contributed to the turning point for better blood pressure control. These include increased awareness about the health risks associated with high blood pressure, the development of more effective medications with fewer side effects, and the implementation of consistent guidelines for blood pressure management. Additionally, there has been a growing emphasis on lifestyle modifications for blood pressure control, which has helped further improve outcomes.

All studies show that women achieve better blood pressure control than men. Another finding was that there is a higher treatment success rate in specialised centres than in general practitioners´ offices (15, 19). The reason for the better result in a specialised centre (e.g. PPK IKEM) was probably the more aggressive hypertension treatment strategy (more frequent use of three- to four-combination of antihypertensives) which was found by the study.

On the other hand, these studies also suggest that in those groups of patients where tight blood pressure control is crucial (as people with diabetes, ischemic heart disease, or stroke) the effort to achieve the targets is still insufficient, even in the specialists' care. Specifically, subjects with diabetes were followed up in two studies (14, 19). Target value <130/80 mmHg was achieved in 29.1% of people with diabetes irrespective of who provided the care (14), in 11% of those treated by the specialists and only in 4.7% of those in the care of GPs (19). The different designs of the studies did not allow comparison. Insufficient hypertension control is concordant with insufficient metabolic control expressed by HbA1c, another cardiovascular risk factor (20). The importance of hypertension detection and control is rising as the prevalence of diabetes is increasing even in the younger population and certain ethnic groups (21, 22).

Various factors are responsible for the significant improvement in the control of arterial hypertension over the past 50 years. These are the availability of medical care and medication, changes in approach to hypertension treatment, and routine measurements of BP during every visit to a healthcare provider of any specialization, allowing both, early diagnosis and more frequent checks of achieved hypertension control.

Available medications

The significant improvement in the control of arterial hypertension described in the results of these studies was possible due to the development and expansion of the various treatment options in the past 50 years. Table 2 shows the years of discovery of antihypertensive drugs or drug classes (23).

The above-mentioned medications were introduced to the Czech market with a time delay. Due to the political situation at that time, it was very difficult to obtain the required data and accurately determine the exact year. However, it is known that the medication was also produced in the Czech Republic. After the 1989 revolution, the medication started to be imported.

Change in approach to hypertension treatment

Another factor responsible for this change in the success of control of hypertension is the gradual move away from initiating therapy with lifestyle changes (e.g. limiting salt intake) only. Rather, it has become routine to immediately initiate the therapy with an antihypertensive drug in mild hypertension and use multiple antihypertensives in case of more severe hypertension.

Focusing on sex differences

Cífková et al. (24) investigated potential sex differences in the control rates of hypertension. The study utilized data from studies performed between 1985 and 2016/2017. It was found that over the study period of 31–32 years, control of hypertension increased significantly with consistently higher rates in women. However, it is important to note, that the age-adjusted trends in the control of hypertension in patients undergoing treatment were equally poor in both sexes.

Comparison between the Czech Republic and the Slovak Republic

We consider important to show a brief overview of hypertension studies in the Slovak Republic, a country with which the Czech Republic formed a single state until 1992. We have discovered several articles related to the subject.

Rosolová et al (25) evaluated the control of arterial hypertension in the Slovak Republic by conducting a cross-sectional epidemiological investigation in the late 1980s. This study en-

Tab. 2. Years of discovery of antihypertensive drugs or drug classes.

Discovery year	Antihypertensive agent
1957	Spironolactone
1958	Thiazide-type diuretics
1959	Furosemide
1973	β-Receptor blockers (eg, propranolol)
1970s	central α2 agonists (eg, clonidine)
1975	Peripheral α1 receptor blockers (eg, prazosin)
1975	ACE inhibitors (e.g. captopril)
1977	Calcium channel blockers (e.g. verapamil, nifedipine)
1993	Angiotensin II receptor blockers (e.g. losartan)
2000	Renin inhibitors (e.g. aliskiren)

compassed 660 male and 440 female participants aged between 35 and 60 years. The results revealed that effective control of arterial hypertension was achieved in only 20% of the overall study sample of 300 individuals with hypertension. This study may be compared to the study by Cífková et al (2), and the results show that the control of arterial hypertension was higher in the Slovak Republic than in the Czech Republic (5.2% of men and 9.2% of women in 1988). However, it is important to note the difference in the age range of the study participants.

