

Association Between Hypertension and Overweight in Adults in Belém, State of Pará (Brazil), 2005

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Summary

Background: Hypertension is a major public health issue affecting 20 to 25% of the global population of adults, and 12 to 35 % of Brazilians.

Objective: To evaluate the association between hypertension and overweight.

Methods: A cross-sectional study was conducted in 2005 with a probabilistic sampling of the population ≥ 18 years of age in Belém, capital of the state of Pará, in the Northern region of Brazil, using the telephone surveillance system for chronic diseases (SIMTEL). The dependent variable was hypertension, the explanatory variable was overweight and the confounding variables were age, level of education and lifestyle characteristics. The variables associated with hypertension were run through the regression logistic model and odds ratios were calculated for each variable.

Results: Hypertension affected 16.2% of men and 18.3% of women, and overweight affected 49.2% of men and 34.1% of women. The prevalence of hypertension was directly associated with age and overweight in both genders. Among men, hypertension was associated with intake of vegetables and low intake of beans (similar to kidney- and pinto-type beans); among women, hypertension was associated with marital status (widow or separated), and inversely to education level. The risk of hypertension increased directly with weight for both genders ($p < 0.001$), and it was 6.33 times higher among obese men and 3.33 among obese women as compared to normal-weight subjects.

Conclusion: Overweight was associated with hypertension. However, variables such as age, education, and food consumption interfere in this relationship, creating circumstances favorable to reducing or increasing that risk. (Arq Bras Cardiol 2008;91(2):99-106)

Key words: Hipertension, obesity, adults.

Introduction

The increasing prevalence of non-communicable chronic diseases among populations is well known, especially obesity and hypertension. Hypertension is a chronic disease considered a major public health problem across all socioeconomic strata¹. It is estimated that at least 50 million people in the United States have high blood pressure, and Brazilian studies have shown prevalences from 12% to 35%² in the country. Hypertension is one of the leading causes of morbidity and mortality in the world, and one of the most prevalent risk factors for the development of coronary artery disease, cerebrovascular accidents, peripheral vascular disease, renal failure, heart failure, as well as obesity³.

Multiple causes are involved in the development of hypertension, and its main risk factors (lifestyle, smoking,

sedentarism, inappropriate eating patterns and others) are considered modifiable. Among these, a direct association between hypertension and obesity and between hypertension and overweight stands out⁴. Gender, age and certain socioeconomic aspects are potentially confounding variables of the relationship between overweight and hypertension, since they are associated with body mass⁵.

A study conducted in 2006 with adult populations of Brazilian state capitals and the Federal District indicated a prevalence of 44.1% of overweight, 11.4% of these were cases of obesity, and 21.6% of the population reported having a prior medical diagnosis of hypertension⁶.

In this article, we studied the association between a prior medical diagnosis of hypertension and overweight, taking into account sociodemographic and lifestyle variables among the adult male and female population in the city of Belém (state of Pará).

Methods

This is a cross-sectional study using data obtained by

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SIMTEL (surveillance system of risk and protection factors for chronic non-communicable diseases by telephone interview) in 2005. SIMTEL was carried out in five capitals of Brazilian macro-regions and Belém was chosen to represent the Northern region. Sampling procedures used by SIMTEL-BELÉM were the same as those used in other capitals, which aimed to obtain a probabilistic sampling of the population ≥ 18 years old living in households with at least one fixed telephone line. The minimum number of interviews was established as 2,000 in order to estimate with a 95% confidence coefficient and an approximate two percentage point error the frequency of any risk factor in the study population, following the same methodology of the SIMTEL-2003 survey carried out in São Paulo⁷.

In the first phase of the sampling, 7,000 telephone numbers were drawn from the fixed household telephone catalogue in the city of Belém; next, these telephone lines were redrawn and divided into 20 replicas of 350 telephone lines ordered from 1 to 20, each replicas reproducing the same ratio of lines per area of the city. The second phase of the sampling consisted in the random selection of the individuals – one per telephone line – to be interviewed by the system. This phase involved the prior identification, among the lines drawn, of those that were, in fact, household telephones and were in service (eligible lines), and the agreement to participate in the survey. Up to ten phone calls were placed to each number during the first phase: on weekdays, two calls in the morning, two in the afternoon, two at night (up to 9:00 p.m.); on weekends, one on Saturday morning, one on Saturday afternoon, one on the morning of the Sunday or holiday and another in the afternoon. In the second phase, up to 10 calls were also placed on the days and times pre-set in the first phase or through later contacts. The following situations were considered as losses: telephone numbers called up to 10 times with failure to contact for confirmation of a household and selection of a household member in the first phase, or no contact made with the selected person in the second phase. In total, 3,500 telephone numbers were called, 2,918 of which were eligible (confirmed households, no answer, busy, fax or answering machine), 205 people refused to participate in the study, and 2,620 interviews were completed, e.g., an 89.9% success rate and 7.0% refusal rate.

