



# Epidemiologic aspects of arterial hypertension in Maracaibo, Venezuela

T Sulbarán, E Silva, G Calmón and A Vegas

*Centro de Enfermedades Cardiovasculares “Tulio Alberto Sulbarán” de la Universidad del Zulia, Facultad de Medicina, Apartado Postal 846. Maracaibo, Venezuela*

The purpose of this study was to determine the prevalence of arterial hypertension (HT) awareness and the influence of age, sex and body mass index on the degree of control of HT in the population of Maracaibo, State of Zulia, Venezuela. It included 7424 subjects, 3640 males (M) and 3784 females (F). Information was collected through domiciliary visits with a questionnaire designed for this purpose. Hypertension was defined as such when values were  $\geq 140$  mm Hg for systolic blood pressure (SBP) and  $\geq 90$  mm Hg for diastolic blood pressure (DBP). In the total sample, 36.9% were hypertensive. A higher prevalence in M (45.2%) than in F (28.9%), was observed. The percentage of HT increased with age in both genders. There was a high percentage of hypertensives with obesity (73.5%) which did not vary

when discriminating for gender and age. Obese subjects were more prone to have HT until age 50. Those younger than 40 took less medication but were proportionally better controlled. Of the hypertensive population 54.3% were not aware of their condition, of 45.7% remaining, 22.8% did not have regular control visits, 18.4% in spite of medication were not controlled and only 4.5% were well controlled. Better control was observed in F (6.2%) than in M (3.3%),  $P < 0.001$ . It is concluded that HT is a serious public health problem because of its high prevalence and lack of control, and it is necessary to implement educational and medical programmes for the detection and control of this disease. *Journal of Human Hypertension* (2000) 14, Suppl 1, S6–S9.

**Keywords:** hypertension; epidemiology

## Introduction

Blood pressure (BP) is universally accepted as one of the most important risk factors in the development of cardiovascular disease and hypertension (HT) still represents a serious public health problem worldwide. The VI Joint National Committee Report on Hypertension of USA (JNCR-VI)<sup>1</sup> indicated that instead of increasing, awareness of this condition has diminished, also that the percentage of hypertensive patients receiving treatment decreased as did that of the well-controlled hypertensive patients, since the previous JNCR-V.<sup>2</sup> On the other hand, prevalence of strokes, adjusted by age, has increased and the curve of prevalence of coronary artery disease has shown a tendency to flatten. Furthermore, an increment has been observed in end-stage renal failure and congestive heart failure, both closely related to hypertension.

Statistics similar to those of the USA and other countries<sup>1–4</sup> have not been officially published in Venezuela, however, the fact that cardiovascular and cerebrovascular mortality, both related to HT, have been found to increase over the past three decades and that local epidemiological reports have shown a high prevalence of HT, should be a reason of concern because of the high impact of HT on public health in Venezuela. This problem will most probably be intensified over the next few years con-

sidering the rise in proportion of the elderly due to the longer life span of the Venezuelan population and the high prevalence of HT in that age group.

Considering the above factors, this study was performed to determine the epidemiological facts related to HT in the urban population of Maracaibo, State of Zulia, Venezuela.

## Materials and methods

### Population studied

A cross-sectional survey was carried out with a randomised sample of 7424 persons, stratified according to age and sex in proportion to the National Demographic Survey, thus achieving a representative sample of the Venezuelan population at large. The sample included 3640 males (M) and 3784 females (F),  $>20$  years of age.

