

REVIEW ARTICLE

Prevalence of hypertension in rural populations from Ibero-America and the Caribbean

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ABSTRACT

Introduction: Hypertension and cardiovascular risk factors are widespread in developing countries, but little is known about cardiovascular risk profiles in rural communities from Ibero-America and the Caribbean. The aim of the present study was to evaluate the peer-reviewed literature published from 1990 to 2012 relating to the prevalence of hypertension in rural populations from Ibero-America and the Caribbean.

Methods: A bibliographic search was conducted in MEDLINE, SCIELO and LILACS databases. Included were population-based studies in which prevalence of hypertension in adults was reported.

Results: A total of 30 peer-reviewed publications were identified that reported the prevalence of hypertension in 33 143 patients. The crude hypertension prevalence reported from rural Ibero-America was 32.6% (95% confidence interval: 31.4–32.5%; range: 1.8–52%). The prevalence of hypertension was lower in aboriginal populations than in other rural communities (19.5% vs 36%). Only nine studies assessed the awareness, treatment, and level of control of hypertension (means 54%, 57%, and 14% respectively). The most prevalent cardiovascular risk factors were abdominal obesity (39%) and overweight (39%).

Conclusions: Hypertension is of public health importance in rural Ibero-America and the Caribbean, with evidence of considerable under-diagnosis, treatment, and control. There is an urgent need to develop strategies to prevent, detect, treat, and control hypertension effectively in this region.

Key words: blood pressure, epidemiology, hypertension, Ibero-America, prevalence, rural populations.



Introduction

Hypertension and cardiovascular risk factors are widespread in developing countries^{1,2}, but little is known about cardiovascular risk profiles in rural communities from Ibero-America and the Caribbean. Ibero-America is a term used since the second half of the 19th century to refer collectively to the countries in the Americas that were formerly colonies of Spain or Portugal and in which Ibero-Romance languages are spoken³. Culturally Ibero-America is one of the largest language areas and culturally cohesive world. Ibero-America is composed of the following countries: Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, México, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Portugal, Spain, Uruguay, and Venezuela⁴.

With an area of approximately 21 462 000 km², Ibero-America represents about 15% of the global land area. The Ibero-American population accounts for 9.2% of the world population and is estimated at 712 974 000 inhabitants with a population density of 61.09 inhabitants/km². Currently the life expectancy in Ibero-America is 75.4 years, an increase of more than 10 years in the past 30 years⁵.

In Latin America and the Caribbean, non-communicable diseases have an even greater impact on mortality and accounted for 73% of deaths and 76% of disability-adjusted life years in 2000⁶. The hypertension prevalence estimates from the peer-reviewed literature range from 7% to 49%. These studies were primarily done in urban centers and are not evenly distributed throughout the region^{7,8}. According to World Health Organization data, smoking rates average 30%; additionally, obesity and overweight vary from 40% to 72% in the region⁹.

'Rural population' usually refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population¹⁰. There is no single, universally preferred

definition of 'rural area'. Rural definitions are used to identify rural population, places or healthcare providers¹¹. Methods for defining 'rural' are based on geographic units that are sometimes combined with population or provider characteristics. But each country has its own definition of a rural area, which is typically based on identifying what does not fit a particular definition of an urban area. As a rough generalization, most countries from Ibero-America will classify as 'urban' any settlement of more than 1500–2000 people¹². In Ibero-America and the Caribbean the rural population represents 27.4% of the total population⁴.

This study aimed to evaluate the peer-reviewed literature published from 1990 to 2012 on the prevalence of hypertension in rural populations from Ibero-America and the Caribbean.