Sninčák et al conducted an investigation into the findings of the Clinical-Epidemiological Study of Hypertension (KESHSR), which took place from 2002 to 2004. This comprehensive study involved a representative sample of adults from eight regions across the Slovak Republic. A total of 369 individuals (172 men and 183 women) underwent thorough examinations across 18 study centres. The age range spanned 7 decades, from 19 to 75 years and older, with an average age of 49.52 years. In a chosen sample of 251 individuals aged between 25 and 64 years, extracted from the representative population of Slovakia, 41.4% were found to have arterial hypertension. However, it's important to note that the effectiveness of this pharmacological treatment was relatively low, with only 27.1% of patients with hypertension in the 25–64 age group achieving effective control, as opposed to a mere 7.6% in the general population (26, 27). This study corresponds to Cífková et al (11), and the comparison between the two studies reveals that hypertension control was better in the Slovak Republic than in the Czech Republic. Cífková et al (11) reported that, in their 2000/2001 study, 16.4% of men and 25.4% of women achieved adequate hypertension control.

Farský et al analysed the database of 1,595 consecutive patients, with metabolic syndrome and/or diabetes mellitus, visiting department of cardiology and internal medicine clinic in 2005–2014 (28). The final number of patients for analysis who fulfilled the inclusion criteria was 570. At the last visit, 132 out of 413 (32%) of patients who had a systolic BP >140 mmHg at the first visit, achieved systolic BP <140 mmHg by the time of their last visit (28). This study provides another perspective on the issue, and it cannot be easily compared to one of the Czech studies.

In 2019, Hatala et al conducted an assessment of the prevalence and control of arterial hypertension among adults in the Slovak population who visited a general practitioner's (GP) office. This screening encompassed a total of 1,260 participants. The mean age of the participants was 49.6 years, with 75% of them falling below the age of 65 years. The study identified arterial hypertension as defined by systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg in 431 individuals, representing a prevalence rate of 34.2%. Among the 509 patients with arterial hypertension (accounting for 40.4% of the cohort), BP values of less than 140/90 mmHg were observed in 232 patients (45.6%) (29). This study from the Slovak Republic provides additional information on the issue of arterial hypertension control. However, it cannot be directly compared to any of the Czech studies.

For completeness, several studies have been conducted on the prevalence of hypertension in the Slovak Republic. Riecanský et al conducted a study that investigated the outcomes of the Cardiovascular Program implemented in the Slovak Republic during the period from 1978 to 1989. A comprehensive assessment of 484,185 individuals aged between 30 and 59 years revealed a prevalence of 10.7% for arterial hypertension within this population (30).

The European Health Interview Survey 2009 (EHIS 2009) was the first sample survey on population health in the Slovak Republic (SR). Among 4972 respondents aged 15 years and over, 25.8% reported being diagnosed with arterial hypertension (31).

An interesting study focused on chronic diseases including hypertension did not confirm their higher prevalence in regions with weaker socio-economic status in Slovakia. Out of the 4 monitored socio-economic attributes, 3 of them (age, education and lifestyle) had a significant impact on the prevalence of chronic diseases (32).

Comparison between the Czech Republic and the rest of the world

For the purpose of an overview of hypertension control in the world, we select the following studies for comparison. One of these is a cross-sectional population-based study from 2021, including 99 468 previously diagnosed, treated hypertensive patients enrolled in the UK Biobank, recruited between 2006 and 2010. Out of the participants, 38.1% (33) were successfully controlled, a figure higher than the 32.3% of men and 37.4% of women in the Czech Republic according to the latest study conducted between 2015 and 2018 (12).

A worldwide review study using data from the NCD-RisC (Non-Communicable Disease Risk Factor Collaboration) registry, in which the Czech Republic also participated, presented an analysis of data on hypertension treatment in the period 1990–2019 (34). In 2019, an average of 23% of women and 18% of men reached BP target values. In 2019, hypertension control rates were higher in South Korea, Canada, and Iceland (> 50% of treated patients), followed by the USA, Costa Rica, Germany, Portugal, and Taiwan. Control rates were less than 10% for women and men in Nepal, Indonesia, and some countries in sub-Saharan Africa and Oceania, and for men in some countries in North Africa, Central and South Asia, and Eastern Europe. Control rates have improved in most countries since 1990, but there has been only a little change in most countries in sub-Saharan Africa and Oceania. The most significant change has occurred in high-income countries, in Central Europe, in some upper-middle-income countries, and more recently in countries currently moving into the high-income category, including Costa Rica, Taiwan, Kazakhstan, South Africa, Brazil, Chile, Turkey, and Iran. In most countries, hypertension treatment and control rates were found to be higher among women than men. However, in high-income countries, the difference in treatment rates between men and women was comparatively smaller.

