

Hypertension Control in Brazilian Publications

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Abstract

Hypertension is a major public health problem due to its high prevalence and cardiovascular complications. Its treatment is aimed at reducing cardiovascular morbidity and mortality, its goal being to maintain blood pressure levels below 140/90 mm Hg. Hypertension control in Brazil is low, and nationwide rates are unknown. The objective of this review was to provide an overview on hypertension control in Brazil from publications in a database. We identified 45 publications. In population-based studies, the highest control rate (57.6%) was reported in a multicenter study in 100 municipalities and the city of São José do Rio Preto, São Paulo state (52.4%), while the lowest rates (around 10%) were identified in microregions of the Rio Grande do Sul state and in the city of Tubarão, Santa Catarina state. In conclusion, the studies assessed showed a wide variation in hypertension control rates. It is worth noting that the comparison between studies was a major limiting factor, because of the different methods used.

Introduction

Arterial hypertension is an important public health problem because of its high prevalence and associated cardiovascular complications. Brazilian epidemiological studies have reported arterial hypertension prevalence ranging from 19.2% to 44.4%¹. It is generally estimated that more than 30% of Brazilians have arterial hypertension, similarly to the world population². In 2010, cardiovascular diseases corresponded to 30.6% and 13.4% of the total deaths and hospitalizations of adults aged at least 20 years, respectively³. The treatment of arterial hypertension is aimed at reducing cardiovascular morbidity and mortality, and the blood pressure control goal proposed by the VI Brazilian Guidelines of Arterial Hypertension is systolic and diastolic blood pressure levels lower than 140 mm Hg and 90 mm Hg, respectively. More severe reductions can be aimed depending on the cardiovascular risk profile.

Keywords

Hypertension / complications; Review; Hypertension / prevention & control; Medication Adherence.

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Knowing the control levels for arterial hypertension is highly relevant in planning the therapeutic resources and assessing the extension and effectiveness of the measures adopted. Although arterial hypertension control in Brazil is believed to be low, national rates are unknown. This systematic review of the literature was aimed at providing an overview of arterial hypertension control in Brazil based on publications from a national access-free database, containing full original texts.

Method

This study is a systematic review of the literature about arterial hypertension control in Brazil. Aiming primarily at elaborating a database of arterial hypertension articles, a bibliographic survey of publications indexed at the Scientific Electronic Library Online (SciELO) was conducted in October 2012. SciELO was chosen because it comprises a selected collection of Brazilian scientific periodicals. The terms “hipertensão/hypertension” and “pressão arterial/blood pressure” were used in the search fields “subject” and “title words”, with restriction of neither time period nor idiom, resulting in 1,431 publications.

The present study selected articles with a cross-sectional design and reporting on arterial hypertension control in Brazil. Figure 1 shows the flowchart of the selection of articles. In the case of articles elaborated based on the study of the same cohort, the oldest publication was chosen ($n = 3$). The articles selected ($n = 45$) were characterized regarding the year of publication, site of study conduction, subject of the journal, population studied, blood pressure assessment and results of arterial hypertension control. The control rates were presented as percentages of controlled hypertensives described in the articles ($n = 37$) or based on the subtraction of the percentages of uncontrolled hypertensives from the number 100, described in the article ($100 - \text{uncontrolled } \%, n = 8$). The publications were grouped as follows: population-based studies ($n = 13$); site of study conduction, primary or secondary health care ($n = 15$); studies with specific populations ($n = 12$); and studies with interventions ($n = 5$).

Results

An increase in the number of publications on arterial hypertension control has been observed since 2001 (13.3%, from 1988 to 2000, versus 86.7%, from 2001 to 2012). Regarding the periodicals in which the articles were published, medical journals predominated. Journals of cardiology were the most frequent ones (40.0%), followed by those of public health (28.9%). Journals of nursing contributed with 13.3%,

