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ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Prevalence of self-reported arterial hypertension in Brazilian capitals in 2011 and analysis of its trends in the period between 2006 and 2011

Prevalência da hipertensão arterial autorreferida nas capitais brasileiras em 2011 e análise de sua tendência no período de 2006 a 2011

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ABSTRACT: ***Objective:*** To describe the prevalence of self-reported arterial hypertension in the adult population in the Brazilian state capitals and Federal District in 2011, and analyze the trend from 2006 to 2011. ***Methods:*** A time series study was conducted with data from the monitoring system by telephone survey (Vigitel) in the period between 2006 and 2011. Approximately 54,000 individuals were assessed per year in the locations studied. A polynomial regression model was used for trend analysis according to gender, age, education and region of the country. ***Results:*** The prevalence of hypertension was 22.7% in 2011, higher in women (25.4%; 95%CI 24.2 – 26.5) than in men (19.5%; 95%CI 18.4 – 20.7). In the period between 2006 and 2011, the lower frequency of hypertension was observed in 2006 (21.5%), and the higher in 2009 (24.4%), with no statistically significant difference in the period. ***Conclusion:*** There was no significant sex-specific trend, maintaining the higher frequency among women. The prevalence of hypertension increased progressively with age and was higher among adults with lower education (0 – 8 years of study). The South was the only region that showed a statistically significant increasing trend for the years between 2006 and 2011 (15% per year).

Keywords: Hypertension. Prevalence. Interview. Chronic disease. Time series studies. Morbidity.

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RESUMO: ***Objetivo:*** Descrever as prevalências de hipertensão arterial (HA) autorreferida na população adulta nas capitais brasileiras e no Distrito Federal em 2011, e analisar a tendência entre 2006 e 2011. ***Métodos:*** Foi realizado estudo de séries temporais de dados provenientes do sistema de monitoramento por inquérito telefônico, o Vigitel, no período de 2006 a 2011. Foram avaliados cerca de 54.000 indivíduos em cada ano nos locais estudados. Foi utilizado o modelo de regressão polinomial para análise de tendência segundo sexo, faixa etária, escolaridade e região do país. ***Resultados:*** A prevalência de HA foi de 22,7% em 2011, maior em mulheres (25,4%; IC95% 24,2 – 26,5) do que em homens (19,5%; IC95% 18,4 – 20,7). No período de 2006 a 2011, a menor frequência de HA foi verificada em 2006 (21,5%), e a maior em 2009 (24,4%), sem diferença estatisticamente significativa no período. ***Conclusões:*** Não houve tendência significativa específica por sexo, mantendo-se maior frequência entre mulheres. A prevalência de HA aumentou progressivamente com a idade e foi maior entre os adultos de menor escolaridade (0 a 8 anos de estudo). A região Sul foi a única que apresentou tendência de aumento estatisticamente significativo (incremento de 15% ao ano) para os anos de 2006 a 2011.

Palavras-chave: Hipertensão. Prevalência. Entrevista por telefone. Doença crônica. Séries temporais. Morbidade.

INTRODUCTION

Cardiovascular diseases (arterial hypertension, ischemic and cerebrovascular diseases) are the first cause of morbimortality in the world[1] and are responsible for about 30% of causes of death in Brazil[1,2]. Among them, hypertension is the most frequent cause of morbidity and the main risk factor for cardiovascular complications, such as stroke and acute myocardial infarction, besides chronic kidney disease[1,3].

The World Health Organization (WHO) estimates that approximately 25% of the population have arterial hypertension (AH), and an increase of 60% is predicted for 2025[1,4]. Besides, AH brings high socioeconomic costs, and directly affects individuals, the health system and the economy[5].

Risk factors associated with AH are described in literature, such as inadequate diet, excessive salt, abusive alcohol consumption, physical inactivity, excess weight, smoking, glucose and lipid metabolism disorders[3-7].

In Brazil, there are a few population based studies referring to the prevalence of AH. Most of them are focused on cities or regions[8-13]. In general, studies present methodological differences (sample, population groups, age group, and diagnostic criteria) that make comparability more difficult. However, prevalence ranges from 15 to 40% in the urban adult Brazilian population[8-14].

Due to the methodological difficulties to measure blood pressure in population studies, analyses that employ self-reported data have been used as a proxy measure, even if it is not gold-standard for the evaluation of blood pressure. However, this is the only available standardized option for all of the capitals, regardless of their respective social discrepancies[14].