The LEADER study included 9340 patients with type 2 diabetes with a mean duration of diabetes of 12.7 years (SD±8.0 years) from 410 centres in 32 countries worldwide (35). This study found that only 26% achieved BP targets (<130/80 mmHg). This is a similar result to the percentage of diabetic patients in the Czech Republic who achieved the target value <130/80 mmHg (29.1%) (14).

To compare the success rates of hypertension treatment in the Czech Republic with those observed in other European countries that allocate similar levels of healthcare resources, we selected the following studies. The NATPOL PLUS study, conducted in 2002, examined a representative sample of 3,051 adult Polish residents between the ages of 18 and 93 (36). The study found a treatment effectiveness rate of 12%. Control of hypertension was marginally better among female patients (14%) than male patients (10%). The Effective Control of Hypertension Project (ECHP) Study of the Hungarian Society of Hypertension, published in 2004, analysed the effectiveness of treatment of arterial hypertension in patients of general practitioners from Budapest. The study investigated 1599 patients. The frequency of patients under effective blood pressure control (<140/90 mmHg) was 27.8% (37). Comparing these 2 studies with a study conducted by Cífková et al. (11) in 2000/2001 suggests that the control of hypertension in the Czech Republic is comparable to those of other European countries that allocate a similar amount of healthcare resources.

Strengths and limitations

The strength of this review is that the authors have conducted a thorough search to the best of their knowledge and ability, attempting to locate all available literature on the topic.

However, it is worth noting that the conclusion regarding the difference in treatment effectiveness between general practitioners and specialists is based on only two studies and requires further exploration. The limitations of the individual studies were assessed and are mentioned in Table 3.

Tab. 3. Summary of studies reviewed.

Author year	Study Design	Characteristics of the study group	Main Findings	Conclusion	Limitations
Cífková R et al (2) 1985	Cross-sectional, 1% population random sample from each of the 6 districts	25–64 years 1253 men, 1317 women	2.8% men, 5.2% women	Control of arterial hypertension is suboptimal.	The survey was performed mostly in rural districts. This may have led to a selection of a population sample with a lower education level and subpar health awareness.
Cífková R et al (2) 1988	Cross-sectional, 1% population random sample from each of the 6 districts	25–64 years 1357 men, 1411 women	5.2% men, 9.2% women	Control of arterial hypertension is suboptimal.	The survey was performed mostly in rural districts. This may have led to a selection of a population sample with a lower education level and subpar health awareness.
Cífková R et al (2) 1992	Cross-sectional, 1% population random sample from each of the 6 districts	25–64 years 1134 men, 1209 women	2.8% men, 6.1% women	Control of arterial hypertension is suboptimal.	The districts where the survey was performed were mostly rural. This may have led to a selection of a population sample with a lower education level and subpar health awareness.
Cífková R et al (11) 1997/98	Cross-sectional, 1% population random sample from each of the 9 districts	25–64 years 1538 men, 1670 women	14.2% men, 25.1% women	Control of arterial hypertension is suboptimal. – Control rates were better in the female population.	A decrease in the response rates may have led to a possible selection bias due to the increased participation of healthier and more health-aware individuals in the later surveys.
Cífková R et al (11) 2001/02	Cross-sectional, 1% population random sample from each of the 9 districts	25–64 years 1627 men, 1693 women	16.4% men, 25.4% women	Control of arterial hypertension is suboptimal. Control rates were better in the female population.	A decrease in the response rates may have led to a possible selection bias due to the increased participation of healthier and more health-aware individuals in the later surveys
Cífková R et al (2) 2007/08	Cross-sectional, 1% population random sample from each of the 9 districts	25–64 years 1102 men, 1144 women (2007/08)	24.4% men, 24.9% women (2007/08)	Control of arterial hypertension has significantly improved. Control is more effective in women.	A decrease in the response rates may have led to a possible selection bias due to the increased participation of healthier and more health-aware individuals in the later surveys

Tab. 3.

