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Original Articles

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Promotion, prevention and arterial hypertension care in Brazil

ABSTRACT

OBJECTIVE: To estimate the prevalence of promotion, prevention and arterial hypertension care actions in adults and to identify their association with decompensated hypertension.

METHODS: A population-based cross-sectional epidemiological study was conducted by interviewing 12,324 adults aged from 20 to 59 years, in 100 Brazilian cities. The independent variables considered as promotion, prevention and hypertension care were as follows: to have received guidance on ideal weight maintenance and physical activity practice; to have consulted a doctor; and to have had an electrocardiogram performed in the previous year. A blood pressure higher than 140/90 mm/Hg was considered to be decompensated, being the dependent variable adopted to assess quality of care.

RESULTS: Of all participants, 16.3% (n = 2,004) reported a medical diagnosis of hypertension. The highest prevalences of hypertension were observed in the 50 to 59 year age group, primarily in the Southeast and Center-West regions. More than half (66.1%) of participants had a medical consultation about hypertension in the previous year, of which half (52.4%) had an electrocardiogram. Of all those with hypertension who had their blood pressure measured during interview (74.6%), less than half (42.4%) had decompensated values.

CONCLUSIONS: There was no association between having consulted a doctor in the previous year and decompensated blood pressure values. The proportion of decompensated hypertensive participants was significantly lower among those who had received guidance on ideal weight maintenance and physical activity practice and those who had had an electrocardiogram performed. The following factors were associated with decompensated hypertension: to be male, to be aged more than 40 years and to live in the South region.

DESCRIPTORS: Adult. Hypertension, epidemiology. Hypertension, prevention & control. Risk Factors Health Surveys.

INTRODUCTION

The increase in blood pressure is a sign of manifestation of a specific disease in secondary hypertension (HTN), corresponding to 5% of cases. In the case of primary or essential HTN, it is a sign that a set of factors is affecting the cardiovascular system, corresponding to the remaining 95% of HTN cases. In these cases, its manifestation and severity are influenced by factors such as the amount of salt in the diet, physical activity pattern, body weight control, smoking and co-morbidities such as diabetes mellitus.[15] Thus, health promotion actions, disease prevention and clinical care are required to approach this

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condition.[10] The directives that guide these initiatives are well-established and widely disseminated.[a]

Quality of HTN care has been evaluated using different methodologies and indicators.[1-3,7-9,13] A recent study pointed to the following quality indicators to approach HTN: measuring blood pressure at least once a year and providing guidance on body weight control, physical activity and a low-salt diet.[1]

The directives recommended by the Brazilian national policy[a] and by authors who represent the British Hypertension Society[15] were considered to assess HTN care for adults in Brazil. A previous study found a significant association between diastolic blood pressure and the variables that represent the care process and concluded that, despite the efforts made to develop methods that assess medical care quality, none of them was fully satisfactory.[9] Care provided by the same doctor throughout time is a variable significantly associated with compensated blood pressure.[11] Capacity building and sensitization of primary health care professionals increase the adoption of practices such as guidance on risk factors and assessment of target HTN services, variables considered to be health care qualifiers.[3] The present study aimed to estimate the prevalence of promotion, prevention and hypertension care actions for adults in Brazil and to identify its association with decompensated hypertension.

METHODS

A population-based cross-sectional epidemiological study was conducted between 2008 and 2009. The target population was representative of the Brazilian population, comprised of adults aged between 20 and 59 years, living in private homes in the urban area of 100 cities in Brazil.

The sample was obtained in a complex process on multiple levels: a) population in five categories: 1) < 10,000 inhabitants; 2) 10,000 < 20,000 inhabitants; 3) 20,000 < 100,000 inhabitants; 4) 100,000 < 1.1 million inhabitants; and 5) more than 1.1 million inhabitants; b) census tracts; and c) households.[14] The territorial division and network of census tracts used in the 2000 Demographic Census of the *Instituto Brasileiro de Geografia e Estatística* (IBGE – Brazilian Institute of Geography and Statistics) was adopted to select cities and urban census tracts. The number of sectors selected in each city was proportional to the number of valid sectors and population size.[b,c]

Individuals who were not legally free or who lived in long-term institutions were excluded from this study.

The parameters for the association tests used a power of 80%, 95% confidence level and ratio of exposure of 1:4; prevalences of outcome from 15% to 60% in the non-exposed group, prevalence ratio of 1.3 and an additional 10% for losses and 15% for confounding factors. Considering the design effect of 2.4, a sample comprised of 10,200 adults was estimated to be sufficient to meet the needs.