### Methodology

A questionnaire, including demographic data, history of HT, use of antihypertensive drugs and periodic visits to HT clinics, was used during the domiciliary visits. Blood pressure was measured according to standardised criteria using a mercury sphygmomanometer with special attention given to size of the BP cuff and rate of descent of the mercury column. The appearances of the first and fifth Korotkoff sounds were recorded as systolic BP (SBP) and diastolic BP (DBP), respectively. Blood pressure was measured three times on one occasion, with the subject in the sitting, recumbent and standing positions,

Correspondence: Tulio Sulbarán, Centro de Enfermedades Cardiovasculares “Tulio Alberto Sulbarán” de la Universidad del Zulia, Facultad de Medicina, Apartado Postal 846. Maracaibo, Estado Zulia, Venezuela

**Table 1** Demographic data by age group

Age group (years)	Males	Females	Total	Percentage
20–29	1360	1248	2608	35.1
30–39	936	1072	2008	27.0
40–49	624	624	1248	16.8
50–59	352	424	776	10.5
≥60	368	416	784	10.6
Total	3640	3784	7424	100.0

to an accuracy of 2 mm Hg. Hypertension was defined as SBP ≥140 mm Hg and DBP ≥90 mm Hg or a use of antihypertensive medication by the participant.<sup>2</sup>

Weight and height were measured to determine body mass index (BMI), which was calculated according to Quetelet, BMI = weight (Kg)/height (m<sup>2</sup>).<sup>5,6</sup> Obesity was defined as >25 Kg/m<sup>2</sup>. Hypertension was considered under control when BP values were less than 140 mm Hg and 90 mm Hg, for SBP and DBP, respectively.

**Statistical analyses**

All the data were run using the 6.8 software version of the Statistical Analysis System (SAS, Cary, NC, USA). Comparison of frequencies was carried out through  $\chi^2$  test or ANOVA, for qualitative or quantitative data, respectively. A  $P < 0.05$  was considered statistically significant.

**Results**

Demographic data by age group is presented in Table 1.

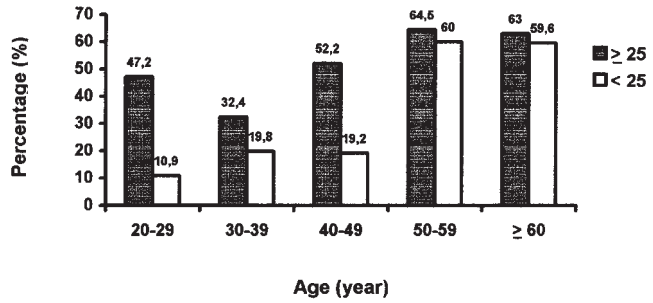
**Hypertension prevalence**

The overall HT prevalence was 36.9%, 45.2% in M and 28.9% in F ( $P < 0.0001$ ). The higher prevalence in M was present for both, systolic and diastolic HT. Hypertension increased with age, the values being 26.9%, 27.1%, 42.3%, 62.9% and 61.2% in the age groups of 20–29, 30–39, 40–49, 50–59 and >60 years, respectively. Table 2 shows the prevalence of HT according to age and sex and as may be observed, statistically significant differences were found, it being higher in M than F in all age groups, except for the 40–49 age group.

**Table 2** Prevalence of hypertension according to age and sex

Age group (years)	Males (%)	Females (%)
20–29	40.6	12.2*
30–39	35.0	20.2*
40–49	39.7	44.9**
50–59	77.2	50.9*
≥60	67.4	55.8*

\* $P < 0.01$ ; \*\* $P$  NS.



**Figure 1** Prevalence of hypertension according to body mass index and age.

**Body mass index**

A higher percentage of obese than non-obese individuals was found to be hypertensive, 47.6% vs 24.2% ( $P < 0.01$ ). The percentage of HT stratified according to age and BMI is shown in Figure 1. Greater influence of BMI was observed in ages below 50 years. In the hypertensive population 73.5% were found to be obese while no statistical differences were found between the genders.

**Awareness of treatment**

The percentage of hypertensives aware of their condition was 45.7%, however 22.8% did not have control visits on a regular basis, and in spite of receiving treatment, another 18.4% were not well controlled.

**Degree of control of hypertension**

Of the 22.9% of the hypertensive group receiving pharmacological treatment, only 4.5% of the total number of hypertensives were well controlled. As shown in Table 3, though a higher percentage of hypertensives receive pharmacological treatment as age increases, a lower percentage of them is well controlled. Degree of control was not related to the obese status, as obese and non-obese had the same response to treatment. It was demonstrated that more women (26%) than men (13.1%)  $P < 0.001$  received medication and that in the same manner, more women were well controlled (6.2%) vs (3.3%),  $P < 0.01$ .

