Prevalence, awareness, management of hypertension and association with metabolic abnormalities: the Maracaibo city metabolic syndrome prevalence study

Prevalencia, conciencia, manejo de la hipertensión y la asociación con alteraciones metabólicas: Estudio de prevalencia del Síndrome Metabólico de la Ciudad de Maracaibo

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Abstract

Background: The purpose of this study was to determine the prevalence and epidemiologic behavior of Hypertension (HT) in the Maracaibo Municipality, Zulia state, Venezuela.

Materials and Methods: This was a cross-sectional descriptive study, where 2,230 subjects from both genders were randomly selected as part of the Maracaibo city Metabolic Syndrome Prevalence Study (MMSPS). Complete medical examination, laboratory workup and anthropometry measurements were taken. The quantitative variables were expressed as mean±SD, and comparisons were calculated using t Student test. The qualitative variables were represented as absolute and relative frequencies, and comparisons were obtained using Z test for proportions and associations with c^2 test.

Results: The prevalence of HT was 19.42% (20.92% in women and 17.75% in men). The prevalence of newly diagnosed individuals was 12.0%, with 8.71% in women and 16.90% in men. The overall percentage of HT was 32.02%, being 29.63% in women and 34.65% in men. Several variables were associated with HT, such as glycemic status ($\chi 2=64.97$, $p<0.001$), insulin resistance ($c^2=25.58$, $p<0.001$) and body mass index ($c^2=209.952$, $p<0.0001$). Clinical control of blood pressure was observed in 44.7% of treated and 56.6% of untreated subjects. The most frequent anti-hypertensive drugs were: Angiotensin Converting Enzyme Inhibitors with (n=105), Beta-Blockers (n=97) and Angiotensin Receptor II Blockers (n=32).

Conclusion: Even though elevated numbers of AHT are observed in our population combined with low clinical control of blood pressure, there is a lower prevalence of AHT compared to other studies at regional, national or international levels.

Key words: arterial hypertension, cardiovascular disease, prevalence, Latin America, obesity, diabetes mellitus.

Introducción

Hypertension (HT) is one of the most prevalent modifiable risk factor for the development of coronary artery disease (CAD), cerebrovascular disease, and end-stage kidney disease (ESRD) in the industrialized countries[1]. The Framingham study reported that the risk to develop CAD increases progressively as the levels of systolic and diastolic blood pressure (BP) rise[2]. Approximately 75% of the American adults with CAD, congestive heart failure, CvD, or type 2 diabetes mellitus (T2DM) also suffer from HT[3]. This pattern is observed not only in developed countries, but it is also seen in developing countries[4]. Currently, HT is considered one of the most important public health problems worldwide[5], contributing to an estimated 7.5 million deaths per year[6].

According to the World Health Organization (WHO), the global prevalence of HT in adults over 25 years of age in 2008 was about 40%[6]. In a systematic review, Kearny et al.[7] reported that the global prevalence of HT in 2000 was 26.4%, equivalent to 972 million people, and this number is projected to rise to about 1.54 billion people (29.2%) in 2025. In the majority of the epidemiological studies, an association has been found between increasing age and a rise in BP and the prevalence of HT[8]. However, this relationship was not observed in populations where there is low prevalence of obesity, salt consumption, and stress level, in association with increased physical activity[8], suggesting that the increase in BP during the aging process depends on the level of modernization of the populace being analyzed[9].

A relationship between obesity and BP has been reported[10]. In addition, elevated BP and the risk of developing HT appear to vary inversely with socioeconomic indicators, such as education and household income[11]. Furthermore, it has also been reported that HT prevalence differs between countries, and also amongst regions within a given country, due to the different environmental and genetic factors[10]. Although, several investigations have been carried out in Venezuela and some local regions which have focused on HT, these studies are limited in regard to the analysis of risk factors surrounding this disease. The purpose of the present study was to determine the prevalence, awareness, treatment and control of HT, and factors associated with its pathology in the municipality of Maracaibo, State of Zulia, Venezuela.

Materials and Methods

Population Sample

The sampling method has previously been described in the Maracaibo City Metabolic Syndrome Prevalence Study (MMSPS) cross-sectional proposal[12]. Briefly, using the population estimates from the National Institute of Statistics (NIS), Venezuela, (1,428,043 in 2007), the sample was calculated to be 1,986 individuals with 244 subjects (12.0%) added because of the oversampling method, to give an overall number of 2,230 individuals from both sexes, ≥ 18 years of age[12]. The city of Maracaibo is divided into 18 parishes and each of these was proportionally sampled. The sampling was done using a 2-phase method: during the first phase, the sorting was random and stratified, where each stratus was represented by sectors from each of the 18 parishes, finally selecting 4 from each parish. The second phase was stratified to represent a city block, in which they were selected using a random number generation tool. All the individuals enrolled in the study signed an informed written consent before physical examination and blood collection. All procedures were approved by the Ethics Committee of the Endocrine and Metabolic Diseases Research Center of The University of Zulia, Maracaibo, Venezuela.