The definition of the number of individuals to be located in each urban census tract (standard unit of population group) considered a mean concentration of 1.94 adults aged from 20 to 59 years per urban household.[d] Households were selected in all sectors by systematically ignoring 30 households with a random beginning. All eligible adults were studied in each household.

The inclusion criterion for the category of participant having HTN was to have received a medical diagnosis of this condition, whose predictive positive value is 73.9%,[6] when compared to the diagnosis performed by measuring blood pressure, considered to be the gold standard. The mean to define the outcome was obtained in different moments during the interview using two blood pressure measurements made with a Geratherm Wristwatch Medical AG blood pressure monitor, considering mean blood pressures higher than 140/90 mmHg to be decompensated.[15]

Sex, age, place of residence, economic classification[e] and level of education were used in the analysis of quality of care behavior. The independent variables considered as promotion, prevention and care were as follows: to have consulted a doctor in the previous year, to have received guidance on ideal weight maintenance; to have received guidance on physical activity; and to have had an electrocardiogram (EKG) performed in the previous year. A blood pressure higher than 140/90 mmHg was considered to be decompensated, being the dependent variable used to assess quality of care (Figure).

Self-reporting hypertension based on an informed medical diagnosis was validated by Brazilian authors in a recent study.[6] Likewise, the variables adopted to indicate health promotion, prevention and care were similar to those used by authors in North America in the last decade as well.[1]

In addition to the questionnaire application and blood pressure measurements, weight (Geratherm digital

[a] Ministério da Saúde (BR), Secretaria de Políticas de Saúde. Plano de Reorganização da Atenção à Hipertensão Arterial e ao Diabete Mellitus Brasília (DF); 2001.
[b] Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostras de Domicílios: acesso e utilização de serviços de saúde - 2003. Rio de Janeiro; 2005.
[c] Instituto Brasileiro de Geografia e Estatística. Indicadores populacionais. Rio de Janeiro; 2000.
[d] Instituto Brasileiro de Geografia e Estatística. Dados populacionais. Rio de Janeiro; 2006.
[e] Associação Brasileira de Empresas de Pesquisa. Critério de classificação econômica do Brasil. São Paulo; 2008.

scale) and height (WISO T87 measuring tape) were assessed, thus enabling objective and standardized measurements. All pieces of equipment were of proven quality and their use was authorized by the *Agência Nacional de Vigilância Sanitária* (Anvisa – National Health Surveillance Agency) and *Instituto Nacional de Metrologia, Qualidade e Tecnologia* (Inmetro – National Institute of Metrology, Quality and Technology).

Data were recorded electronically in a Personal Digital Assistant (PDA). At the end of each day of research, PDA data were stored into a portable computer and subsequently sent to the server located at the research headquarters via Internet. This technology also enabled participants' homers to be located by Global Positioning System (GPS), used as field work quality control. Data were stored and analyzed in Stata 10.0.

Bivariate analysis was performed to compare proportions, using the chi-square test with a 5% significance level. Crude and adjusted prevalence ratios with 95% confidence intervals were calculated using Poisson regression,[5] according to a hierarchical analysis model (Figure). The following variables were included at the most distal level: sex, age, geographic region, socioeconomic class and level of education; at the second level: to have consulted a doctor about HTN and to have received guidance on health promotion; and at the third level: to have had an EKG performed.

This study was approved by the Research Ethics Committee of the Universidade Federal de Pelotas, according to protocol number 152/07 of November 23rd, 2007. All participants signed an informed consent form.

RESULTS

A total of 12,324 adults were interviewed in the 100 cities of the sample, of which 16.3% (2,004) reported a medical diagnosis of HTN. There were no differences in the distribution of hypertensive individuals by sex among Brazilian regions. The distribution by age showed higher proportions of hypertension in the 50 to 59 year age group, concentrated in the Southeast and Central-West regions, whereas the lower frequency

Table 1. Distribution of the adult population with systemic arterial hypertension by ethnicity, sex, age, socioeconomic classification and level of education, according to geographic region. Brazil, 2010.