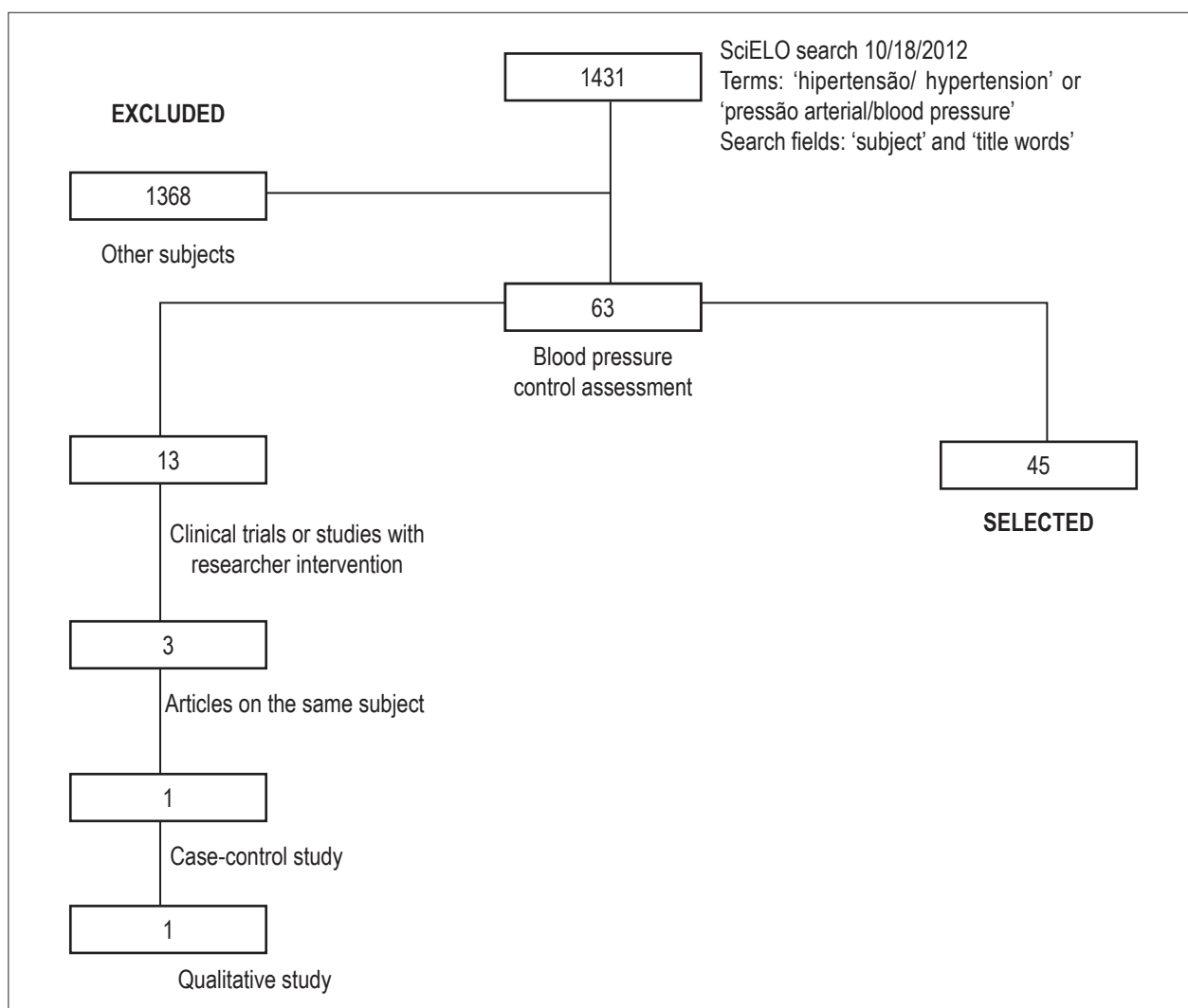


Figure 1 - Flowchart of the selection of articles on arterial hypertension control.

and there was only one publication in a journal of pharmacy. The Brazilian southeastern region corresponded to 57.8% of the sites of study conduction, followed by the southern (20%), northeastern (11.1%) and west-central (6.7%) regions. Two studies were performed in multiple centers in the five geographical regions of the country, and none was conducted exclusively in the northern region. São Paulo state accounted for 40% of the study sites (Figure 2).