**Table 3** Pharmacological treatment and control of hypertension according to age

Age group (years)	Receiving pharmacological treatment (%)	Hypertensive with pharmacological treatment and well controlled (%)	Well controlled in whole group of hypertensives (%)
20–29	3.3	66.7	2.2
30–39	19.2	35.4	6.8
40–49	17.4	24.7	4.3
50–59	27.7	22.4	6.2
≥60	30.6	10.5	3.2

## Discussion

### Prevalence

Several studies have demonstrated differences in prevalence of HT.<sup>7–9</sup> Genetic and environmental factors, as well as the level of BP considered abnormal, are some of the possible explanations for the diversified findings. In this study, the prevalence of HT found was 36.9%, which is higher than values found by Stamler *et al*<sup>3</sup> in the USA and by Freeman *et al*<sup>10</sup> in the Caribbean. This demonstrates that HT is widely prevalent in Maracaibo and probably so in Venezuela. Hypertension increases progressively with age in both genders, although the prevalence is higher for men than for women (45.2% vs 28.9%) in all age groups, which agrees with the data presented by Stamler *et al*,<sup>3</sup> but differs from the findings by Macias *et al*,<sup>11</sup> who reported that after the age of 65, HT was more prevalent in F. Freeman *et al*<sup>12</sup> found that after 50 years of age, HT was higher in F. The higher prevalence in M, in this study, could be explained by genetic, hormonal, environmental and cultural factors.

### Body mass index

The relation of HT with obesity is well established.<sup>13,14</sup> Ascherio *et al*<sup>15</sup> described the importance of this relationship when they showed that a reduction of BMI to values less than 23, would prevent 46.7% of future hypertensive cases in men. Page<sup>16</sup> found an increment in the development of HT in the normotensive who gained weight during the follow-up period. Stamler *et al*<sup>13</sup> showed that the percentage of HT increased as the weight was higher, thus in the age group 20–39, the percentage of HT was 4.6% in individuals with a weight lower than ideal weight, while it was 14.9% in the obese.

### Awareness, treatment and control of hypertension

In this study, less than half of the HT knew of their condition, of those only half of them were visiting physicians on a regular basis and only 4.5% of the total hypertensive population were well controlled. This number is highly worrisome as it shows a very low percentage of well controlled hypertensives when compared to the JNCR-VI from the USA,<sup>1</sup> where 27.4% of hypertensives were well controlled. The 4.5% compares negatively with the 16.3% well controlled reported by the National Health Examination Survey (NHES) of 1960 to 1962 from USA.<sup>17</sup> The data for undetected, untreated and uncontrolled HT demonstrated that 95.5% of hypertensives are in this category, this being a particularly serious problem in terms of risks of premature morbidity, disability and mortality. The possible explanation is the lack of community-oriented educational programmes, and health examination survey, which have shown to be useful in other countries, such as the National High Blood Pressure Education Program launched in the USA in 1973.<sup>18</sup>

### Factors related to control of hypertension

As to the differences in gender, it was found that more F (26%) were taking medicines compared to M (13.1%). Similar results were found in the North Karelian study in Finland, where the percentage of females on drug therapy was 67% vs 48% in M.<sup>19</sup> In this study, the percentage of well controlled F was 6.2% vs 3.3% of M. No statistical significant differences were found when comparing the percentage of well controlled patients with the percentage of those taking medicines in each gender. This equal response rate indicates that the higher percentage of well controlled F compared to M is related to the higher percentage of F taking antihypertensive medicines. A possible explanation as to why M take less medication could be a cultural barrier, such as fear of impotence.

Though a higher percentage of patients took antihypertensive drugs in the older age group, a lower percentage of them were well controlled. In younger groups, less awareness of the hypertensive condition was found. This should be considered when developing antihypertensive programmes, as for the younger group these should aim at the detection of HT, whereas, in the older group the programme should focus on education for optimal control.