The total SIMTEL-BELÉM database sample consisted of 2,620 individuals. For the purpose of this article, however, since it is an association study, pregnant women (23 cases), subjects who did not know their weight and height (27 cases), subjects who did not know their weight (39 cases), and those who did not know their height (179 cases) were excluded, leaving 2,352 valid cases.

The SIMTEL interview is based on a questionnaire consisting of questions on demographic and socioeconomic characteristics, eating patterns, self-reported weight and height, smoking status, alcohol binge drinking use, presence or absence of hypertension, among others.

For the purpose of this investigation, hypertension was considered as the outcome variable, and overweight was considered the explanatory variable. Hypertension was classified as Yes or No, according to prior medical diagnosis;

overweight was classified as non-overweight, preobesity and obesity, according to the body mass index (BMI) values calculated as weight in kilograms divided by the square of the height in meters, e.g., $< 25 \text{ kg/m}^2$, $25 \text{ to } 29 \text{ kg/m}^2$, and 30 kg/m^2 or more, respectively⁸.

The other independent variables considered potentially confounders were age (classified in six age groups: 18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, or 65 years of age and more), skin color (stratified in two groups: white and yellow or mulatto, light brown skin and black), schooling (stratified in four levels: 0 to 4, 5 to 8, 9 to 11, or 12 and more years of schooling), marital status (stratified in three groups: single, married or widowed and separated), regular intake of fruit and vegetables (≥ 5 times per week), beans [similar to kidney- or pinto-type beans] (≥ 5 times per week), soft drinks (≥ 3 times per week), fatty meats or chicken meat with skin, alcohol binge drinking use (> 5 doses for men and > 4 doses for women in at least one occasion in the last 30 days), and physical activity during leisure time (≥ 1 day per week) were stratified as Yes or No, and smoking status was stratified in three categories: never smoked, smoker, or ex-smoker.

The estimates of hypertension prevalence according to the independent variables were calculated separately for men and women. The variables associated with hypertension at the $p < 0.05$ level were selected to calculate the crude odds ratio for the occurrence of hypertension in each category by logistic regression. Next, a multivariate analysis was performed for each variable adjusted for the other variables, aiming to identify the predictors of hypertension. Only the variables with $p < 0.05$ values after the adjustment were entered into the final model in order to determine the adjusted odds ratio of hypertension, with a 95% confidence interval.

In this study, the informed consent form was replaced by a verbal consent obtained during the telephone contacts with the study population. This study was approved by the Ethics Committee of the *Faculdade de Saúde Pública* of the *Universidade de São Paulo*.

Results

Study population consisted mostly (60.2%) of women (Table 1). There is a higher percentage of men in the youngest age group and a smaller percentage of widowed or divorced men. Men had higher frequencies of overweight, non-regular fruit and vegetable intake, regular soft drink intake, the habit of eating fatty meats or chicken with the skin, and alcohol binge drinking use. On the other hand, women had higher frequencies of non-regular intake of beans and no reference to leisure practice of physical activities. No differences were observed between genders as to skin color, schooling level, and references to hypertension. Hypertension affected approximately 17.5% of the study population, whereas preobesity and obesity affected 29.9% and 10.2%, respectively, totalizing 40.1% of the population with overweight.