In the supplement of the National Household Survey (PNAD) from 2008, a frequency of 14% of hypertension was reported among people aged more than 15 years old[15]. In the United States, the Behavioral Risk Factor Surveillance System (BRFSS) used the self-reported methodology to monitor AH for more than 20 years[16].

The prevalence of self-reported hypertension in the United States, from 2005 to 2009, increased from 25.8 to 28.3%, according to data from BRFSS[17]. A systematic review with data published from January 1980 to July 2003 indicates that the prevalence of hypertension is different around the world: the lowest prevalence was in the rural region of India (5.2%), and the highest one was in Poland (70.7%)[18].

The monitoring of AH is useful to support the elaboration of preventive measures of morbimortality for this group of cardiovascular diseases. In 2006, the Ministry of Health implemented Vigitel – Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases – an instrument that monitors the distribution of risk and protective factors for non-communicable chronic diseases, including self-reported arterial hypertension, using telephone interviews[19].

The objective of this study is to estimate the prevalence of self-reported AH in the adult population in 2011 in Brazilian capitals and in the Federal District, and also to analyze the trend in the period from 2006 to 2011.

METHODS

TYPE OF STUDY

A study of time series database with data originated from the Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases (Vigitel) was conducted in the 26 Brazilian capitals and in the Federal District from 2006 to 2011. Annually, about 2,000 telephone interviews were collected in each of the 26 Brazilian capitals and in the Federal District, accounting for 54,000 individuals assessed every year[19].

SAMPLE

Vigitel uses the probability sample in two stages:

1. Systematic raffle of 5,000 landlines in each city, followed by a new raffle and the organization of 25 replicas (sub-samples) of 200 landlines;

2. Random selection of one adult person aged > 18 years old living in the household to answer the interview[19].

The estimates of indicators were weighed by considering the differences in the probability of selecting each interviewee, characterized according to the number of landlines and adults living in the selected household, as well as the differences in the sociodemographic composition of the Vigitel sample in relation to the composition of the total adult population in each city, according to the census distribution of 2000. Final weights are attributed to each interviewed individual, which are a result of the multiplication of the following factors: the opposite of the number of landlines in the household of the interviewee; number of adults in the interviewed household; and post-stratification weight, which aims at equaling the sociodemographic composition of the adult population in the city with the population census, according to data of sex, age groups and schooling. A forth weighing factor is used for the estimates related to the set of the 27 capitals, being the ratio between the proportion of adults in a given city by the proportion of adults in the 27 cities[19].

STUDIED VARIABLES

The current study analyzed data referring to the prevalence of arterial hypertension, based on the number of individuals that refer to the medical diagnosis of arterial hypertension/ interviewed individuals, according to the answer given to the question "Has any doctor ever told you have high blood pressure?".

STATISTICAL ANALYSIS

The tendency measure of the time series of AH was stratified according to sex, age group, schooling and region of the country. The indicator was expressed by the proportion of adults who answered yes to the question concerning AH for each year of the survey. The technique used to estimate the tendency was the polynomial regression model, whose response variable (Y_i) is the proportion of the indicator, and the explanatory variable (X_i) is time (year of survey). The negative signal of the angular coefficient (β) of the line adjusted by the model indicates that the relationship between indicator and time is decreasing; otherwise, the relationship is increasing. The value of the positive angular coefficient represents a mean annual increase in the proportion of the indicator for each unit of time. Otherwise, it represents the mean annual decrease of the proportion[20].

The proportions for the period of 2006 to 2011 were presented, as well as the tendency expressed by the angular coefficient of the line and the significance level of the tendency. The residue analysis was used, with a 5% significance level, as measures

of model adequacy. For data processing and statistical analyses, the software Stata, version 11.1, was used. The commands indicated for proportions were used, considering the weighing factors attributed to each individual who was interviewed in Vigitel surveys[19].

ETHICAL ASPECTS

This study was approved by the National Human Ethics Research Committee (CONEP). The informed consent form was replaced by the verbal consent, obtained during telephone contacts with the interviewees.