Physical Examination and Blood Pressure Measurement

Each individual was subjected to a complete medical history. BP was measured by the auscultatory method using calibrated mercury sphygmomanometer, appropriate cuff size, and employing Korotkoff`s phase I and V as systolic and diastolic BP, respectively. BP was monitored in subjects sitting down with feet resting on the ground. After a resting period of 15 minutes, the pressure was taken 3 times, with 15 minutes in between each take on two different days. Those subjects with BP above 140/90 mmHg on more than two occasions, without previous diagnosis of HT or taking antihypertensive medication were categorized as 'Newly-Diagnosed Hypertensives', unaware of the presence of the disease. On the other hand, those who were referred to having previously been diagnosed with HT or to taking treatment for it were considered as 'Known-Hypertensives'. The classification of HT was done using the criteria reported in the Seventh Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7)[13]. Those with known history of HT (or taking antihypertensive medications) were classified as 'controlled' or 'uncontrolled' subjects, according to the classification of JNC-8[14]: a) <140/90 mmHg in those ≥18 years with T2DM or chronic kidney disease; b) <140/90 mmHg in those <60 years; c) <150/90 mmHg in those ≥60 years.

Anthropometric Evaluation

A bioelectric scale was used to obtain weight (Tanita, TBF-310 GS Body Composition Analyzer, Tokyo – Japan). Height was determined by using a calibrated metric measurement tape. For body mass index (BMI) the formula

(weight/height^2) was applied, expressing the results as kg/m^2. Subjects were classified according to the classification proposed by the WHO[15]. For abdominal (waist) circumference, a non-distensible metric tape was used, in accordance to National Institutes of Health protocol [16]. For analysis purposes, abdominal circumference was divided in quintiles (Q), for each gender; for women, Q1 (<79.00 cm), Q2 (79.00-86.99 cm), Q3 (87.00-93.99 cm), Q4 (94.00-102.99cm) and Q5 (≥103.00 cm); and for men, Q1 (<86.00 cm), Q2 (86.00-93.99 cm), Q3 (93.00-100.99 cm), Q4 (101.00-108.99 cm) and Q5 (≥109.00 cm).

Laboratory Analysis

Blood samples were collected after 8 hours of fasting, and serum/plasma was obtained by centrifugation and stored at 20^{0}C prior to analysis. Serum levels of glucose total cholesterol, triglycerides, high density lipoprotein-cholesterol (HDL-C) were determined using computerized equipment (Human Gesellschoft Biochemica and Diagnostica MBH, Magdeburg, Germany. Fasting insulin levels were determined with Drug International Inc (New Jersey, USA) insulin kit.

Glycemic status and Metabolic Syndrome

Glycemic status was classified as follows[17]: a) Type 2 Diabetes (T_2DM) was diagnosed when any individual obtained ≥126 mg/dL in 2 different blood sample measurements ('T2DM Newly Diagnosed'), or those with previous diagnosis of the disease ('Known T2DM'); b) Impaired Fasting Glucose (IFG) those with fasting glycemia between 100 - <126 mg/dL; and c) Normoglycemic, those with fasting glucose <100 mg/dL. For the calculation of insulin resistance (IR), the homeostatic model assessment formula was applied using the HOMA Calculator v2.2.2 available at https://www.dtu.ox.ac.uk/homacalculator/download.php, obtaining HOMA-IR, HOMA2-β-cell and HOMA2-S. The diagnosis of metabolic syndrome was made by using the consensus criteria of IDF/NHLBI/AHA-2009[18].

Statistical Analysis

Qualitative variables are expressed as absolute or relative frequencies, applying Z Test for Proportions and c^2 test for further analysis. Quantitative variables were subjected to logarithmic transformation observing a normal distribution after Geary test; results are expressed as mean ± SD.To determine differences between means, Student t-test was applied between the logarithms of the corresponding variables. Data were analyzed with the Statistical Package for Social Sciences (SPSS) v.19 for Windows (SPSS IBM Chicago, IL). The results were considered statistically significant when $p<0.05$.