Table 2 shows that, among men, the prevalence of hypertension increases directly with age; it is higher in the

Table 1 – Distribution (%) of adults (≥ 18 years of age) according to sociodemographic characteristics, presence of hypertension, overweight, eating patterns, alcohol binge drinking use, physical activity during leisure time and smoking status, by gender Belém, 2005

Characteristics	Men (n=936)	Women (n=1416)	Total (n=2352)	p*
Age (years)				<0.001
18 to 24	23.0	15.6	18.5	
25 to 34	25.9	24.6	25.1	
35 to 44	21.8	23.0	22.5	
45 to 54	12.7	17.2	15.4	
55 to 64	8.7	10.8	9.9	
≥ 65	8.0	8.8	8.5	
Skin color				0.099
White or yellow	28.1	31.2	30.0	
Mulatto, light brown or black	71.9	68.8	70.0	
Years of schooling				0.346
0 to 4	10.1	10.4	10.3	
5 to 8	19.1	16.5	17.5	
9 to 11	48.0	50.8	49.7	
≥ 12	22.8	22.3	22.5	
Marital status				<0.001
Single	41.0	37.2	38.7	
Married	52.1	46.3	48.6	
Widowed or separated	6.8	16.5	12.6	
Hypertension				0.200
No	83.8	81.7	82.5	
Yes	16.2	18.3	17.5	
Overweight				<0.001
No overweight	50.7	66.0	59.9	
Preobesity	37.9	24.6	29.9	
Obesity	11.3	9.5	10.2	
Regular intake of fruit and vegetables				<0.001
Yes	15.1	22.5	19.6	
No	84.9	77.5	80.4	
Regular intake of beans				<0.001
Yes	52.5	32.7	40.6	
No	47.5	67.3	59.4	
Regular intake of soft drinks				<0.001
No	57.6	75.8	68.5	
Yes	42.4	24.2	31.5	

Table 1 – Continue

Characteristics	Men (n=936)	Women (n=1416)	Total (n=2352)	p*
Intake of fatty meats or chicken with skin				<0.001
No	60.4	78.5	71.3	
Yes	39.6	21.5	28.7	
Alcohol binge drinking use				<0.001
No	66.2	92.6	82.1	
Yes	33.8	7.4	17.9	
Physical activity during leisure time				<0.001
Yes	57.1	35.9	44.3	
No	42.9	64.1	55.7	
Smoking status				<0.001
Never smoked	51.3	69.4	62.2	
Smoker	18.6	8.8	12.7	
Ex-smoker	30.1	21.9	25.2	

* Comparison between genders as per the chi-square test.

group with less schooling, it decreases with the increase in years of schooling up to the range corresponding to high school, and increases again among people with more years of schooling. Hypertension also increases directly with weight, affecting 42.5% of obese subjects. Hypertension is higher among widowed and separated people than among married people, and it is higher among those who are married than among single subjects.

Hypertension was greater among those who regularly ate fruit and vegetables, and for those who did not regularly eat beans or have soft drinks.

It was also greater among those who had once experimented tobacco smoking, especially ex-smokers. Among women, hypertension also increased with age, diminished with schooling and increased with weight, and affecting 41.0% of obese women. It was greater among widowed and separated women than among married women, and it was also greater among married women than among single women. It was greater with regular intake of fruit and vegetables, with the non-habit of consuming fatty meats or chicken meat with skin, and with the no alcohol binge drinking use and smoking, especially ex-smokers.

Logistic regression showed that, among men, only age, overweight, intake of fruit and vegetables, and intake of beans remained associated with hypertension after adjustments for the other variables (Table 3). Among women, the variables that remained in the model were age, marital status, and overweight (Table 4).

The multivariate analysis using only the variables associated in the bivariate model showed, among men, an

Table 2 – Prevalence (%) of hypertension among adults (≥ 18 years of age) according to sociodemographic characteristics, overweight, eating patterns, alcohol binge drinking use, physical activity during leisure time and smoking status, per gender - Belém, 2005

Characteristics	Men %	pp	Women%	pp
Age (years)		<0.001		<0.001
18 to 24	3.3		4.1	
25 to 34	4.1		5.7	
35 to 44	15.7		12.3	
45 to 54	33.6		25.0	
55 to 64	37.0		42.5	
≥65	44.0		51.2	
CorSkin color		0.087		0.613
White or yellow	19.5		19.0	
Mulatto, light brown, black	14.9		17.9	
Years ooling		<0.001		<0.001
0 to 4	27.4		38.1	
5 to 8	21.8		27.5	
9 to 11	9.6		14.3	
≥ 12	20.7		11.4	
Marital status		<0.001		<0.001
Single	5.7		9.9	
Married	21.5		17.1	
Widowed or separated	39.1		40.8	
Overweight		<0.001		<0.001
No overweight	8.8		11.0	
Preobesity	18.3		29.0	
Obesity	42.5		41.0	
Regular intake of fruit and vegetables		<0.001		0.006
Yes	27.7		23.5	
No	14.2		16.8	
Regular intake of beans		<0.001		0.087
Yes	12.0		15.8	
No	20.9		19.5	
Regular intake of soft drinks		0.009		0.161
No	18.9		19.1	
Yes	12.6		15.7	
Intake of fatty meats or chicken with skin		0.016		0.001
No	18.6		20.1	
Yes	12.7		11.5	