Variable	North		Northeast		Southeast		South		Central-West		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												$p < 0.711$
Male	44	38.3	165	38.8	285	38.3	207	41.9	93	41.3	794	39.6
Female	71	61.7	260	61.2	460	61.7	287	58.1	132	58.7	1210	60.4
Total	115	100	425	100	745	100	494	100	225	100	2004	100
Age (years)												$p < 0.002$
20 to 29	6	5.3	36	8.5	42	5.7	36	7.3	15	6.7	135	6.8
30 to 39	16	14	91	21.4	103	13.9	66	13.4	42	18.8	318	15.9
40 to 49	40	35.1	125	29.4	211	28.5	170	34.5	58	25.9	604	30.3
50 to 59	52	45.6	173	40.7	384	51.9	221	44.8	109	48.7	939	47
Total	114	100	425	100	740	100	493	100	224	100	1996	100
Socioeconomic class												$p < 0.000$
A	1	1.1	9	2.2	28	4	17	3.6	9	4.1	64	3.4
B	14	14.7	49	11.9	190	27.3	167	35.2	64	29.1	484	25.5
C	50	52.6	195	47.3	360	51.6	263	55.4	104	47.3	972	51.2
D	26	27.4	142	34.5	117	16.8	25	5.3	42	19.1	235	18.5
E	4	4.2	17	4.1	2	0.3	3	0.6	1	0.5	27	1.4
Total	95	100	412	100	697	100	475	100	220	100	1899	100
Level of education (years)												$p < 0.000$
None	16	13.9	86	20.3	70	9.4	27	5.5	27	12.1	226	11.3
1 to 4	21	18.3	104	24.5	199	26.9	126	25.7	41	18.4	491	24.6
5 to 8	23	20	91	21.5	239	32.3	172	35	61	27.4	586	29.4
9 to 11	38	33	105	24.8	150	20.2	122	24.8	58	26	473	23.37
12 and +	17	14.8	38	9	83	11.2	44	9	36	16.1	218	10.9
Total	115	100	424	100	741	100	491	100	223	100	1994	100

of HTN in this age group was found in the Northeast region (40.7%). Almost half of the sample of Brazilians with hypertension belonged to socioeconomic class C; a higher proportion of individuals of classes D and E in the North and Northeast regions contrasted with the higher proportion of individuals of classes A and B in the South, Southeast and Central-West regions. The proportion of individuals with hypertension who had no formal education in the Northeast region was higher than that found in the remaining regions, followed by the North and Central-West regions. In the latter region, the lowest proportion of adults with hypertension who had not completed one year of school was observed (Table 1).

Among this sample comprised of 1,995 individuals with hypertension, 1,318 (66.1%) had consulted a doctor about HTN in the previous year. Of these, 682 (52.4%) had had an EKG performed to monitor the heart as a target organ of HTN. The blood pressure of 1,495 participants with HTN (74.6%) of this sample was measured in this study, of which 634 (42.4%) had values higher than the normal limits and were thus considered to be decompensated.

The proportion of adults with HTN who had consulted a doctor in the previous year was significantly higher ($p < 0.000$) among women (69.0%) than men (61.5%). When stratified by age, the proportion of adults who had consulted a doctor in the previous year was 59.9% in the 20 to 29 year age group, 56.8% in the 30 to 39 year age group, 64.4% in the 40 to 49 year age group, and 72.1% in the 50 year and more age group, and these differences were significant ($p < 0.000$). In addition, the results of this study also showed significant regional differences ($p= 0.03$), with higher frequencies in the North (76.3%) and Central-West regions (70.5%), whereas the overall sample had a lower value (66.1%). The stratification of this variable by socioeconomic classes did not show significant differences. When the stratification was performed by level of education in number of years of school completed, those with 12 or more years of school had consulted a doctor with a significantly higher frequency ($p = 0.01$) (72.0%) than the overall sample (66.0%).

The majority (87.2%) of adults with hypertension monitored their weight. Almost half (45.4%) received guidance on ideal weight maintenance, of which 77.8% attempted to follow this guidance. One third of them (31.6%) reported having had problems with excessive weight in the previous year; an even higher proportion (38.5%) had a body mass index that indicated obesity.

Guidance on ideal body weight did not show significant difference in prevalence ($p = 0.37$) between men and women, nor among the different age groups ($p = 0.10$). However, the distribution of this guidance differed among regions ($p = 0.001$), with a lower frequency in the Northeast region (37.5%) and a higher frequency in the Central-West region (53.4%). This guidance was significantly ($p < 0.000$) more frequent in the socioeconomic classes A (66.7%), B (53.6%) and C (43.2%) than classes D (34.0%) and E (37.0%). A significant difference ($p < 0.000$) was also observed in the stratification by level of education, with lower values among those without formal education (30.2%), which increased in the following categories: one to four years of school (42.9%), five to eight years (45.5%), nine to 11 years (49.2%) and 12 years or more (58.6%).