Results

General Characteristic of the Study Population

The general characteristics of the participants (n=2,230), including sociodemographic and metabolic parameters are shown in Table 1.

Blood Pressure, Prevalence of Pre-Hypertension and Hypertension

Overall (n=2,230), mean systolic BP was 119.66±16.80 mmHg, while mean diastolic BP was 77.25±11.25 mmHg. According to gender, men obtained higher BP levels, with mean systolic BP of 121.8±15.98 mmHg in men versus 117.69 ±17.29 mmHg in women ($p=4.4x10^{-9}$), while diastolic BP was 79.03±11.46 mmHg in men versus 75.65±10.81 mmHg in women ($p=1.4x10^{-12}$). The prevalence of pre-hypertension was 31.08%, and a total prevalence of HT of 32.02% (12.60% Newly-Diagnosed Hypertensives and 19.42% Known-Hypertensives). In men, there were 34.47% Pre-Hypertensives, 16.90% Newly Diagnosed Hypertensives and 17.75% Known-Hypertensives; whereas, in women there were 28.01% Pre-Hypertensives, 8.71% Newly-Diagnosed Hypertensives and 20.92% Known-Hypertensives. The overall prevalence of HT (Known + Newly-Diagnosed) according to ethnic groups was: Afro-Venezuelans 36.4%, Hispanic Whites 32.4%, Mixed Race 32.0%, Others 28.6%, and Amerindians 28.3% (data not shown). Table 2 shows selected sociodemographic and metabolic alteration in subjects with previous history of HT.

Behavior of different types of hypertension is shown in Figure 1-PanelA. Systolic-Diastolic Hypertension (SDHT) was the most frequent BP disorder within the known hypertension group with 32.5% (n=232), followed by Isolated Diastolic Hypertension (IDH) with 25.4% (n=181), and Isolated Systolic Hypertension (ISH) with 13.6% (n=97). As can be observed, SDHT increases with age in both genders, with an earlier peak for men (40-49 years) compared to women (50-59 and 60-69 years) (Figure 1-Panel B). Comparing both isolated types of hypertension, ISH presents 2 peaks during in the 50-59 years and ≥70 groups in both sexes (Figure 1 – Panel C); meanwhile IDH was most frequent between 40-49 years in males and females, observing a steep decline afterwards (Figure 1 – Panel D).

Hypertension and metabolic features

Distribution of individuals with Known Hypertension according to BP, age groups ($c^2=210.00$; $p<0.00001$), HOMA-IR ($c^2=25.58$; $p<0.001$) and glycemic status ($c^2=64.97$; $p<0.0001$) is depicted in Figure 2. As can be ascertained, hypertension increases with age, being highest at 50-59 years (30.3%); Figure 2 – Panel A and Table 2. Moreover, as insulin resistance elevated so did the number of individuals with hypertension, observed especially un Hypertensives Stage I and II, whom went from 10.5% and 1.2%, respectively in the first tercile, to 14.6% and 5.8%, respectively in the last tercile (Figure 2 – Panel B).

Likewise, normoglycemic individuals represent 49.2% of normotensive subjects, and 39% of those with IFG and 42.4% of T2DM patients were Pre-Hypertensives. In the T2DM categories, 25.4% of Known T2DM and 29.4% Newly Diagnosed T2DM were classified as having Hypertension-Stage-I. Finally, the highest prevalence of Hypertension-Stage-II was observed in Newly Diagnosed T2DM with 8.8% (Figure 2 – Panel C).

Distribution of Known Hypertensive according to BMI (c^2=209.952; p<0.0001) and waist circumference (c^2=215.957; p<0.0001) is shown in Figure 3 and Table 2. The majority of the subjects were overweight (34.2%), with IFG (25.2%), and MS (81.8%). Hypertension seem to increases according to elevations of both BMI and waist circumference (Figure 3 – Panels A and B). Pre-Hypertension rates increased gradually from 31.4% in normal weight individuals to 42.9% in obese-grade III persons. Similarly, the prevalence of Stage II-HT in normal weight persons was 1% and rose gradually to 20.6% in obese-grade III individuals. The prevalence of Stage I-HT and Stage II-HT was 7% and <1% respectively, in subjects with abdominal circumference in the 1st quintile; meanwhile the rates increased gradually to 20% and 12% respectively, in individuals with abdominal circumference in the 5th quintile.