Author year	Study Design	Characteristics of the study group	Main Findings	Conclusion	Limitations
Cífková R et al (12) 2015–2018	Cross-sectional, 1% population random sample from each of the 9 districts	25–64 years 1250 men, 1371 women	32.3% men, 37.4% women	Control of arterial hypertension is still insufficient but higher than the average control rate for high-income countries (24.6% men and 32.2% women). Significant improvement in control rates occurred between 1985 and 2015.	A decrease in the response rates may have led to a possible selection bias due to the increased participation of healthier and more health-aware individuals in the later surveys.
Žejglicová K etal (13) 2014	Cross-sectional, respondents of the European Health Examination Survey (EHES)	25–64 years 485 men, 727 women	Age group 25–44: 71.4% men, 76.9% women Age group 45–64: men 42.9%, 67.7% women	Control of arterial hypertension is insufficient. Higher proportion of young hypertensives achieved target BP values when compared to an older population.	Relatively low response rate of the EHES survey (32%) may have led to a less representative population sample.
Vejtasová V et al (14) 2014	Cross-sectional, respondents of the European Health Examination Survey (EHES)	25–64 years 467 men, 703 women	29.1% of diabetic patients (< 130/80 mmHg) vs 60.6% of non-diabetic patients (< 140/90 mmHg)	The control rate of arterial hypertension is non-significantly lower in the diabetic than in the non-diabetic population for a target BP value of 140/90 mmHg but is significantly lower (approximately half) in the case of a target value of 130/80 mmHg in diabetic patients when compared to the target with a value of 140/90 mmHg for the non-diabetic population.	Relatively low response rate of the EHES survey (32%) may have led to a less representative population sample.
Jozífová M et al (15) 2000/01	Cross-sectional 1% population random sample from each of the 9 districts vs hypertensive patients treated for at least 3 months from July to November 2001 at the PPK IKEM	25–64 years 622 (hypertensive patients treated by a general practitioner) vs 691 (hypertensive patients treated at PPK IKEM)	38.1% (hypertensive patients treated by a general practitioner) vs 75.1% (hypertensive patients treated at PPK IKEM)	Hypertension control was more favourable in the group of patients treated at a specialized workplace.	Reason for a higher control rate in the hypertensive patients treated at the specialized workplace may have been more aggressive hypertension treatment and a higher education level of the patients.
Matějka J et al. (16) 1995	Ecological random sample of men from one city	45–64 years 191 men	9% of the treated and 4% of all hypertensive subjects	Hypertension control in the investigated representative population sample is inadequate.	No reported limitations.
Widimský J et al (17) 2002	Cross-sectional, survey using questionnaires. Each of 150 general practitioners enrolled 15 consecutively examined patients into the study.	45 or above 1012 men, 1195 women	18.4%	Poor control of arterial hypertension in the offices of general practitioners.	The study did not ensure a uniform blood pressure measurement methodology.
Souček M et al (19) 2010	National multicenter non-interventional cross-sectional registry involving 123 specialised centres (90 internal, 33 cardiology) compared to the data from GP offices obtained from STOP CMP survey (Each of 150 general practitioners enrolled 15 consecutively examined patients into the study).	19–99 years 19 821 patients (53% women, 5842 diabetic patients)	48% patients (< 140/90 mmHg) 11% diabetic patients (< 130/80 mmHg)	Significantly more patients treated by specialists achieved target BP values when compared with patients treated in the offices of general practitioners. Hypertension control rate was lower in diabetic patients. More diabetic patients treated by a specialist achieved target BP values (<130/80 mmHg) relative to diabetics treated by a general practitioner.	The cohort composition of the two studies is different and therefore definitive comparison is not possible.

Conclusion

It has taken 50 years of sustained effort to substantially improve the rates of hypertension control in the Czech Republic to such an extent that they are fully comparable with those of developed countries. More significant improvement in BP control did not occur until the fall of the Iron Curtain in the late 1990s. However, the success rate of arterial hypertension treatment in the Czech Republic is still insufficient and lags behind the countries with the best rates. Moreover, the success rate is not significantly higher in subgroups of patients with increased cardiovascular risks (ischemic heart disease, stroke, or transient ischemic attack). In addition, patients who seek treatment at specialized centres have a higher probability of achieving successful treatment outcomes than those who rely on the assistance of a general practitioner. Due to the stricter target BP values for patients with diabetes, their levels of hypertension control are lower than among patients without diabetes. Nonetheless, BP control in people with diabetes in the Czech Republic is at least comparable to those worldwide. Table 3 summarizes the studies described in this review.

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