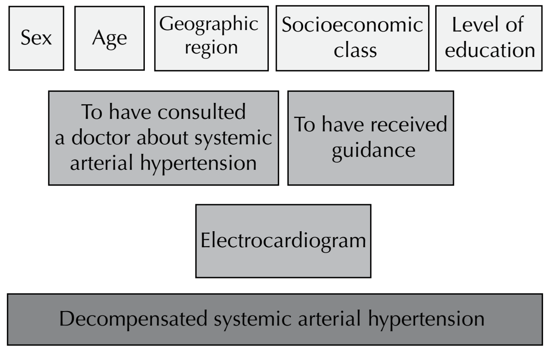

Figure. Model of analysis of quality of care in systemic arterial hypertension in the adult population. Brazil, 2010.

Although almost half of the individuals with hypertension (47.9%) had received guidance on physical activity practice in the previous year, nearly two thirds of them (63.3%) did not change their physical activity pattern. Sedentary habits in the transportation (94.3%) and leisure time domains (84.5%) were the most frequent types of behavior.

Guidance on physical activity practice was less frequent ($p = 0.03$) among men (45.3%), when compared to women (49.6%). The prevalence of this guidance differed significantly ($p = 0.005$) among age groups, increasing with age: 20-29 years (35.1%), 30-39 years (45.4%), 40-49 years (47.8%) and 50-59 years (50.9%). The difference in guidance among Brazilian regions was also significant ($p = 0.03$): lower in the North (36.5%) and higher in the Central-West region (52.5%). Such guidance was more frequent ($p < 0.000$) in socioeconomic classes A (70.3%) and B (60.5%) than classes C (45.1%), D (35.3%) and E (51.9%). A significant difference ($p < 0.000$) was observed with regard to the distribution by level of education (32.6%), which increased in the following categories: one to four years of school (42.6%), five to eight years (47.9%), nine to 11 years (54.4%), and 12 years or more (63.1%).

The frequency of EKG did not show significant differences according to sex ($p = 0.308$; 51.8% in men and 53.4% in women). Significantly different prevalences ($p = 0.01$) were observed among age groups: 41.5% in the 20 to 29 year age group, 46.9% in the 30 to 39

Table 2. Measures of association between independent variables and outcome (decompensated systemic arterial hypertension). Brazil, 2010.

Variable	All participants with hypertension n	%	BP > 140/90 mm Hg %	Crude prevalence ratios (95%CI)	Adjusted prevalence ratios (95%CI)
Sex				p< 0.000	p = 0.022
Female	1210	60.4	39.1	1	1
Male	794	39.6	50.0	1.27 (1.13;1.44)	1.20 (1.02;1.40)
Age (years)				p < 0.000[a]	p < 0.000[a]
20-29	135	6.8	32.9	1	1
30-39	318	15.9	31.0	0.94 (0.70;1.27)	0.98 (0.71;1.35)
40-49	604	30.3	45.6	1.38 (1.08;1.77)	1.46 (1.11;1.90)
50 and more	0 939	47.0	46.4	1.41 (1.10;1.79)	1.44 (1.11;1.88)
Region				p = 0.001	p = 0.036
Southeast	745	37.2	37.1	1	1
Center-West	225	11.2	39.5	1.06 (0.85;1.33)	1.08 (0.87;1.35)
Northeast	425	21.2	42.2	1.13 (0.96;1.34)	1.08 (0.91;1.29)
North	115	5.7	46.9	1.26 (0.97;1.63)	1.25 (0.97;1.61)
South	494	24.7	50.7	1.36 (1.17;1.58)	1.33 (1.14;1.55)
Socioeconomic class				p = 0.160[a]	p = 0.104[a]
A	64	3.4	37.8	1	1
B	484	25.5	38.3	1.02 (0.68;1.51)	1.00 (0.69; 1.47)
C	972	51.2	42.4	1.12 (0.76;1.65)	1.11 (0.77; 1.62)
D	352	18.5	46.6	1.23 (0.83;1.83)	1.23 (0.83;1.84)
E	27	1.4	56.0	1.48 (0.89;2.47)	1.34 (0.79;2.26)
Level of education (years)				p = 0.001[a]	p = 0.328[a]
12 and more	218	10.9	32.0	1	1
9 to 11	473	23.7	42.0	1.32 (1.01;1.72)	1.26 (0.95;1.66)
5 to 8	586	29.4	39.9	1.25 (0.96;1.62)	1.19 (0.90;1.57)
1 to 4	491	24.6	45.4	1.42 (1.09;1.84)	1.26 (0.95;1.68)
None	226	11.3	49.7	1.56 (1.18;2.05)	1.35 (0.98;1.85)
Guidance on					
Ideal weight maintenance				p = 0.028	p =0.560
Yes	900	45.4	39.3	1	1
No	1084	54.6	44.9	1.14 (1.01;1.29)	1.04 (0.89;1.22)
Physical activity practice				p = 0.032	p =0.908
Yes	954	47.9	39.7	1	1
No	1037	52.1	45.1	1.13 (1.01;1.28)	1 (0.86;1.17)
Consulted a doctor in the previous year				p = 0.789	p = 0.651
Yes	1318	66.1	42.2	1	1
No	677	33.9	42.9	1.01 (0.89;1.15)	1.02 (0.90;1.16)
Had an EKG performed in the previous year				p = 0.014	p =0.09
Yes	682	52.4	38.5	1	1
No	619	47.6	46.2	1.20 (1.03;1.39)	1.14 (0.97;1.33)