Methods

A bibliographic search was conducted using MEDLINE (for international literature in the medical and biomedical areas), SCIELO and LILACS databases (for Latin American and Caribbean health sciences literature), supplemented by a manual search of bibliographies of retrieved articles using the following search terms in English, Spanish, and Portuguese: *hypertension, blood pressure, high blood pressure, prevalence, rural population, cross sectional studies, Latin America, South America, Central America, Caribbean*, and the names of all the countries from Ibero-America. The search was restricted to studies published from January 1990 to December 2012. Data were extracted following a standard protocol and using standard data collection forms and a checklist by a single reviewer. Variables extracted included year of survey, country of study, mean age of participants, sampling methods, sample size, devices and methods for preparation and measurement of blood pressure, definition(s) used for hypertension, and type of measuring device used.



Eligibility criteria for inclusion were: (1) rural population-based cross-sectional studies in which prevalence of hypertension (or data to calculate it) was reported; (2) studies with representative samples with more than 100 participants; (3) studies that included subjects aged 15 years and above; (3) hypertension condition defined as an average systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg or use of antihypertensive medications¹.

Global prevalence of hypertension, percentage of those with hypertension who had been previously diagnosed, were on treatment, and those controlled were also obtained. Available information was obtained on the prevalence of hypertension by gender, high blood pressure in the elderly population, and the proportion with isolated systolic hypertension. Also evaluated (if available) were the prevalence of diabetes, hypercholesterolemia, smoking, overweight, obesity, and abdominal obesity.

Studies were excluded if the participants were limited to special populations (elderly, pre-hypertensives or pediatric populations under 15 years), or if there were multiple reports of the same results. Also excluded were studies using non-JNC7 standards (140/90 mmHg)¹³ to avoid inconsistency of outcomes resulting from different blood pressure categories.

Crude prevalence of hypertension was calculated by dividing the number of all patients with hypertension in each study by the total of patients studied in each study. The result is expressed as a percentage. A formal meta-analysis was not conducted because of the heterogeneity in methods used and participants included. All continuous data were expressed as mean \pm standard deviation. Comparison between groups was done using a χ^2 test for discrete variables and student *t*-test for continuous variables.

Results

The initial bibliographic search found 41 studies published between 1990 and 2012. Finally, 11 studies were excluded

(three based on hospital populations, four that included participants less than 15 years in the analysis, two studies reporting a small sample size, and two using different definition of hypertension). A total of 30 peer-reviewed publications¹⁴⁻⁴³ were identified that reported the prevalence of hypertension in 33 143 patients (60.5% were females). Country of origin, number of participants per study, sex, mean age, global prevalence of hypertension, and general characteristics of the sample are shown in Table 1. The number of participants per study ranged from 116 to 6024.

Fifty-six percent of the studies reported the types of device used to measure blood pressure. The mercury sphygmomanometer was used for measurement of blood pressure in nine studies, aneroid sphygmomanometer was used in four studies and an electronic device was used in four studies. The majority of studies (86%) used two blood pressure measurements on a single visit, with the exception of four studies in which blood pressure was measured in two visits.

Hypertension

Prevalence: The crude prevalence of hypertension reported from rural Ibero-America was 32.6% (95% confidence interval (CI): 31.4–32.5%; range: 1.8–52%).

Only 14 studies reported the mean age of the study population. Mean age was 45.3 ± 5.5 years (range: 36–60 years). Men had higher prevalence of hypertension than women (35.1% (CI: 32.6–37.5%) vs 32% (CI: 30–33.9%); $p=0.0001$). The estimated total number of people with hypertension in Ibero-America and the Caribbean was 44 816 036.

Hypertension in older people: The prevalence of hypertension in people aged 60 years and older was 64.8% (range: 38–80%). Only fourteen studies (46.6%) reported specifically the prevalence of hypertension in older patients.