RESULTS

In the set of the adult population of the 27 cities analyzed in 2011, the frequency of a previous medical diagnosis of arterial hypertension reached 22.7% (95%CI 21.9 – 23.5), being higher among women (25.4%; 95%CI 24.2 – 26.5) than men (19.5%; 95%CI 18.4 – 20.7) (Table 1). The prevalence of adults who reported a medical diagnosis of arterial hypertension in 2011 ranged between 12.9% (95%CI 10.2 – 15.6) in Palmas and 29.8% (95%CI 27.0 – 32.6) in Rio de Janeiro. For the male gender, the highest frequencies were observed in Rio de Janeiro (23.9%; 95%CI 20.0 – 27.9), Campo Grande (23.9%; 95%CI 19.5 – 28.3) and Porto Alegre) 23.6%; 95%CI 19.8 – 27.5); lowest frequencies were observed in Porto Velho (12.9%; 95%CI 10.3 – 15.5), Palmas (13.1%; 95%CI 8.8 – 17.4) and Fortaleza (14.3%; 95%CI 11.2 – 17.4). Among women, the highest frequencies were observed in Rio de Janeiro (34.7%; 95%CI 31.0 – 38.4), Recife (30.3%; 95%CI 26.5 – 34.1) and Natal (28.2%; 95%CI 24.0 – 32.4); lowest frequencies were in Palmas (12.7%; 95%CI 9.4 – 16.0), Boa Vista (18.4%; 95%CI 14.0 – 22.8) and São Luís (19.1%; 95%CI 15.0 – 23.2). The capitals that presented significant differences in prevalence between men and women were Porto Velho, Recife and Rio de Janeiro (Table 1).

In the period of 2006 to 2011, the frequency of reported arterial hypertension among adults analyzed by Vigitel ranged from 21.5% in 2006 and 24.4% in 2009. Howver, there was no statistically significant difference in all of the analyzed period. Likewise, no specific significant tendency was observed by sex. The highest frequency of hypertension among women was observed in all of the analyzed years (Table 2).

It was possible to verify progressive increase in the frequency of hypertension diagnosis with age, and the prevalence among the elderly (65 years old or more) was up to 10 times higher than that among young adults (18 to 24 years old). In 2011, for instance, the prevalence was of 5.4% for the former and 59.7% for the latter. This relationship was observed in all of the years of the series, with no time tendency of changes in the period. From the age of 55, arterial hypertension reaches practically half of the population (Table 2).

It is important to mention the inverse association between schooling and the diagnosis of the disease: while 26.8% of the people, with up to eight schooling years, reported having

arterial hypertension, the same condition was observed among 16.0% of the adults with 12 schooling years or more. These differences between schooling categories remained in 2011 (28.3 and 17.5%, respectively), also with no changes of tendency in the period.

In the evaluation of prevalence according to regions of the country, it was possible to notice that the highest frequencies were observed in the Southeast (prevalence of 24.7%

Table 1. Percentage* of adults (≥ 18 years old) who reported medically diagnosed hypertension, by sex, according to the Brazilian state capitals and the Federal District. Vigitel, 2011.