BP: Blood pressure
EKG: Electrocardiogram
[a] Trend

year age group, 56.2% in the 40 to 49 year age group and 53.9% in the 50 year and more age group. This monitoring was significantly (p = 0.004) more frequent in the Southeast region (58.5%), when compared to the general prevalence of the sample (52.4%). The prevalence of monitoring was significantly (p < 0.000) higher among those of socioeconomic class A (74.5%), when compared to the overall sample (52.6%). Those with 12 or more years of school had significantly ($p < 0.000$) more EKGs performed (69.4%) than the overall sample (52.6%).

The proportion of individuals with decompensated HTN ($p < 0.000$) differed between men and women and, regardless of sex, the lowest prevalence was in the 30 to 39 year age group (31.0%) and the highest one was in the 50 year and more age group (46.4%). The lowest prevalence of participants with decompensated HTN was found in the Southeast region (37.1%), significantly ($p = 0.001$) lower than the overall sample (42.4%), whereas the highest prevalence (50.7%) was observed in the South region. There were no differences according to socioeconomic class. There was a significantly lower prevalence ($p = 0.01$) of individuals with decompensated HTN among those with 12 or more years of school (32.0%) than the overall sample (42.4%), while a higher prevalence was found among those with no formal education. The relationship between having consulted a doctor in the previous year and decompensated blood pressure values did not show significant differences ($p = 0.789$). The proportion of individuals with decompensated hypertension was significantly lower among adults who had received guidance on ideal weight maintenance ($p = 0.028$), those who had received guidance on physical activity practice ($p = 0.032$) and those who had had an EKG performed ($p = 0.014$) (Table 2).

The crude and adjusted analyses showed an association between having decompensated HTN and the following: being male, being aged more than 40 years and living in the South region (Table 2).

DISCUSSION

The prevalence of decompensated hypertension in this study (42.4%) was lower than that found in a study conducted in the United States (58%).[2] The positive association between lower proportions of decompensated blood pressure values and ideal weight maintenance, physical activity practice and EKG identified in the crude analysis suggests that these actions may represent positive clinical care markers of HTN.

In the present sample, level of education was more sensitive to the differences in HTN care than economic classification, despite the heterogeneous social composition in terms of socioeconomic class and level of education.[2] Only half of the individuals with hypertension had an EKG performed in the previous year, a result similar to that found in a study conducted in Saudi Arabia that included 47% of participants with decompensated HTN and where the EKG was one of the procedures least frequently performed.[4]

Only half of the sample received guidance on ideal weight maintenance and physical activity practice, thus confirming literature data and contributing to the loss of effectiveness of management of this health condition. Relatively low frequencies such as these are in agreement with the still relevant prevalences of obesity and sedentary habits which should consequently be the focus of concern for public health agents.[12] Ideal weight maintenance stands out as a minor impact that these types of guidance have on the behavioral changes expected from each of them, because to have received such guidance was positively associated with the lower prevalence of decompensated blood pressure.

The lack of association between having consulted a doctor in the previous year and decompensated blood pressure values was a curious and apparently contradictory finding with previously published evidence.[11] The independent variable in this study[11] was "to have consulted the same doctor" and that of the present study was "to have consulted a doctor", regardless of being the same one or not, which may represent a difference in adherence to the recommended measures.

Special attention should be given to the result of the multiple analysis in which the independent variables that remained associated with decompensated blood pressure were: being male, being in the 40 to 49 year age group or 50 year and more age group, and living in the South region of Brazil. Each variable represents a synthetic concept that, as such, includes several attributes. Consequently, with the study design adopted, this makes it impossible to accurately identify factors susceptible to an intervention that reduce the prevalence of decompensated blood pressure.

Finally, health prevention and promotion actions aimed at this population are small. New studies with a national scope and an appropriate design such as multicenter cohort studies are required to study the possible determinants that cause decompensated blood pressure in these conceptual components.

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