Table 1: Population-based studies on hypertension prevalence from rural Ibero-America and the Caribbean

Country, year, reference	Mean age (age group)	n	Device	Number of meas., visits	Males	HTN prevalence	HTN females	HTN males	HTN elderly	Awareness	Treatment	Control¶	DBT	Dyslipidemia	Smokers	Obesity/over weight	CO
Argentina, 1995 (14)	ND (15–75)	1080	Mercurial	3, 1	37.0%	39.8%	35.1%	44.9%	77.8%	47.0%	87.0%	8.0%	ND	ND	ND	ND	ND
Argentina, 2005† (15)	43.5 (>18)	522	ND	1, 1	40.0%	28.0%	27.0%	31.0%	59.0%	ND	ND	ND	ND	ND	ND	ND	ND
Argentina, 2006† (16)	36.1 (14–91)	385	ND	3, 2	36.1%	25.2%	23.6%	28.1%	75.9%	ND	ND	ND	2.1%	ND	ND	21.3%/33%	49.0%
Argentina, 2008 (17)	ND (>18)	471	ND	3, 1	47.0%	43.5%	36.0%	51.0%	ND	ND	ND	ND	ND	ND	ND	ND	ND
Argentina, 2012 (18)	40.4 (>18)	473	Mercurial	2, 2	48.0%	32.3%	32.9%	31.7%	67.3%	60.8%	70.0%	ND	5.5%	ND	17.5%	ND	ND
Brazil, 2003 (19)	46.6 (>18)	126	Aneroid	3, 1	43.7%	36.5%	35.1%	44.9%	ND	ND	ND	ND	4.0%	51.6%	11.9%	7.9%/27.8%	41.3%
Brazil, 2008 (20)	ND (18–88)	287	Mercurial	3, 1	48.4%	47.0%	48.6%	45.3%	68.5%	ND	ND	ND	5.9%	47.4%	ND	12.3%/48.9%	13.0%
Brazil, 2008 (21)	ND (>18)	418	Mercurial	3, 1	39.8%	57.1%	52.1%	62.0%	ND	ND	ND	ND	ND	ND	ND	ND	ND
Brazil, 2010 (22)	43.2 (>18)	1168	Automatic	2, 1	36.8%	32.7%	30.9%	35.8%	63.1%	ND	ND	ND	ND	ND	32.9%	16.1%/33.7%	51.8%
Brazil, 2011 (23)	44.1 (18–94)	567	ND	3, 1	20.0%	42.9%	44.1%	41.6%	ND	ND	ND	ND	ND	35.5%	30.3%	5.5%/17.4%	24.5%
Caribbean, 2009 (24)	48.4 (>16)	1504	Automatic	2, 1	41.0%	29.0%	30.0%	26.0%	65.0%	ND	22.0%	ND	11.0%	10.5%	9.5%	24%/37%	39.5%
Caribbean, 2010 (25)	ND (15–74)	1005	Automatic	2, 1	46.2%	35.2%	33.1%	37.3%	67.5%	68.5%	86.5%	32.6%	ND	ND	15.6%	22.5%/35.5%	ND
Chile, 1993 (26)	ND (>14)	6024	ND	2, 2	ND	22.8%	ND	ND	57.8%	43.0%	26.1%	8.2%	ND	ND	ND	ND	ND
Chile, 1999† (27)	47.3 (>15)	592	ND	ND	ND	13.2%	11.8%	14.7%	ND	ND	ND	ND	ND	40.3%	6.6%	21.2%/ND	ND
Chile, 2012† (28)	42.2 (>15)	400	ND	2, 1	46.7%	24.5%	22.0%	27.2%	70.6%	ND	ND	32.0%	ND	ND	ND	ND	ND
Cuba, 2000 (29)	ND (>15)	208	ND	3, 2	51.9%	29.8%	ND	ND	45.4%	ND	57.2%	8.6%	ND	ND	ND	ND	ND
Ecuador, 2003 (30)	ND	4284	ND	ND	38.0%	36.0%	ND	ND	ND	ND	13.0%	0.3%	ND	ND	ND	ND	ND
Spain, 1997 (31)	ND	425	ND	ND	ND	16.4%	23.0%	9.8%	ND	ND	ND	ND	ND	17.5%	30.5%	ND	ND
Spain, 1998 (32)	ND (15–34)	623	Mercurial	3, 1	ND	49.4%	ND	ND	39.9%	69.1%	14.1%	ND	ND	ND	ND	ND	ND
Spain, 1999 (33)	ND (25–74)	1330	Mercurial	2, 1	52.7%	41.4%	42.0%	40.8%	80.8%	ND	ND	ND	15.6%	26.5%	26.5%	29.3%/ND	ND
Spain, 2008 (34)	ND (>15)	1828	Aneroid	2, 1	48.1%	41.3%	ND	ND	70.9%	57.4%	89.0%	3.7%	11.1%	31.8%	22.1%	25%/ND	ND
Mexico, 1998 (35)	ND	5802	Mercurial	2, 1	23.3%	21.9%	22.7%	19.2%	38.7%	69.1%	ND	ND	26.1%	ND	15.1%	16.4%/ND	ND
Mexico, 2000† (36)	48.9 (35–64)	815	Mercurial	2, 1	23.3%	6.8%	ND	ND	ND	41.0%	ND	ND	ND	ND	ND	ND	ND
Mexico, 2007 (37)	ND (>20)	115	ND	ND	8.3%	40.8%	38.5%	43.0%	ND	ND	ND	ND	11.4%	37.1%	30.9%	ND/83.7%	ND
Mexico, 2007 (38)	ND (20–75)	271	Automatic	3, 1	42.0%	25.0%	21.0%	29.0%	ND	ND	ND	ND	ND	ND	ND	31%/31%	54.0%
Nicaragua, 2007 (39)	45.7 (>18)	1303	Aneroid	1, 1	39.2%	40.5%	43.2%	37.8%	ND	61.5%	52.1%	25.8%	ND	ND	ND	ND	ND
Peru, 2011 (40)	48.3 (>30)	201	ND	3, 1	47.2%	11.0%	ND	ND	ND	ND	ND	ND	0.8%	ND	5.5%	3%/ND	ND
Portugal, 2000 (41)	ND (20–44)	340	ND	ND	ND	20.0%	ND	ND	ND	ND	ND	ND	ND	32.1%	21.5%	11.8%/ND	ND
Portugal, 2008 (42)	60 (>40)	438	Aneroid	1, 1	45.4%	63.0%	ND	ND	ND	ND	ND	ND	ND	52.0%	ND	ND	ND
Venezuela, 2011 (43)	40.6 (>20)	138	Mercurial	2, 1	36.9%	25.0%	19.1%	35.3%	ND	ND	ND	ND	ND	22.1%	ND	ND	ND