Hypertension control was assessed by use of blood pressure measurement in 32 studies (72.7%). The other studies assessed the registry of blood pressure in medical records (22.7%). One study used blood pressure self-report via telephone call, and another did not inform the blood pressure assessment method. Measurement at the medical office was performed in 32 studies, two of which also carried out ambulatory blood pressure monitoring (ABPM), while another performed home blood pressure monitoring (HBPM) in addition to measurement at medical office. Of the studies measuring blood pressure at the

medical office, one third used mercury column devices. Oscillometric devices were used in nine studies, seven of which reported device validation. Eight studies used aneroid devices, manometer calibration being reported in six. Five articles provided no description of blood pressure measurement equipment. Two and three blood pressure measurements per individual predominated in the studies assessed (42.4% and 30.3% of the studies, respectively).

The most common source of recommendation for blood pressure measurement at the medical office was the Brazilian Guidelines of Arterial Hypertension, accounting for 33.3% of the articles, followed by the VI Joint National Committee, 21.2% of the articles. One study informed the World Health Organization as the source of recommendation for blood pressure measurement, another, the American Heart Association, and 13 studies did not mention any. Training of the professional responsible for blood pressure measurement was reported in 57.6% of the studies, while appropriateness of the cuff to arm circumference was mentioned by only 39.4%.

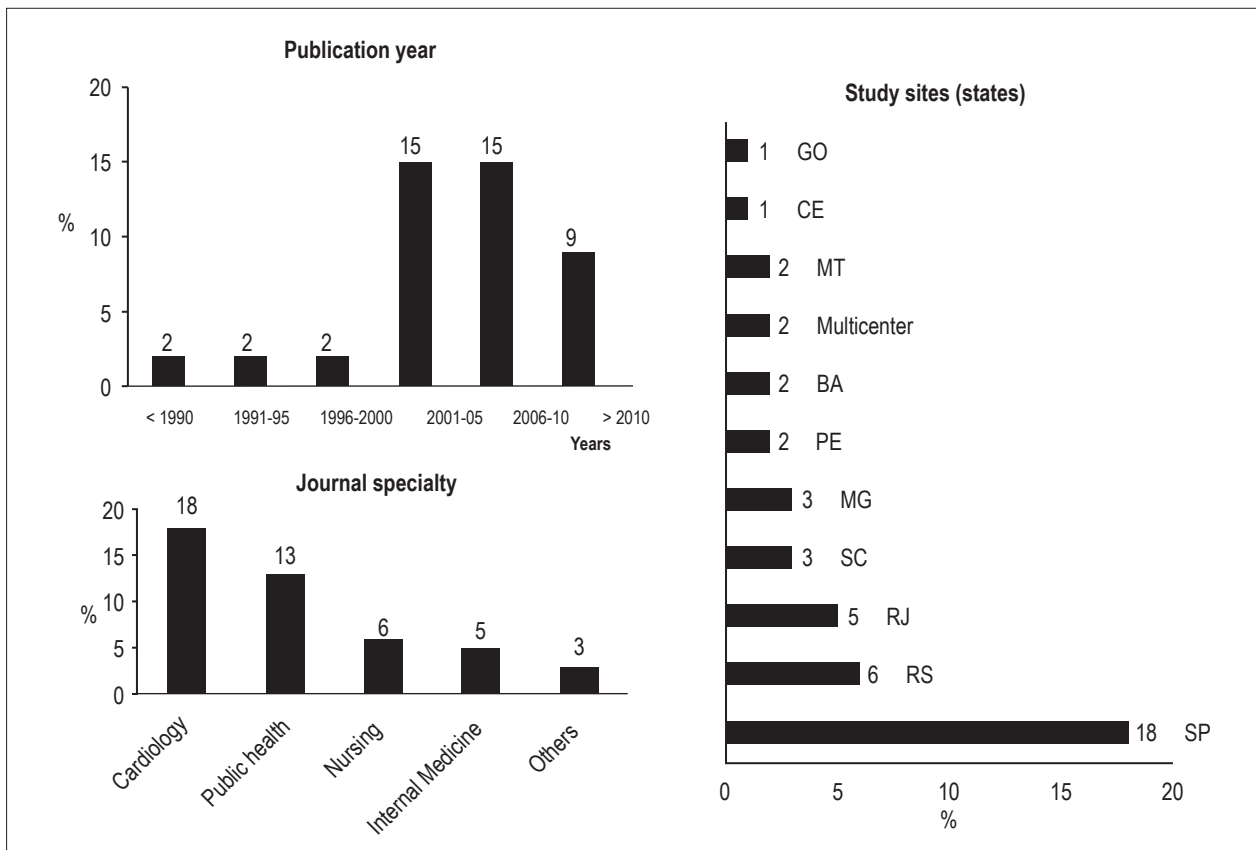


Figure 2 - Publication time, journal specialty, and study sites (São Paulo, 2012).