Obesity was a factor in developing HT below the age of 50 years, as a higher prevalence of HT was found in obese vs non-obese in these age groups. However, obesity did not influence the degree of control as no statistical significant differences were found between obese and non-obese, in this regard.

### Conclusion

Programmes for detection of HT in the younger patients and an educational programme on treatment benefits in older patients, should be developed. Considering the high prevalence, low awareness and poor level of control observed in this study, HT is a major public health problem challenging medical care and public health in Venezuela, which is particularly important considering that HT is a modifiable risk factor. It is necessary to intensify and expand the effort and support to achieve proper, sustained control of HT for most hypertensive patients.

### References

- 1 Journal National Committee. The Sixth Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure. (JNCR VI). *Arch Intern Med* 1997; **157**: 2413–2446.
- 2 Journal National Committee. The Fifth Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure. (JNCR V). 1993; **153**: 154–183.
- 3 Stamler R *et al*. Hypertension screening of 1 million Americans. *JAMA* 1976; **235**: 2299–2306.
- 4 Yang N, Lee S, Chou P. Community based epidemiological study on hypertension and diabetes community based preventive medicine by Yang-ming Crusade in 1989. *Chung Hua I Hsiueh Tsa Chih* 1990; **46**: 134–146.
- 5 Thomas AE, McKay DA, Cutlips MB. A monograph

- method for assessing body weight. *Am J Clin Nutr* 1976; **29**: 302–304.
- 6 Lee J, Kolonel LN, Hinds MW. Relative merits of the weight corrected for height indices. *Am J Clin Nutr* 1981; **34**: 2521–2529.
  - 7 Joffres M, Titanich K, Hessel P. The Alberta health survey: methods and results. *Can J Cardiol* 1993; **9**: 300–308.
  - 8 Chadha S *et al*. Prevalence awareness and treatment status of hypertension in urban population of Delhi Indian. *J Med Res* 1990; **92**: 233–240.
  - 9 NHANES II (National Health and Nutritional Examination Survey II). 1976–1980. Blood Pressure levels in persons 13–74 years of age. National Health Survey Series, Ser II, No 234. Hyattsville, Maryland: National Center for Health Statistics, 1986.
  - 10 Freeman V *et al*. A comparative study of hypertension prevalence, awareness, treatment and control rates in Sta. Lucia, Jamaica and Barbados. *J Hypertens* 1996; **14**: 495–501.
  - 11 Macias I, Del Collado F, Forte G. The effect of a community hypertension control program. *Hypertension* 1988; **11** (Suppl I): I-194–I-197.
  - 12 Freeman D *et al*. Changes in the prevalence distribution of hypertension: Connecticut Adults 1978–79 to 1982. *J Chron Dis* 1985; **38**: 157–164.
  - 13 Stamler R *et al*. Weight and blood pressure. *JAMA* 1978; **240**: 1607–1610.
  - 14 Haffner S, Ferramini E, Hazuda H, Stern M. Clustering of cardiovascular risk factors in confirmed prehypertensive individuals. *Hypertension* 1992; **20**: 38–45.
  - 15 Ascherio A *et al*. A prospective study of nutritional factors and hypertension among U.S. men. *Circulation* 1992; **86**: 1475–1484.
  - 16 Page I. Epidemiologic evidence on the etiology of human hypertension and its possible prevention. *Am Heart J* 1976; **91**: 527–534.
  - 17 National Health Survey, National Center for Health Statistics: Hypertension and Hypertensive Heart Disease in Adults, United States, 1960–1962, series 11, No. 13. US Department of Health, Education, and Welfare, 1966.
  - 18 National Conference on High Blood Pressure Education: Report of Proceedings, DHEW Publication No. (NIH) 73–486. US Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, 1973.
  - 19 Enlund H, Nissinen A, Tuomilehto J. Antihypertensive drug treatment in a middle-aged population. *Hypertension* 1982; **4**: 716–724.