Table 2 – Continue

Alcohol binge drinking use	0.170	0.031
No	17.4	18.9
Yes	13.9	10.5
Active during leisure time	0.119	0.083
Yes	14.6	20.7
No	18.4	17.0
Smoking status	0.002	<0.001
Never smoked	12.5	16.0
Smoker	16.7	17.7
Ex-smoker	22.3	25.8

increased risk of hypertension starting at the age of 35, an increase of 80% in the risk for those with a BMI between 25 and 29 kg/m², and a 533% for those with a BMI equal to or greater than 30 kg/m², a reduction of 40% for those who did not regularly eat fruit and vegetables, and 69% for those who did not regularly eat beans (Table 5). Among women, the risk of hypertension increased with age after the age of 45, increased 27% for widows or divorcées, and 87% with a BMI between 25 and 29 kg/m² and 114% among women with a BMI equal to or greater than 30 kg/m² (Table 6). For both genders, overweight proved to be the best predictor of hypertension with a potential for modification.

Discussion

The aim of this study was to assess the association between hypertension and overweight. Medical diagnosis of hypertension was reported by 17.5% of the study population. In a population-based study conducted in 2003 through house calls in Belém, 18% of the population aged 25 years and more reported having been diagnosed with hypertension, 15% men and 19% women⁹. In 2006, in another population-based study conducted in Belém, data obtained through telephone calls showed that 16.1% of men and 21.2% of women had hypertension⁶. Our study indicated 16.2% of hypertension among men and 18.3% among women, values which are similar to those reported in the two studies cited above considering the confidence interval.

We observed a direct association between prevalence of hypertension and age, in accordance with other studies^{5,10-15}. Regarding schooling, there was an inverse association with the prevalence of hypertension, which is in agreement with the results obtained in several studies^{12,15-17}.

Marital status also proved to be associated with the prevalence of hypertension: widowed or separated and married individuals had greater prevalences compared to single individuals. Similar data were reported by another study¹⁵, where single women showed a lower prevalence of hypertension. According to Sawyer et al¹⁸, the presence of a partner or stable family ties is associated with access to

Table 3 - Odds Ratio (OR) and 95% confidence interval of hypertension among men (≥ 18 years of age) according to sociodemographic characteristics, overweight, eating patterns, alcohol binge drinking use, physical activity during leisure time and smoking status. Belém, 2005

Characteristics	Raw OR		Adjusted OR*	
Age (years)		<0.001		<0.001
18 to 24	1		1	
25 to 34	1.28 (0.48-3.43)		0.95 (0.33-2.72)	
35 to 44	5.53 (2.38-12.84)		3.99 (1.46-10.87)	
45 to 54	15.05 (6.47-34.98)		8.96 (3.10-25.85)	
55 to 64	17.48 (7.27-42.05)		10.36 (3.40-31.60)	
≥65	23.35 (9.68-56.31)		18.54 (5.95-57.77)	
Anos de estudoYears of schooling		0.032		0.952
0 to 4	1		1	
5 to 8	0.74 (0.42-1.31)		1.28 (0.65-2.50)	
9 to 11	0.28 (0.16-0.49)		0.78 (0.40-1.50)	
≥ 12	0.69 (0.40-1.21)		1.20 (0.59-2.43)	
Marital status		<0.001		0.248
Single	1		1	
Married	4.51 (2.79-7.30)		1.04 (0.54-2.03)	
Widowed or separated	10.55 (5.44-20.44)		1.42 (0.60-3.36)	
Overweight		<0.001		<0.001
No overweight	1		1	
Preobesity	2.31 (1.53-3.50)		1.77 (1.10-2.84)	
Obesity	7.61 (4.62-12.52)		6.50 (3.64-11.64)	
Regular intake of fruit and vegetables		<0.001		<0.001
Yes	1		1	
No	0.43 (0.29-0.66)		0.41 (0.24-0.70)	
Regular intake of beans		<0.001		0.024
Yes	1		1	
No	1.94 (1.36-2.76)		1.63 (1.08-2.45)	
Regular intake of soft drinks		0.010		0.473
No	1		1	
Yes	0.62 (0.43-0.89)		0.86 (0.56-1.34)	
Intake of fatty meats or chicken with skin		0.017		0.858
No	1		1	
Yes	0.64 (0.44-0.92)		0.90 (0.58-1.40)	
Smoking status		<0.001		0.375
Never smoked	1		1	
Smoker	1.40 (0.87-2.27)		0.96 (0.55-1.69)	
Ex-smoker	2.01 (1.36-2.97)		0.77 (0.47-1.27)	