The population-based studies adopted different values of blood pressure control. Only publications from 2001 onward considered values lower than 140 mm Hg and 90 mm Hg for systolic and diastolic blood pressures, respectively. Of those publications, the multicenter study in 100 municipalities and in the city of São José do Rio Preto, São Paulo state, reported the highest control rates (57.6% and 52.4%, respectively). The lowest percentages, around 10%, were identified in microregions of the Rio Grande do Sul state and in the municipality of Tubarão, Santa Catarina state. Most of those articles ($n = 7$) assessed arterial hypertension control in hypertensives undergoing antihypertensive treatment, reporting rates ranging from 10.1% to 52.4%⁴⁻¹⁰. Arterial hypertension control of individuals knowing their hypertensive condition ($n = 3$) ranged from 31.3% to 57.6%¹¹⁻¹³. Two articles assessed arterial hypertension control in the total number of hypertensives identified in the sample, reporting rates of 10.4% and 24.2%^{14,15}. Klein et al¹⁶ reported the value of arterial hypertension control in the entire population studied (hypertensives and not hypertensives) as of 8.8%, corresponding to 60% of the hypertensives treated (Table 1).

Among hypertensives in the Family Health Program¹⁷⁻¹⁹, the arterial hypertension control rates ranged from 20.0% to 30.7%, and among those being followed up in basic health units, from 30.0% to 53.9%¹⁹⁻²¹. Arterial hypertension control

among hypertensives in secondary health care was assessed in 24.4% of the studies, ten being performed at hypertension outpatient clinics²²⁻³¹ and one at an internal medicine outpatient clinic³². The lowest control rate was identified in the city of Peruíbe, São Paulo state; however, when blood pressure was assessed by use of home measurement, a significant increase in control was observed (9.9% versus 23.9%)³⁰. The highest control levels in hypertensives of primary health care were obtained in the cities of Porto Alegre (53.9%)²¹ and São Paulo (45.5%)²⁰ (Table 2).

Table 3 shows studies with hypertensives in special situations such as diabetics and elderly. It is worth noting that the control of diabetic hypertensives according to the cutoff point of 140/90 mm Hg corresponded to twice that adopting more severe blood pressure reductions recommended for that population^{23,33,34}. Regarding the studies with elderly, three were population-based^{35,36}, and the control rates varied from 27% to 44.6%, reaching 80% when blood pressure was assessed by using ABPM³⁷. Two studies assessed arterial hypertension control of health professional. In the city of Salvador, Bahia state³⁸, the hypertension control rate among nursing professionals undergoing treatment for arterial hypertension was 30.6%, while in a university-affiliated hospital in the city of São Paulo, São Paulo state³⁹, that rate among professionals of several categories (physicians, nurses and administrative) who knew to be hypertensives

Table 1 - Arterial hypertension control in Brazilian population-based studies (São Paulo, 2012)

Article	Study site	Population*	Control (%)
dos Santos et al ⁴	Cáceres, MT	> 10 years	55.2% men 28.6% women [‡]
Piccini e Victora ⁵	Pelotas, RS	20-69 years	32 [‡]
Klein et al ¹⁶	Ilha do Governador, RJ	> 20 years	8.8 [§]
Trindade et al ⁶	Passo fundo, RS	18-74 years	37.5 [§]
Freitas et al ⁷	Catanduva, SP	≥ 18 years	27.6 [§]
Fuchs et al ⁸	Porto Alegre, RS	≥ 18 years	62 [§] 36 [¶]
Gus et al ¹⁴	Microregions, RS	> 20 years	10.4 [¶]
Pereira et al ⁹	Tubarão, SC	≥ 18 years	10.1 [¶]
Rosário et al ¹⁵	Nobres, MT	18-90 years	24.2 [¶]
Cipullo et al ¹⁰	S José Rio Preto, SP	≥ 18 years	52.4 [¶]
Mion Jr et al. ¹¹	São Paulo, SP	≥ 18 years	35.2 [¶]
Lyra et al. ¹²	Canaã, PE	≥ 30 years	31.3 [¶]
Piccini et al. ¹³	100 Brazilian municipalities	20-59 years	57.6 [¶]