Treatment and Control of Hypertension

According to JNC-8, there were 216 BP-controlled individuals, 44.7% (n=109) treated and 56.6% (n=107) untreated. Women obtained higher results among the controlled group, with 48.6% (n=72) treated and 67.3% (n=66) untreated, compared with the men´s group which resulted in 38.5% (n=37) treated and 45.1% (n=41) untreated achieving BP goals (p<0.05). Age was associated with proper BP control (c^2=16.621, p=0.01), while factors such as BMI (c^2=6.014, p=0.198), waist circumference (c^2=4.933, p=0.294) and type of medication used for control (c^2=4.933, p=0.294) were not. The most prescribed anti-hypertensive drug class was Angiotensin Converting Enzyme Inhibitor (ACEI) with 24.2.0% (n=105), followed by Beta-Blockers with 8.5% (n=37), and Angiotensin receptor II Blockers with 7.4% (n=32); Table 3. Regarding BP control, there were ethnic differences where Hispanic Whites had the highest control rates (34.2%), followed by Mixed Race (28.4%), Afro-Venezuelans (25.0%), and Amerindians (16.7%).

Table 1. General characteristics of the adult population from the Maracaibo Municipality. Zulia State.

	Female		Male		Total	
	n	%	n	%	n	%
Age Groups (age)						
< 20	100	8.5	80	7.6	**181**	**8.1**
20-29	249	21.2	332	31.4	**581**	**26.1**
30-39	197	16.8	199	18.8	**396**	**17.8**
40-49	269	23.0	193	18.2	**462**	**20.7**
50-59	205	17.5	164	15.5	**368**	**16.5**
60-69	102	8.7	61	5.8	**163**	**7.3**
≥ 70	50	4.3	29	2.7	**79**	**3.5**
Ethnic groups						
Mixed Race	876	74.7	816	77.1	**1692**	**75.9**
Hispanic White	191	16.3	161	15.2	**352**	**15.8**
Afro-venezuelan	30	2.6	36	3.4	**66**	**3.0**
Amerindian	62	5.3	44	4.2	**106**	**4.8**
Other	13	1.1	1	0.1	**14**	**0.6**
BMI (WHO)						
Low weight	30	2.6	15	1.4	**45**	**2.0**
Normal weight	390	33.3	260	24.6	**650**	**29.1**
Overweight	371	31.7	415	39.2	**786**	**35.2**
Obesity grade I	226	19.3	231	21.8	**457**	**20.5**
Obesity grade II	104	8.9	93	8.8	**197**	**8.8**
Obesity grade III	51	4.4	44	4.2	**95**	**4.3**
Abdominal Circumference						
Quintil 1	217	18.5	208	19.6	**425**	**19.1**
Quintil 2	247	21.1	192	18.1	**439**	**19.7**
Quintil 3	235	20.1	223	21.1	**458**	**20.5**
Quintil 4	235	20.1	211	20.0	**446**	**20.0**
Quintil 5	238	20.2	224	21.2	**462**	**20.7**
Glycemic Status						
Normoglycemics	870	74.4	736	69.6	**1606**	**72.1**
Impaired Fasting Glucose	202	17.3	233	22.0	**435**	**19.5**
DM2*	69	5.9	61	5.8	**130**	**5.8**
DM2†	29	2.5	28	2.6	**57**	**2.6**
Metabolic Syndrome						
Absent	698	59.6	586	55.3	**1284**	**57.6**
Present	474	40.4	472	44.7	**946**	**42.4**
Total	1172	100.0	1058	100.0	**2230**	**100.0**

DM2: Type 2 Diabetes Mellitus.

*Previously diagnosed Type 2 Diabetes Mellitus. † Newly-diagnosed Type 2 Diabetes Mellitus.

Table 2. Prevalence of known history of Hypertension according to age groups and metabolic alterations. Maracaibo Municipality. Zulia state.