Capitals and DF	Total		Sex			
			Male		Female	
	%	95%CI	%	95%CI	%	95%CI
Aracaju	23.3	20.3 – 26.3	21.1	16.4 – 25.9	25.1	21.2 – 29.0
Belém	19.9	17.1 – 22.7	19.5	15.1 – 23.8	20.2	16.6 – 23.9
Belo Horizonte	22.4	20.0 – 24.9	19.1	15.3 – 22.9	25.3	22.0 – 28.5
Boa Vista	17.0	13.8 – 20.2	15.6	11.1 – 20.2	18.4	14.0 – 22.8
Campo Grande	24.0	21.2 – 26.8	23.9	19.5 – 28.3	24.1	20.6 – 27.6
Cuiabá	21.4	18.6 – 24.2	21.0	16.7 – 25.3	21.8	18.1 – 25.5
Curitiba	22.0	19.6 – 24.3	19.5	16.1 – 22.8	24.2	20.8 – 27.5
Florianópolis	18.7	16.6 – 20.7	16.3	13.4 – 19.2	20.8	18.0 – 23.6
Fortaleza	17.3	15.0 – 19.6	14.3	11.2 – 17.4	19.8	16.5 – 23.1
Goiânia	21.1	18.5 – 23.7	20.1	16.1 – 24.1	21.9	18.5 – 25.3
João Pessoa	21.0	18.4 – 23.6	18.1	14.4 – 21.8	23.4	19.8 – 27.0
Macapá	19.0	16.0 – 22.0	16.8	13.0 – 20.7	21.0	16.5 – 25.6
Maceió	22.2	19.2 – 25.2	19.1	14.4 – 23.7	24.8	21.0 – 28.7
Manaus	18.6	15.8 – 21.5	15.4	11.4 – 19.4	21.6	17.5 – 25.7
Natal	24.9	21.4 – 28.3	20.8	15.3 – 26.3	28.2	24.0 – 32.4
Palmas	12.9	10.2 – 15.6	13.1	8.8 – 17.4	12.7	9.4 – 16.0
Porto Alegre	25.7	23.2 – 28.1	23.6	19.8 – 27.5	27.4	24.2 – 30.5
Porto Velho	16.8	14.6 – 19.0	12.9	10.3 – 15.5	20.6	17.0 – 24.2
Recife	26.1	23.3 – 29.0	21.0	16.9 – 25.0	30.3	26.5 – 34.1
Rio Branco	21.0	17.7 – 24.2	19.6	14.6 – 24.7	22.2	18.0 – 26.3
Rio de Janeiro	29.8	27.0 – 32.6	23.9	20.0 – 27.9	34.7	31.0 – 38.4
Salvador	21.2	18.9 – 23.5	18.1	14.9 – 21.3	23.8	20.5 – 27.0
São Luís	17.7	14.9 – 20.5	16.0	12.3 – 19.7	19.1	15.0 – 23.2
São Paulo	22.5	19.9 – 25.0	19.6	16.2 – 23.0	24.9	21.3 – 28.5
Teresina	20.7	17.7 – 23.7	19.6	15.1 – 24.1	21.5	17.4 – 25.6
Vitória	25.0	21.8 – 28.3	22.6	18.7 – 26.4	27.1	22.1 – 32.1
Distrito Federal	20.2	17.8 – 22.7	16.9	13.5 – 20.2	23.2	19.7 – 26.6
Total	22.7	21.9 – 23.5	19.5	18.4 – 20.7	25.4	24.2 – 26.5

*Percentage weighed to adjust the sociodemographic distribution of the Vigitel sample to the distribution of the adult population of each city in the 2000 Demographic Census 2000 (see *Methodological Aspects*).
Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey.

Table 2. Trend analysis of self-reported diagnosis of hypertension in the overall adult population (≥ 18 years old) of the Brazilian state capitals and the Federal District, by sex, by age and years of education. Vigitel, 2011.