†Aboriginal community. ¶Blood pressure <140/90 mmHg under treatment. CO, central obesity (abdominal). DBT, diabetes mellitus. HTN, hypertension. Meas., measurements. ND, no data.

Awareness, treatment, and control: One-third of the studies assessed the level of treatment, awareness, and control of hypertension. Among hypertensives only 54% (range: 39.9–69%) were aware of their condition; of these 57% (range: 22–89%) were undergoing drug therapy, and of those being treated, only 14.8% (range: 0.3–32.6%) were optimally controlled (blood pressure <140/90 mmHg).

Systolic isolated hypertension: The prevalence of isolated systolic hypertension was 24.4% (reported only in two studies).

Aboriginal communities: Five of the 30 studies were conducted in rural aboriginal communities (2714 subjects, mean age 43.6 years). Notably, the prevalence of hypertension was lower in aboriginal populations than in other rural communities (19.5% vs 36%; $p=0.001$).

Other cardiovascular risk factors

Fourteen studies additionally reported the prevalence of obesity (mean: 17.6%; range: 3–31%) and smoking (mean 19.7%, range: 5.5–32.9%). Twelve studies reported the prevalence of dyslipidaemia (mean: 32.7%; range: 10.5–52%).

The crude prevalence of abdominal obesity was 39% (range: 13–54%). The prevalence of overweight was 39% (range: 17–83.7%) and was reported in nine studies.