* Population representative sample.

hypertension control (systolic and diastolic blood pressure, respectively): < 140 mm Hg and < 90 mm Hg (15-19 years), 150 mm Hg and 90 mm Hg (20-39 years), and 160 mm Hg and 95 mm Hg (≥ 30 years). ‡ hypertension control: < 160 (systolic) and 90 mm Hg (diastolic). § hypertension control: < 160 (systolic) and 95 mm Hg (diastolic). ¶ hypertension control: <140 (systolic) and 90 mm Hg (diastolic).

was 49%. A study⁴⁰ with hypertensives with the human immunodeficiency virus has reported an arterial hypertension control rate of 14.8%, considering the total number of hypertensives in the cohort. Greater control rates were found among hypertensives from the pharmaceutical (65.7%)⁴¹ and social assistance (67.3%)⁴² settings.

Five observational studies assessed hypertension control after an intervention (Table 4), and the results showed better blood pressure control after improving the antihypertensive treatment and adopting public health strategies. The samples of two studies^{43,44} consisted of uncontrolled hypertensives, and thus the initial control was zero. Comparative studies reported better arterial hypertension control with the beginning of treatment or its improvement, including the adoption of the public health strategies recommended by the Brazilian Unified Health Care System^{45,46}. Another study identified a reduction in the control rate after the end of an intervention via telephone with hypertensives followed up at a hypertension outpatient clinic⁴⁷.

Discussion

The studies assessed evidenced different arterial hypertension control rates in Brazil. That control results from a complex system involving biological, socioeconomic, cultural and sanitation aspects. The heterogeneity of the Brazilian population demands the expansion of the knowledge on arterial hypertension control and its determinants in different Brazilian regions. Most of the publications on arterial hypertension control were recent, concentrated on the last decade. The older publications

corresponded to public health periodicals, indexed in the SciELO database for a longer period, from the end of the 1960s to the beginning of the 1980s. A cardiology journal, first indexed in the mid-1990s, accounted for 40% of the publications on the subject. In addition, in past decades the scientific production gained more incentive for innovation and competition in the elaboration and use of its indicators due to the increase in access to electronic resources and support of national and international research agencies⁴⁸.

The large majority of studies have adopted systolic and diastolic blood pressure values to control arterial hypertension equal to or lower than 140 mm Hg and 90 mm Hg, respectively. In the studies published before 1999, when data from the III Brazilian Consensus for Arterial Hypertension were published⁴⁹, the blood pressure levels recommended for control were higher. The arterial hypertension control rates reported by the studies analyzed are very different and difficult to compare. Such differences can be explained by several factors, such as study context (population-based, health care), sampling techniques, methods for blood pressure assessment, and intrinsic characteristics of the population studied.

In population-based studies, adopting systolic and diastolic blood pressure control levels lower than 140 mm Hg and 90 mm Hg, respectively, for hypertensives undergoing treatment, the control rates ranged from 10.1% in the city of Tubarão, Santa Catarina state⁹, in 2003, to 52.4% in the city of São José do Rio Preto, São Paulo state¹⁰, in 2004-2005. The sample from the city of São José do Rio Preto had a higher proportion of elderly (38% versus 20.1%) and a greater percentage of individuals with previous knowledge about their arterial

Table 2 - Arterial hypertension control in Brazilian studies in the primary and secondary health care context (São Paulo, 2012)