Variable	2006		2007		2008		2009		2010		2011		β coefficient	p-value
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI		
Total	21.5	20.8 – 22.3	22.3	21.6 – 23.1	23.9	23.0 – 24.7	24.4	23.3 – 25.4	23.3	22.3 – 24.2	22.7	21.9 – 23.5	0.27	0.34
Sex														
Male	18.4	17.4 – 19.4	19.9	18.7 – 21.0	21.0	19.7 – 22.3	21.1	19.6 – 22.5	20.7	19.1 – 22.2	19.5	18.4 – 20.4	0.23	0.42
Female	24.2	23.3 – 25.2	24.5	23.4 – 25.5	26.3	25.2 – 27.4	27.2	25.8 – 28.5	25.5	24.3 – 26.7	25.4	24.2 – 26.5	0.28	0.34
Age group (years)														
18 – 24	5.7	4.6 – 6.8	5.6	4.1 – 7.1	6.5	4.8 – 8.1	7.5	4.7 – 10.3	8.2	5.3 – 11.1	5.4	3.3 – 7.5	0.21	0.51
25 – 34	10.4	9.2 – 11.7	10.7	9.2 – 12.1	11.1	9.7 – 12.6	13.7	11.6 – 15.7	10.0	8.6 – 11.4	10.2	8.9 – 11.6	– 0.01	0.97
35 – 44	18.1	16.7 – 19.5	19.1	17.6 – 20.5	21.1	19.6 – 22.7	20.9	19.2 – 22.5	18.7	17.1 – 20.3	20.1	18.5 – 21.8	0.25	0.46
45 – 54	31.8	29.9 – 33.8	35.2	33.1 – 37.3	37.0	35.0 – 39.1	34.5	32.5 – 36.5	35.8	33.7 – 38.0	35.3	33.4 – 37.3	0.48	0.30
55 – 64	48.2	45.6 – 50.9	49.2	46.7 – 51.8	52.0	49.5 – 54.5	50.4	47.9 – 52.9	52.8	50.2 – 55.4	50.5	48.1 – 52.9	0.59	0.16
≥ 65	57.8	55.5 – 60.1	57.8	55.3 – 60.3	61.0	58.7 – 63.4	63.2	60.9 – 65.4	60.2	57.8 – 62.5	59.7	57.4 – 61.9	0.54	0.32
Schooling (years)														
0 – 8	26.8	25.6 – 28.0	28.1	26.8 – 29.4	30.3	28.8 – 31.8	31.5	29.7 – 33.4	30.0	28.3 – 31.7	28.3	26.9 – 29.8	0.41	0.38
9 – 11	15.2	14.4 – 16.1	15.2	14.3 – 16.1	16.0	15.2 – 16.9	15.8	15.0 – 16.7	15.3	14.4 – 16.1	15.6	14.7 – 16.4	0.06	0.52
≥ 12	16.0	14.8 – 17.2	16.7	15.5 – 17.9	17.5	16.3 – 18.8	16.8	15.7 – 18.0	16.2	15.0 – 17.3	17.5	16.2 – 18.7	0.15	0.37
Region														
Northeast	21.4	20.4 – 22.3	21.6	20.6 – 22.6	22.3	21.2 – 23.3	23.5	22.4 – 24.6	22.0	20.9 – 23.1	21.1	20.1 – 22.1	0.03	0.92
North	19.1	17.8 – 20.3	17.3	16.1 – 18.4	17.4	16.2 – 18.6	18.9	17.6 – 20.2	18.1	16.8 – 19.5	18.8	17.4 – 20.3	0.07	0.76
Southeast	22.8	21.4 – 24.1	24.6	23.1 – 26.1	27.0	25.3 – 28.7	26.8	24.7 – 28.8	25.2	23.6 – 26.8	24.7	23.1 – 26.4	0.32	0.46
South	20.9	19.5 – 22.3	21.8	20.3 – 23.3	23.3	21.8 – 24.8	22.8	21.2 – 24.4	23.8	22.3 – 25.4	23.1	21.6 – 24.6	0.47	0.04
Center – West	19.4	17.9 – 21.0	19.6	18.2 – 21.0	20.8	19.4 – 22.1	22.3	20.2 – 24.3	22.6	17.9 – 27.3	21.1	19.7 – 22.6	0.54	0.08

in 2011), and the lowest ones were in the North region (18.8%), and this situation was similar to the previous years. The South region showed statistically significant increasing tendency with non-constant increment of 0.47 a year, going from 20.9%, in 2006, to 23.1%, in 2011 (p = 0.044). The Northeast and Center-West regions presented 21.1% of prevalence in 2011 (Figure 1).

The third order model represented the historical series of 2006 to 2011, with no difference of sex and age group. It was observed that the mean coefficient was of 18.1% in the Southeast region, while the highest coefficient was in the North region in the same period (β_0= 22.6).