	Female		Male		Total	
	n	%	n	%	n	%
Age Group (age)						
< 20	2	0.8	0	0.0	0	0.5
20-29	9	3.7	9	4.8	18	4.2
30-39	17	6.9	19	10.2	36	8.3
40-49	56	22.8	61	32.6	117	27.0
50-59	70	28.5	61	32.6	130	30.3
60-69	59	24.0	25	13.4	84	19.4
≥ 70	33	13.4	12	6.4	45	10.4
Ethnic groups						
Mixed Race	183	74,4	154	82,4	337	77,8
Hispanic White	42	17,1	27	14,4	69	15,9
Afro-venezuelan	8	3,3	4	2,1	12	2,8
Amerindian	9	3,7	2	1,1	11	2,5
Other	4	1,6	0	0.0	4	0,9
BMI (WHO)						
Low weight	0	0.0	0	0.0	0	0.0
Normal weight	41	16.7	20	10.7	61	14.1
Overweight	80	32.5	68	36.4	148	34.2
Obesity grade I	71	28.9	55	29.4	126	29.1
Obesity grade II	36	14.6	30	16.0	66	15.2
Obesity grade III	18	7.3	14	7.5	32	7.4
Abdominal circumference						
Quintil 1	9	3.7	5	2.7	14	3.2
Quintil 2	35	14.3	17	9.0	52	12.0
Quintil 3	51	20.4	43	23.4	94	21.7
Quintil 4	71	29.0	51	27.1	122	28.2
Quintil 5	80	32.7	71	37.8	151	34.9
Glycemic Status						
Normoglycemics	136	55.3	94	50.3	230	53.1
Impaired Fasting Glucose	60	24.4	49	26.2	109	25.2
DM2*	39	15.9	32	17.1	71	16.4
DM2†	11	4.5	12	6.4	23	5.3
Metabolic Syndrome						
Absent	42	17.1	37	19.8	79	18.2
Present	204	82.9	150	80.2	354	81.8
Total	246	56.9	187	43.1	433	100

DM2: Type 2 Diabetes Mellitus.
*Previously diagnosed Type 2 Diabetes Mellitus. † Newly-diagnosed Type 2 Diabetes Mellitus.

Table 3. Antihypertensive prescription according to ethnicity. Maracaibo Municipality. Zulia state.

	Ethnic groups											
	Mixed Race		Hispanic White		Afro-Venezuelan		Amerindian		Others		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
No prescription	147	43.6	33	47.8	2	16.7	6	54.5	1	25.0	189	43.6
ACEI	83	24.6	11	15.9	6	50.0	4	36.4	1	25.0	105	24.2
BB	27	8.0	9	13.0	1	8.3	0	0	0	0	37	8.5
ARB	24	7.1	8	11.6	0	0	0	0	0	0	32	7.4
Diuretic	0	0	0	0	0	0	0	0	0	0	0	0
ACEI+BB	4	1.2	0	0	0	0	0	0	0	0	4	0.9
CCB	20	5.9	2	2.9	2	16.7	0	0	0	0	24	5.5
ACEI+ARB	1	0.3	1	1.4	0	0	0	0	0	0	2	0.5
ACEI+Diuretic	3	0.9	1	1.4	0	0	0	0	0	0	4	0.9
BB+ARB	0	0	0	0	0	0	0	0	0	0	0	0
ACEI+CCB	1	0.3	0	0	0	0	0	0	0	0	1	0.2
BB+Diuretic	7	2.1	3	4.3	0	0	0	0	1	25.0	11	2.5
Diuretic+ARB	12	3.6	1	1.4	1	8.3	0	0	1	25.0	15	3.5
BB+CCB	3	0.9	0	0	0	0	1	9.1	0	0	4	0.9
CCB+ARB	2	0.6	0	0	0	0	0	0	0	0	2	0.5
Diuretic+CCB	1	0.3	0	0	0	0	0	0	0	0	1	0.2
ACEI+CCB+Diuretic	1	0.3	0	0	0	0	0	0	0	0	1	0.2
ARB+CCB+Diuretic	1	0.3	0	0	0	0	0	0	0	0	1	0.2
Total	**337**	**100.0**	**69**	**100.0**	**12**	**100.0**	**11**	**100.0**	**4**	**100.0**	**433**	**100.0**

ACEI= Angiotensin Converting Enzyme Inhibitors; BB= β-Blockers; ARB= Angiotensin Receptor II Blockers; CCB= Calcium Channel Blockers; HCT= Hydrochlorothiazide

Figure 1. Behavior of different types of Hypertension according to sex and age groups in individuals with known hypertension history, Maracaibo Municipality, Zulia State.