Article	Study site	Population	Control (%)
Pierin et al ²²	São Paulo, SP	Outpatient clinic, > 18 years, (n = 205)	31*
Freitas et al ²³	São Paulo, SP	Outpatient clinic, > 18 years (n = 1210),	20.9*
		Diabetic hypertensives (n = 290)	23.4*
Strelec et al ²⁴	São Paulo, SP	Health Care Center, > 18 years (n = 130)	35*
Muxfeldt et al ³²	Rio de Janeiro, RJ	Outpatient clinic, adults (n = 1699)	27*
Sanchez et al ²⁵	São Paulo, SP	Outpatient clinic, > 18 years (n = 100)	35*
Coelho et al ²⁶	Ribeirão Preto, SP	Outpatient clinic, 17-86 years (n=245)	27.8*
Mano et al ¹⁷	São Paulo, SP	School Health Care Center, > 18 years (n = 113)	30*
		FHP, > 18 years (n = 113)	20*
Jesus et al ²⁷	São Paulo, SP	Outpatient clinic, > 18 years (n = 511)	15% men* 24% women*
Magnanini et al ²⁸	Rio de Janeiro, RJ	Outpatient clinic, women, resistant hypertension, 24-92 years (n = 382)	42.4§
Helena et al ¹⁸	Blumenau, SC	FHP, adults (n = 595)	30.7*
Pierin et al ²⁹	São Paulo, SP	Outpatient clinic, > 18 years, (251 uncomplicated hypertensives, 260 complicated hypertensives)	complicated hypertension, 17.3% * uncomplicated hypertension, 29.1%*
Pierin et al ²⁰	São Paulo, SP	BHCU, adults (n = 440)	45.5*
Ben et al ²¹	Porto Alegre, RS	BHCU, adults (n = 206)	53.9*
Martins et al ¹⁹	Petrópolis, RJ	BHCU, adults, (n = 250)	39.2*
		FHP, adults (n = 250)	29.2*
Silva et al ³⁰	Peruíbe, SP	Outpatient clinic, > 18 years, stage I or II hypertension, (n = 71)	9.9*
			23.9*

BHCU: basic health care unit; FHP: Family Health Program.

* Blood pressure control: < 140 mm Hg (systolic) and 90 mm Hg (diastolic). # No information on blood pressure control levels. § Blood pressure control: < 135 mm Hg (systolic) and 80 mm Hg (diastolic) for ambulatory blood pressure monitoring.

¥ Blood pressure control: < 90 mm Hg (diastolic). ¶ Blood pressure control: < 135 (systolic) and 85 mm Hg (diastolic) for home blood pressure monitoring.

hypertension (74.4% versus 55.6%). The percentage of individuals with an education level lower than seven schooling years was higher in the sample from the city of Tubarão as compared to that from the city of São José do Rio Preto (52.4% versus 44.6%). Although that comparison does not justify the differences found in control rates, it evidences factors known to be associated with arterial hypertension control and that differ in the populations studied.

The only multicenter population-based study that assessed arterial hypertension control in municipalities in the five Brazilian geographical regions¹³ reported a rate of 57.6%, a figure greater than that of other countries in Latin America (29% to 58%)⁵⁰ and western Europe (31% to 46%)⁵¹. It is worth noting that population-based studies accounted for less than one third of the articles assessed in this review. This evidences the scarcity of such studies, considered fundamental for knowing the conditions that influence the dynamics of hypertension risks and control in populations.

Maintaining the same criteria for arterial hypertension control (< 140/90 mm Hg), the values obtained at hypertension outpatient clinics ranged from 20.9% for non-diabetic hypertensives in the city of São Paulo, São Paulo state, in 2000²³, to 61.7% for hypertensives at

low to medium cardiovascular risk in the five Brazilian geographical regions in 2008³¹. It is worth noting that 9 of 15 studies on arterial hypertension control in primary or secondary health care either had a convenience sample or did not explicit the sample composition. Only three studies have mentioned the constitution of a probabilistic sample and sample calculation.

Regarding the control of diabetic hypertensives, low rates were identified, ranging from 13.4% to 17.1%, considering the cutoff points of 130/80 or 130/85 mm Hg, respectively^{23,33,34}. Those values corresponded to 50% of the control for the cutoff point of 140/90 mm Hg recommended for low to medium cardiovascular risk hypertensives. In the study comparing control rates according to cardiovascular risk stratification and respective blood pressure goals, a 20% to 30% reduction in control was observed for high-risk and very high risk patients, and patients with kidney diseases as compared to low to medium risk patients³¹. Comorbidities commonly associated with hypertension, such as diabetes mellitus, obesity, and target-organ lesions, are conditions that require more strict control goals, because blood pressure levels over 115/75 mm Hg represent an additional risk for cardiovascular disease⁵².