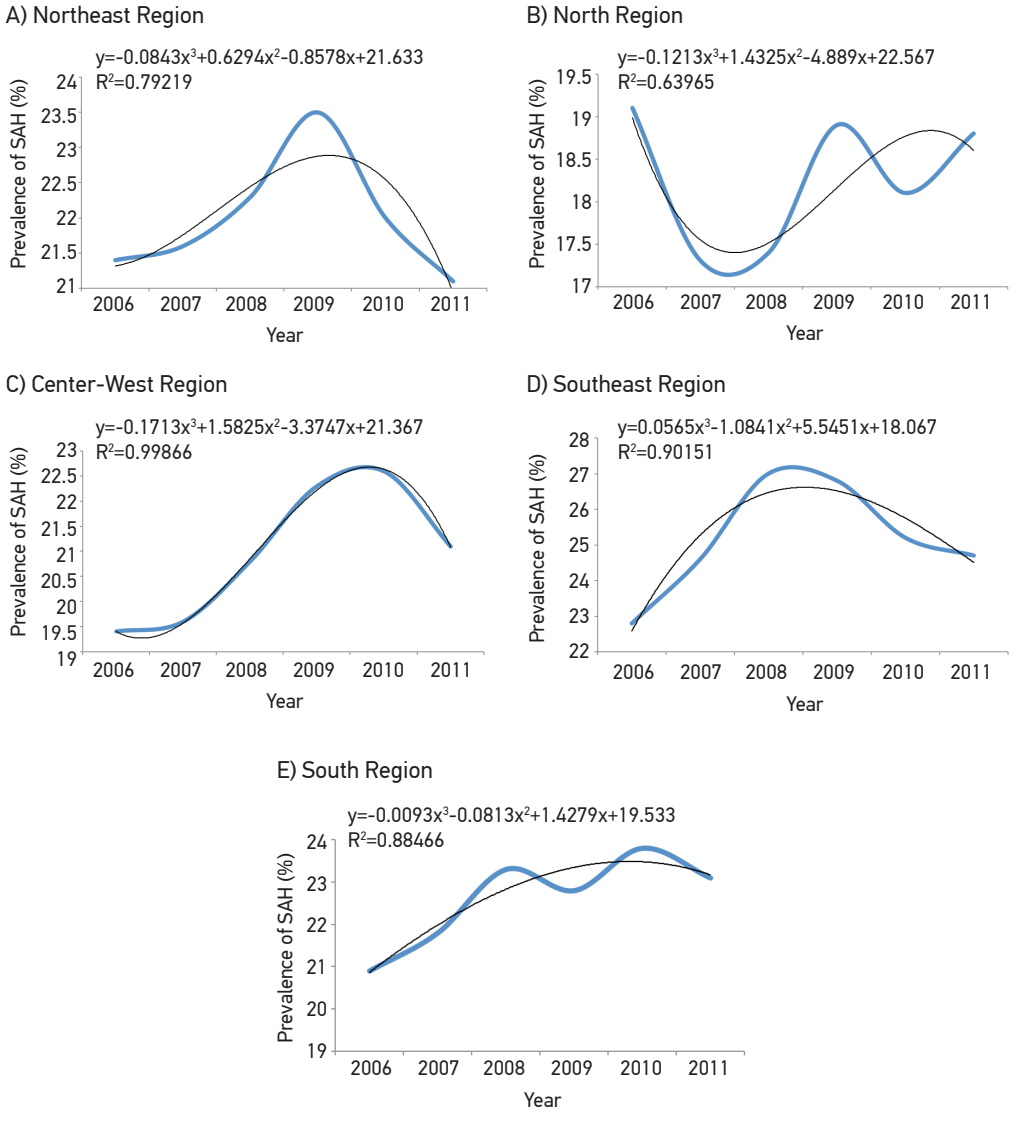

Figure 1. Trend of self-reported diagnosis of hypertension in the overall adult population (≥ 18 years) according to Brazilian Region, 2006 – 2011.

The South region was the only one that presented statistically significant increasing tendency (15% increment a year), however, it was not constant for the years 2006 to 2011 (Figure 1).

DISCUSSION

The study showed prevalence of arterial hypertension (AH) in about one quarter of the population, with progressive increase with age, reaching more than half of the population aged more than 55 years old. Self-reported AH was more frequent among women and people with lower schooling. As to the behavior of the hypertension tendency, the series remained stable throughout the period for the characteristics of sex, age group, schooling and region, except for the South region, which demonstrated an increasing effect in the analyzed series.

Hypertension is the most comprehensive vascular disease in the world, with major social impact, especially in Brazil, where cardiovascular conditions are the first cause of death. The prevalence measured by Vigitel is compatible with other self-reported studies in the country[8,9,12,14].

Regional differences were pointed out and, in some capitals, prevalence rates are very different. Rio de Janeiro presented the highest prevalence (29.8%) among Brazilian capitals. This information is similar to the results in the *Pró-Saúde* study, conducted in a university of Rio de Janeiro, in 2001. This study showed 29.6% for both genders and statistically significant increase in prevalence with age[21]. This fact is compatible with the age structure of Rio de Janeiro, with high proportion of elderly people[22].

On the other hand, the city of Palmas presented the lowers prevalence among all cities (12.9%), and that can be related to the high proportion of the young population in the city, which was created in the 1980s[22,23]. The North, Northeast and Center-West regions also have more young people in the composition of the population; therefore, there is lower prevalence of AH. The regional differences should also be considered for the access to health services. Since this is a self-reported variable, there may be a fraction of undiagnosed cases of hypertension, which tends to be reduced with the amplified access to health services and with the organization of primary care.