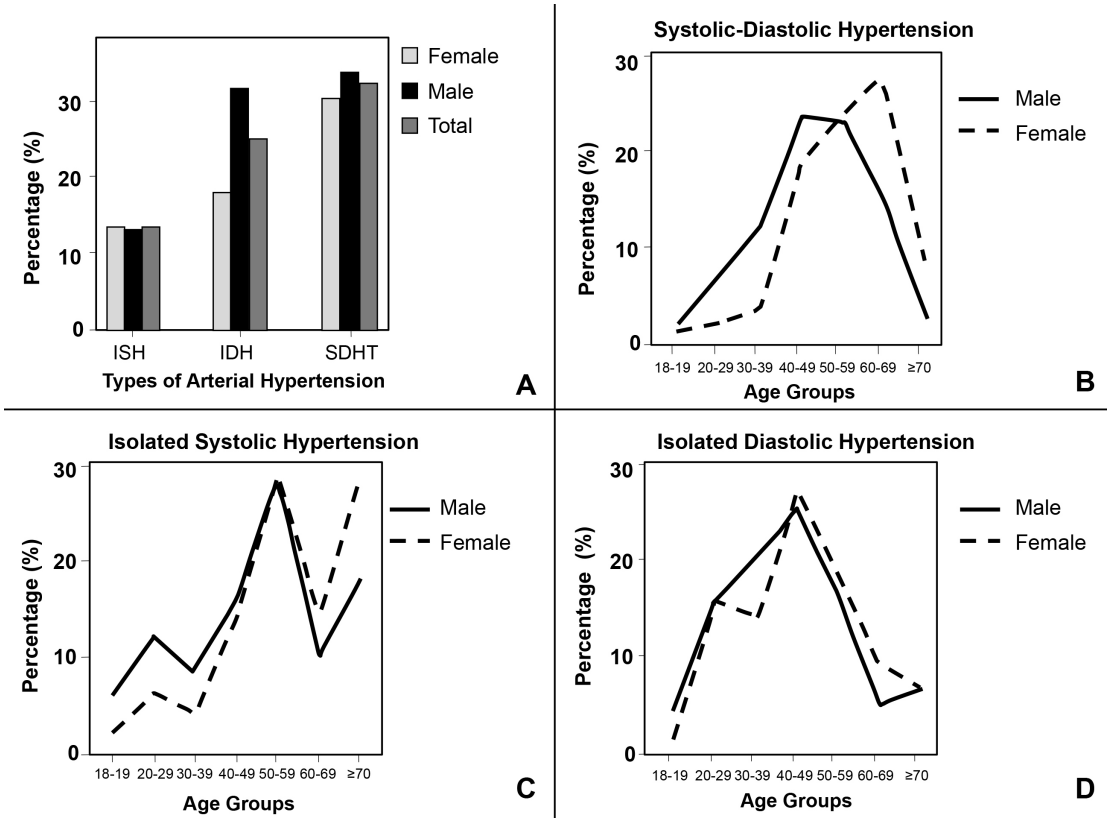


Figure 2. Distribution according to blood pressure, age group, HOMA2-IR and glycemic status in individuals without previous history of hypertension, Maracaibo Municipality, Zulia State.