*Adjusted for all other variables.

health care services and, consequently, a greater likelihood of having hypertension diagnosed, which would justify the greater prevalence of hypertension among these subjects. Marital status is also associated with age, which is associated with hypertension, e.g., widowed or separated persons tend to

be older and more prone to hypertension, thus representing a confounder variable. After adjustments for age, marital status lost its association with hypertension among men, although it remained among women.

In this article, a significant increase was noted in the prevalence

Table 4 - Odds Ratio (OR) and 95% confidence interval of hypertension among women (≥ 18 years of age) according to sociodemographic characteristics, overweight, eating patterns, alcohol binge drinking use, physical activity during leisure time and smoking status - Belém, 2005

Characteristics	Raw OR	Adjusted OR*
Age (years)	<0.001	<0.001
18 to 24	1	1
25 to 34	1.44 (0.64-3.21)	1.12 (0.49-2.56)
35 to 44	3.31 (1.57-6.96)	1.97 (0.90-4.35)
45 to 54	7.85 (3.79-16.25)	4.08 (1.86-8.93)
55 to 64	17.40 (8.30-36.47)	6.80 (3.01-15.38)
≥65	24.71 (11.63-52.51)	8.91 (3.81-20.86)
Years of schooling	<0.001	0.078
0 to 4	1	1
5 to 8	0.62 (0.40-0.96)	1.00 (0.61-1.66)
9 to 11	0.27 (0.18-0.40)	0.83 (0.51-1.33)
≥ 12	0.21 (0.13-0.34)	0.61 (0.34-1.08)
Marital status	<0.001	0.011
Single	1	1
Married	1.88 (1.32-2.67)	1.13 (0.76-1.68)
Widowed or separated	6.29 (4.27-9.27)	1.90 (1.19-3.02)
Overweight	<0.001	<0.001
No overweight	1	1
Preobesity	3.30 (2.42-4.49)	2.53 (1.80-3.56)
Obesity	5.62 (3.76-8.38)	3.42 (2.19-5.35)
Regular intake of fruit and vegetables	0.006	
Yes	1	1
No	0.66 (0.48-0.89)	0.89 (0.62-1.28)
Intake of fatty meats or chicken with skin	0.001	
No	1	1
Yes	0.52 (0.35-0.76)	0.65 (0.42-0.99)
Alcohol binge drinking use	0.035	
No	1	1
Yes	0.50 (0.27-0.95)	0.71 (0.35-1.43)
Smoking status	<0.001	0.273
Never smoked	1	1
Smoker	1.13 (0.69-1.85)	1.16 (0.66-2.03)
Ex-smoker	1.83 (1.35-2.48)	1.18 (0.83-1.68)

* Adjusted for all other variables.

of hypertension among individuals who were overweight, as had already been reported in other studies^{5,19-21}.

The association between eating patterns and overweight is well-known²², in addition to its consequent and possible correlation with hypertension. Among the men in this study, the lack of regular intake of beans and the regular intake of fruit and vegetables was associated with hypertension. In the community studied, beans are a regular part of homemade meals, reflecting a greater concern with health,

whereas only 15% of men are used to eating fruit and vegetables. This can be considered a reverse causality variable, e.g., hypertensive subjects began to eat greater quantities of these foods in an attempt to improve their health status. One of the known recommendations given to hypertensive patients is a balanced diet that includes greater amounts of fruit and vegetables than the patient would normally eat.