This same hypothesis can explain the highest frequencies of AH in the population of the Southeast and the South, with older population and better health care structure, both from the public and the private sector, for the access to the medical diagnosis of AH. According to PNAD from 2008[15], 50.3% of the permanent private households in the South region were registered in the Family Health Program, and 30% of their inhabitants declared having an insurance health plan. Additionally, the population aging in the South region could also explain the increasing tendency in the prevalence of hypertension in this location. Census 2010 pointed out that 8.1% of the population in this region is composed of people aged 65 years old or more[22].

With regard to schooling, the relationship was opposite, thus showing that educational level, proxy of socioeconomic condition, constitutes a protective factor for the risk of NCCDs. It is related to the higher access to health promotion practices, such as healthy diet and

physical activity, and also to the higher access to health services[1,6,24,25]. However, literature reports that AH has been inversely associated with the schooling of the adult population in São Paulo. Despite that, self-reported AH demonstrated to be an adequate indicator for the surveillance of this disease[26].

The World Health Organization (WHO) indicates that the prevalence of hypertension is higher in low and mid-income countries. However, what generates the decreased prevalence of this disease in high income countries are interventions in the public health field[27]. In order to reach the objective of a 25% relative reduction in the prevalence of high blood pressure, interventions are required to reduce the intake of salt and saturated fat, and also to increase the intake of fruits and vegetables. Efforts to reduce overweight and obesity as well as screening to detect and treat hypertensive people early are also necessary[28].

The study demonstrated higher frequency of AH among women, which is different from data from WHO for 2008. The latter shows that for adults older than 25 years old, the highest prevalence is among men, both in the world (29.2% for men and 24.8% for women) and in the American region (26.3% for men and 19.7% for women)[27]. The difference between sexes in the prevalence of hypertension can be explained by the diversity of risk factors among men and women. A plausible explanation is that women recognize their condition of being hypertensive more than men[21], since they attend health services more often[8,12,24].

The main limitation of this study refers to the use of self-reported morbidity to the detriment of biomedical criteria to diagnose the disease. Therefore, the presented data concern only diagnosed cases. Despite the self-reported information, which, in the case of arterial hypertension, may be overestimated in up to 10%, this measure has been used in other studies and has been considered to be adequate[8,25], with similar results[15,19]. Therefore, the high level of awareness of the population about their hypertensive state showed good access to health services and good AH detection[6].

In the United States, a study comparing self-reported AH results in the telephone survey, Behavioral Risk Factor Surveillance System (BRFSS), and the National Health and Nutrition Examination Survey III, which measures blood pressure, point out to good sensitivity and specificity when it comes to measures[16,29]. The study demonstrated that arterial hypertension increased with age, which was compatible with literature due to the natural history of the disease and the accumulation of risk factors[3,21]. For hypertension, literature showed that self-reporting is a satisfactory indicator for prevalence estimates, with the advantage of obtaining information fast and with low cost[8,30].

Another study limitation consisted of the use of landlines in the capitals for purposes of raffle. In the metropolitan South, Southeast and Center-West regions, with more than 70% of coverage, vices due to the exclusion of households without landlines can be unconsidered[31]. However, the North and Northeast regions presented coverage rates that were lower than 70%. In order to correct the potential vices due to the low coverage of households with landlines, Vigitel used the cell weighing method according to sex, age and schooling, therefore adjusting the distribution of the sample to the characteristics of the population

living in each capital (according to the census by IBGE). With that, it was possible to reduce the differences between population with and without landlines[14,31].

Other comparative studies between data from Vigitel and household surveys indicated the importance of weighing to reduce vice in some variables, especially those associated with low income and low schooling[32,35]. The monitoring of Vigitel data makes it possible to analyze tendencies, even though the six-year time for analysis is short to provide a more robust description of tendency, therefore, there may be changes in the historical series.

It is also important to mention the monitoring NCCDs and their risk factors as part of the promises made by Brazil, especially in the plan to face the NCCDs and in national and international goals and those established to reduce the mortality of NCCDs, the reduction of arterial hypertension and the control of risk patients, keeping them in control programs[28,33-36]. However, by considering the complexity and the difficult logistics of regular household surveys with objective measures of blood pressure, information resulting from Vigitel can contribute with planning, monitoring and evaluation of national actions for its control.

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