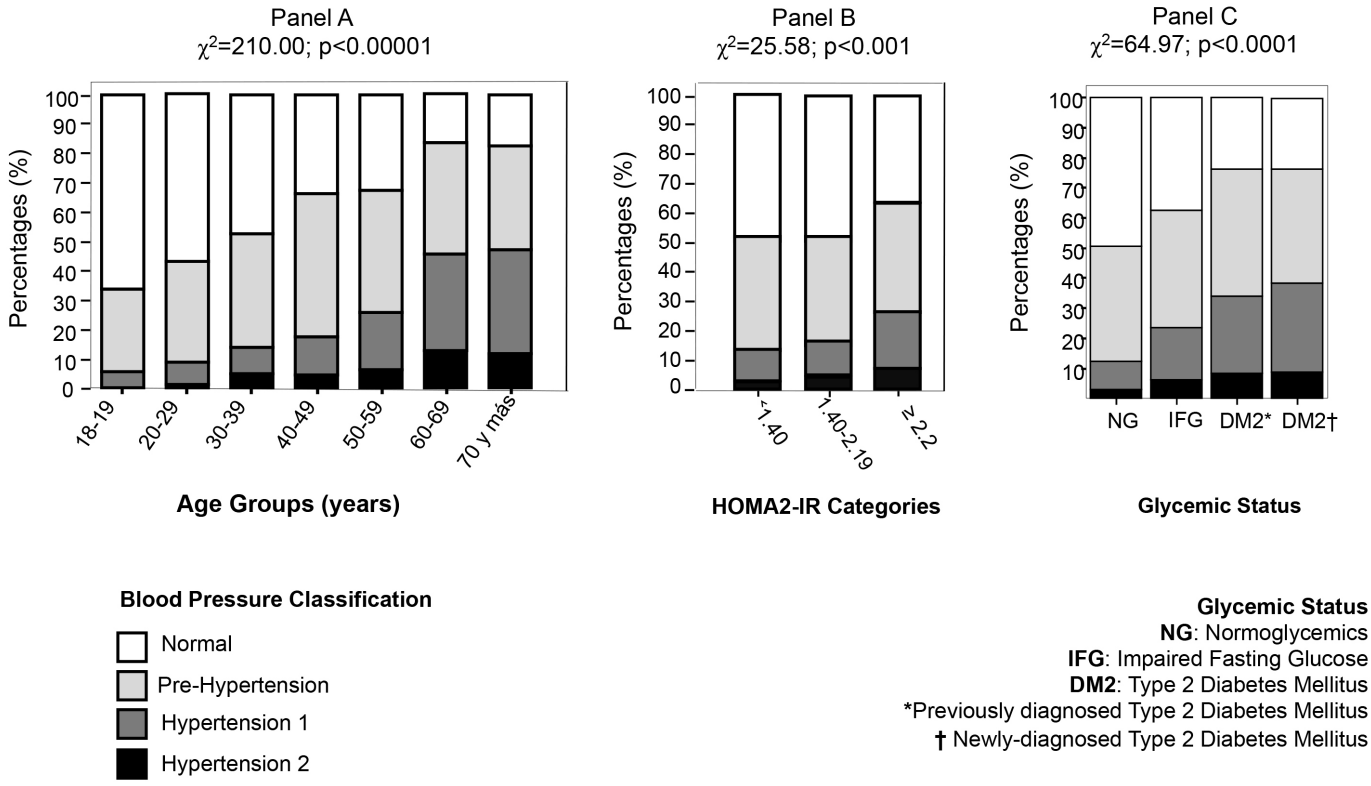
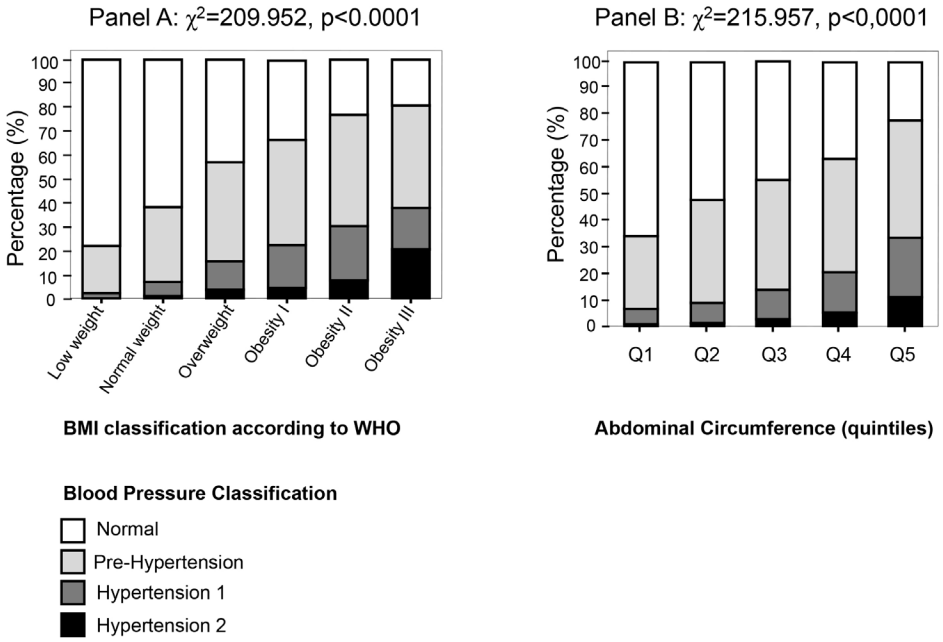


Figure 3. Distribution according to blood pressure and anthropometric parameters in individuals without previous history of hypertension, Maracaibo Municipality, Zulia State.



Discussion

Arterial Hypertension represents one of the leading risk factors for CAD and stroke, and the second most important risk factor for ESRD in the industrialized world[1,2]. Kearny et al.[7] estimated that in 2000, global HT prevalence was 26.44% which translated to almost 100 million people (more males than females – 26.5% vs. 25.5% respectively), – and that two thirds of them resided in developing countries. There is a considerable variation in prevalence data between countries and regions within a country, warranting a survey study which applies validated methodology to gather and analyze the information obtained between such entities[19].