Regarding smoking, an indirect association with

Table 5 - Odds Ratio (OR) of hypertension among men (≥ 18 years of age) according to age, overweight, intake of fruit and vegetables and intake of beans - Belém, 2005

Characteristics	OR Adjusted*	95% CI	
Age (years)			
18 to 24	1	-	-
25 to 34	1.04	0.38	2.86
35 to 44	4.52	1.89	10.82
45 to 54	10.69	4.45	25.70
55 to 64	12.92	5.16	32.33
≥65	21.34	8.59	53.06
Overweight			
No overweight	1	-	-
Preobesity	1.80	1.14	2.85
Obesity	6.33	3.58	11.17
Regular intake of fruits and vegetables			
Yes	1	-	-
No	0.40	0.25	0.66
Regular intake of beans			
Yes	1	-	-
No	1.69	1.13	2.53

*Adjusted for all other variables.

hypertension was observed, in which ex-smokers had a greater prevalence of hypertension as compared to smokers or to those who had never smoked. Costa et al²³ also observed a greater prevalence of hypertension among ex-smokers. A study conducted by Jardim et al²⁴ reported a positive association between hypertension and discontinued smoking (ex-smokers); however, the greatest prevalence was observed among non-smokers. In a study conducted by Barreto et al²⁵, a greater prevalence of hypertension was observed among those who had never smoked, followed by smokers and ex-smokers, respectively. Lessa et al¹² reported a greater prevalence of hypertension among non-smokers as compared to smokers.

After adjustments for the study variables, we observed that age and overweight remained associated with hypertension for both genders; the intake of fruit, vegetables and beans remained associated only for men, and marital status only for women. Taking into consideration overweight as the explanatory variable and all others as the confounder variables, we found a risk of 1.8 for hypertension among men and of 2.49 among women in preobesity and of 6.33 and 3.33, respectively, for both genders in obesity. In the population of Fortaleza, the risk equal to 2.04 and 4.08 was found, respectively for the same anthropometric strata, independently of gender⁵. In Bambuí, state of Minas Gerais, the odds ratio for hypertension for overweight individuals was 2.82, and for the obese, 4.29, after adjustments for

Table 6 - Odds Ratio (OR) of hypertension among women (≥ 18 years of age) according to age, marital status and overweight - Belém, 2005

Characteristics	OR Adjusted*	95% CI	
Age (years)			
18 to 24	1	-	-
25 to 34	1.11	0.49	2.53
35 to 44	2.08	0.95	4.54
45 to 54	4.54	2.10	9.79
55 to 64	8.09	3.64	17.99
≥65	11.62	5.13	26.31
Marital status			
Single	1	-	-
Married	1.19	0.80	1.77
Widowed or separated	2.01	1.27	3.18
Overweight			
No overweight	1	-	-
Preobesity	2.49	1.78	3.50
Obesity	3.33	2.14	5.18

*Adjusted for all other variables.

gender, age, schooling, smoking status and physical activity²⁵. According to data from the National Health and Examination Survey, the prevalence of hypertension among overweight individuals is 2.9 times that of eutrophic subjects²⁶. Considering both genders, our data show a 2.16 odds ratio in preobesity and 4.26 in obesity, similar to what had been described earlier. It is noteworthy that the odds ratio was used as a proxy for the prevalence ratio, which is the most adequate measurement for transversal studies such as ours, despite the risk of overestimating values, significance, and direction of associations are normally maintained.

It is also noteworthy that although the instrument used to collect data (telephone survey) in this study was not the same as that used in the studies discussed, our study can be considered reliable, since the telephone fixed service reaches a high percentage of the population in Belém⁶, which lead us to conclude that the sample was representative of the population. However, the prevalence of hypertension found need to be carefully evaluated, as it reflects mainly the access to healthcare services and not the prevalence of the disease.

The conclusion is that the study population shows a high prevalence of overweight and hypertension (although possibly underestimated), and that there is a strong association between both. Overweight is an important risk factor for the development of hypertension for both genders, and despite the fact that some variables interfere in this relationship, overweight is determinant. Therefore, weight control is the most important step to be taken to reduce hypertension rates and, consequently, to promote health.

Potential Conflict of Interest

I hereby declare that there are no any potential conflicts of interests involving this study.

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Study Association

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