Table 3 - Arterial hypertension control in Brazilian studies with specific groups (São Paulo, 2012)

Article	Study site	Population	Control (%)
Aquino et al ³⁸	Salvador, BA	Female nurses and nurse's aides, (n=494)	30.6*
Barroso et al ³³	Belo Horizonte, MG	Diabetic hypertensives, adults (n=146)	41.7*
			17.1 [‡]
Nobre et al ³¹	4 Brazilian macroregions	291 clinics, outpatient clinics, hypertension services, risk stratification of hypertensives, 21-79 years, (n=2810)	low/medium risk, 61.7%
			high risk, 42.5%
			very high risk, 41.8%
			with renal disease, 32.4%
			Total, 46.5%
Pinto et al ³⁴	Porto Alegre, RS	Diabetic hypertensives, adults (n=348)	39*
			17*
Firmo et al ³⁵	BambuÍ, MG	Population ≥ 60 years, on antihypertensive treatment (n=1494)	38.8*
Firmo et al ³⁵	BambuÍ, MG	Population ≥ 60 years (n=919)	27*
Mion Jr et al ³⁹	São Paulo, SP	University-affiliated hospital professionals, (n=810)	49*
Arruda Jr et al ⁴⁰	Recife, PE	Individuals with HIV/AIDS, ≥ 18 years (n=958)	14.8*
Santos et al ⁴¹	S Caetano do Sul, SP	Hypertensive users of school pharmacy, > 18 years (n=102)	65.7*
Firmo et al ³⁶	BambuÍ, MG	Population 71-81 years, cohort from 1916 to 1926 (n=313)	44.6*
		Population 71-81 years, cohort from 1927 to 1937 (n=484)	40.1*
Vitor et al ⁴²	Fortaleza, CE	Hypertensives from a social assistance center (n=49)	67.3
Bastos-Barbosa et al ³⁷	Ribeirão Preto, SP	≥ 60 years, followed up at public health care centers, on treatment (n=60)	80 [§]

HIV: human immunodeficiency virus; AIDS: acquired immunodeficiency syndrome.

* Blood pressure control: < 140 mm Hg (systolic) and 90 mm Hg (diastolic). # Blood pressure control: < 160 mm Hg (systolic) and 95 mm Hg (diastolic). § Blood pressure control: < 135 mm Hg (systolic) and 80 mm Hg (diastolic) for ambulatory blood pressure monitoring. ¶ Blood pressure control: < 130 mm Hg (systolic) and 80 mm Hg (diastolic).

ç Blood pressure control: < 130 mm Hg (systolic) and 85 mm Hg (diastolic).

Table 4 - Comparative observational studies on arterial hypertension control before and after interventions (São Paulo, 2012)

Article	Study site	Population	Intervention	Initial control (%)	Final control (%)
de Souza e Silva et al ⁴³	Rio de Janeiro, RJ	Users of a university-affiliated hospital, > 20 years (n = 96)	Hypertension outpatient clinic	0	32.9 [#]
Sala et al ⁴⁴	São Paulo, SP	BHCU, ≥ 20 years (n=250)	Aging Health Care Program	0	44.4 [§]
Araujo et al ⁴⁵	Salvador, BA	FHP, ≥ 20 years (n = 135)	FHP implantation	28.9	57*
Gusmão et al ⁴⁷	São Paulo, SP	Hypertension outpatient clinic, 18-60 years, no target-organ lesion (n = 40)	Three years after ending the program with telephone contact	78	50*
		Hypertension outpatient clinic, 18-60 years, target-organ lesion or other diseases (n = 37)		70	49*
Hoepfner et al ⁴⁶	Joinville, SC	BHCU, adults (n=415)	Improvement in therapy	12.8	36.6 [‡]

BHCU: basic health care unit; FHP: Family Health Program.

Blood pressure control: < 90 mm Hg (diastolic). § Blood pressure control: < 160 mm Hg (systolic) and 95 mmHg (diastolic).

* Blood pressure control: < 140 mm Hg (systolic) and 90 mmHg (diastolic). ‡ Blood pressure control: < 140 mm Hg (systolic) and 86 mm Hg (diastolic) (or 130/80 mm Hg for diabetes or chronic renal disease).