Discussion

Ibero-America is a heterogeneous region with wide economic, ethnic, and sociocultural diversity. The growing epidemic of high blood pressure and other chronic non-communicable diseases in association with economic crises represent a real threat to the economies of this region⁸. This analysis indicates that more than one-third of the Ibero-American rural population had hypertension. This is the first literature review about prevalence, awareness, treatment, and hypertension control in this special population.

The greatest prevalence of hypertension occurred in countries with established market economies and more

elderly populations, such as Spain³¹⁻³⁴, Portugal^{41,42} and Brazil¹⁹⁻²³

Hypertension prevalence estimates from rural Ibero-American countries are variable. Countries with the highest estimated prevalence of hypertension had had rates nearly four times those of regions with the lowest estimated prevalence (43.2% in Brazil vs 11% in Peru). Moreover, there were differences in hypertension prevalence estimates within countries. In Brazil, for example, depending on where the hypertension studies were done, the estimated prevalence ranged from 32.7% to 57.1%¹⁹⁻²³.

In men, the highest estimated prevalences were in Brazil¹⁹⁻²³ and Argentina¹⁴⁻¹⁸ (50.7% and 48%, respectively). In women the highest estimated prevalences were in Brazil¹⁹⁻²³, Spain³¹⁻³⁴, and Nicaragua³⁹ (48.3%, 42%, and 43.2%, respectively).

Although there are methodological differences between urban and rural studies the prevalence of hypertension in rural populations is similar or lower than the regional prevalence reported in well-designed population-based studies reported in a recent analysis⁷. The degree of awareness and control of hypertension is very low in rural Ibero-America and the Caribbean, this being a widespread problem shared with those countries considered developed⁴⁴.

The countries of Latin America and the Caribbean have the highest level of social inequality of any region of the world. Social inequality is reflected in inequalities in access to health care. The poor and those living in rural areas have less access to health care, which means they have less opportunity to receive treatment to control the risk factors of chronic diseases^{6,45}.

The prevalence and incidence of cardiovascular diseases are increasing among aboriginal peoples. These trends parallel the epidemiological transition that is occurring in other developing populations throughout the world. As more aboriginal people give up their traditional lifestyles and adopt 'unhealthy urban' lifestyles, the prevalence of hypertension and its risk factors will likely increase⁴⁶. While the overall prevalence of hypertension is low in rural aboriginal people (young adults), the prevalence of hypertension in the elderly



aboriginal increases to 68%^{15,16,28}. The prevalence of hypertension in rural aboriginal communities in Ibero-America is higher than previously reported in the Brazilian Yanomami and Xingu tribes included in the INTERSALT study⁴⁷.

In order to plan cardiovascular prevention strategies in rural areas from Ibero-America there is a need for better documentation of prevalence of hypertension and cardiovascular risk factors. In the past 10 years there has been a trend to increased health research in Latin America; however, it only accounts for 4% of publications compared with North America (26%) and Europe (42%)⁴⁵. Insufficient funding sources, and underdeveloped research networks and infrastructure, are some limitations to conducting research and publish research in this region^{7,48}.

This work has weaknesses that limit the ability to make direct comparisons between studies:

- large variation in the age structure between studies
- large variation in the methods used for the measurement and classification of blood pressure
- variability in reporting level of awareness, treatment, and control of blood pressure
- due to the absence of data, analyzing the prevalence of hypertension adjusted for age was not possible
- no single standard definition of 'rural population', therefore populations considered rural by the authors of each study were included.

It is necessary to conduct well-designed studies with standardized methodologies to allow comparison between different regions within countries and between countries in order to establish health policies appropriate to each country and region.

Conclusions

Despite the relatively limited evidence base, it is clear that hypertension is a major public health problem in rural

populations from Ibero-America and the Caribbean. The high prevalence of cardiovascular risk factors associated with a low degree of control of hypertension represents a short-term threat in these special populations. There is a need to identify barriers to treatment and good control of hypertension and how these could be reduced. There is an urgent need to focus the epidemiological research in these rural areas on the burden of non-communicable diseases and identify potential prevention strategies as strategies of intervention.

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