The Prospective Urban Rural Epidemiology (PURE) study is a prospective study which set out to analyze prevalence, awareness and proper HT control 17 countries on 5 continents, evaluating over 140 thousand subjects[20]. According to their results, 40.8% of the population sample had HT and 46.5% were aware of such diagnosis[21], and 32.5% had BP control. In our study, 12.60% HT subjects were unaware of their diagnosis, while the prevalence of Known Hypertensive was 19.42%, almost a fifth of the population sample. Moreover, controlled BP was observed in half the patients, being higher in women, who seem to be more prone to medical seeking and treatment[22]. As can be ascertained, prevalence of hypertension and awareness are very different according to the country evaluated due to several confounding factors such as socioeconomic factors, medical attention accessibility and study design[23].

Hypertension prevalence in adults published in the last two decades has varied between a low of 11.10% in Valparaiso, Chile[24] and a high of 55.3% in Germany[25]; compared to the prevalence in the present study (32.0%) which is between these previous two values.

There are no prospective multicentered studies of HT prevalence in the entire country of Venezuela. However, there are two regional studies, one is a survey of prevalence of HT in Maracaibo involving 7,424 subjects 20 years and older, which reported a value of 36.9%[26], a number similar to the present study. In the second study (the CARMELA Study[27]) conducted in the city of Barquisimeto (estimated population: 1.5 million in 2013), the reported prevalence of HT (25.62%; for men 27.49% and for women 22.94%) was much lower than found in the present study which was undertaken in a larger city (Maracaibo, estimated population: 2.15 million in 2013). The difference between Barquisimeto and Maracaibo may be explained by the time frame of the two studies and/or difference in urbanization of the two cities. The observed increase in the prevalence of HT is in line with that observed in the USA in NHANES – phase III study, reporting a prevalence of 28.7% for the 1999-2000 period[28], which increased to 31% as reported in 2012 in a later NHANES study published by Yoon et al.[29].

As for the metabolic factors, several studies show relationship of HT with increased abdominal circumference and BMI[30], and our study supports this notion, with higher

percentages of HT as adiposity and waist circumference increased. Moreover, HT prevalence is higher in patients with diabetes with an overall worldwide prevalence of 60%[31], and cardiovascular-related death percentage higher in developing countries[32] such as ours. Impaired fasting glucose subjects were also seems to have Pre-Hypertension and established Hypertension, which is consistent with previous studies that relate prediabetic states with cardiovascular disease[33].

It is a global agreement that HT is a fundamental modifiable cardiovascular risk factor[1,2], making imperative its appropriate identification and treatment to ameliorate deleterious effects[1,2,5]. International guidelines propose that BP control in hypertensive patients must show a steady and sustained decline in their BP, to values <140 mmHg for systolic BP and <90 mmHg for diastolic BP, including in those with diabetes and target organ damage[14]. In the United States, HT has remained constant over the past decade, but it is higher in patients with obesity, diabetes and those with physical disabilities[34]; however, in these groups, HT is better controlled due to closer medical observation and proper medication[35]. In the present study, 50.6% of the hypertensive individuals were controlled; higher in women (56.1%) than in men (41.7%). In a previous investigation in Maracaibo by Sulbarán et al.[26], the percentage of controlled subjects in a sample from 1997 was 4.5%, a rate far lower than in the present study, possibly as a result of improved medical care, promotion of healthy lifestyle, access to better primary care personnel training and more efficacious antihypertensive medications.

Ethnic entity is a complicated situation, especially in Latin America due to the added mixture of ethnicities within each country, which is quite similar but not the same in comparison to other South American nations. Concerning ethnicity and BP control, ACEI was the most prescribed drug, followed by BB and ARB in the major ethnic groups (Mixed Race and Hispanic Whites). In African-Americans (Blacks), JNC-8[14] recommends CCB and diuretics to be preferred over ACEI and BB; however, in this investigation, BP was well-controlled in Afro-Venezuelans with ACEI as the main prescribed drug. Several factors influence medication prescriptions in the Maracaibo region, such as availability, cost, individual tolerance of the drug, and socioeconomic status of the patient. Overall, pharmacological combinations given to the patients were in accordance with current management guidelines[14], which would explain the modest BP control observed in the sample.

In conclusion, the present study reports an elevated prevalence of HT in a local sample of Maracaibo, Venezuela, higher in men than in women, a pattern that is similar in the category of 'newly-diagnosed hypertension' and BP control in individuals with 'known hypertension'. Several confounding factors, such as age, central obesity, insulin resistance, presence of metabolic syndrome, and ethnicity influence the prevalence of HT. Proper analysis and complete description of these kinds of data on non-communicable diseases in Latin American communities is fundamental to accurately design prevention strategies and primary care programs that allow the detection and management of HT.

Disclosure

The authors have are no conflicts of interest to disclose.

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