Arterial hypertension control is usually unsatisfactory. That might be explained by the insufficient reduction in blood pressure levels due to the ineffective treatment proposed. Another possibility to explain unsatisfactory blood pressure control relates to poor compliance with treatment or lack thereof. Those data of poor hypertension control in addition to other observations resulting from the practice of health care professionals reinforce the hypothesis that not only the diagnosis of arterial hypertension but also its treatment is easy; however, despite the efficacy of the existing therapeutic measures, blood pressure control is not an easy task, considering that it usually requires a life-long treatment. To improve arterial hypertension control, it is important to identify noncompliant patients.

Compliance is a complex behavioral process. The challenge of compliance with treatment requires the involvement of patients and health professionals. To achieve and maintain controlled blood pressure levels, the patient usually requires constant stimulation to change lifestyle and adjust the medication. Hypertensive patients should be observed at regular intervals, aiming at controlling their blood pressure levels, as well as maintaining them controlled in the long run. The major reason of the inadequate arterial hypertension control seems to be noncompliance with the treatment in the long run, regarding both the changes in lifestyle and the observation of the medication prescribed.

Noncompliance with treatment might reach high levels of interruption, considered the greatest degree of lack of compliance and representing a great challenge to health professionals. Several factors interfere with the process of compliance with treatment. Biosocial variables such as age, sex, race, educational level, socioeconomic level, occupation, marital status, religion, lifestyle, cultural aspects and health beliefs should be considered. A cohort study carried out in the city of Porto Alegre showed that interruption of the antihypertensive treatment was associated with smoking habit, a maximum educational level of 5 years, and less than 5 years of disease duration, while an increase in age was associated with a higher probability of follow-up⁵³. However, a study with hypertensives in the city of São Paulo evidenced that higher blood pressure levels during the follow-up were associated with age over 60 years, low educational level, low income, and hypertension duration longer than 5 years²².

Changes in life habits and style, as well as cultural aspects, can also influence compliance with treatment and require determination of the patient and professional team. Knowledge on the disease and its treatment is another factor to be considered. Studies^{24,25} have shown that hypertensives usually are instructed about their health condition, but are not properly controlled. Discrepancy between getting information about the disease and its treatment and managing to control blood pressure indicates an essential difference between knowledge and compliance. While knowledge is rational, compliance is a complex process, involving emotional factors and concrete practical and logistic barriers. Psychosocial factors, disease chronicity and lack of specific symptoms, as well as long-term complications influence the compliance process. The relationship between health care professionals and hypertensives also deserves attention.

The characteristics of the medicamentous treatment, such as side effects, complex therapeutic regimens, and life-long treatment, might influence compliance.

Arterial hypertension control depends on its detection, the structure of health care services and access to them, and compliance with treatment. To achieve blood pressure control, compliance with treatment is essential. In addition to frustrating health care professionals, because it prevents them from achieving their predetermined goals, noncompliance has an inherent negative social impact, because it affects individuals in their productive years.

Most of the population-based studies presented in this review assessed arterial hypertension prevalence and treatment, as well as the knowledge about the disease, in the populations studied⁴⁻¹⁶. Other studies have assessed relevant subjects, such as biosocial aspects influencing compliance with antihypertensive treatment, knowledge and beliefs about the disease^{19,22,24-27,29}, and health care practices^{14,17,20,21,34}. However, extending the knowledge about arterial hypertension control in Brazil, as well as about its determinant factors, is necessary to improve and assess the health care measures proposed by the Brazilian Unified Health Care System.

Conclusion

The studies assessed showed a wide variation in blood pressure control rates. It is worth noting that the comparison between studies was a limiting factor because of the differences in the methods adopted. However, even considering the most optimistic values, approximately 50% of hypertensives undergoing treatment are exposed to the complications of that disease due to lack of blood pressure control. This is even more alarming for hypertensives with other cardiovascular risks. Nationwide population-based studies, whose assessment criteria are in accordance with current recommendations, are necessary to better plan health care to hypertensives, thus, reducing cardiovascular morbidity and mortality.

Author contributions

Conception and design of the research, Acquisition of data, Analysis and interpretation of the data, Statistical analysis, Writing of the manuscript and Critical revision of the manuscript for intellectual content: Pinho NA, Pierin AMG.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

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