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# Health behaviors among older adults with hypertension, Brazil, 2006

## ABSTRACT

**OBJECTIVE:** To estimate prevalence of cardiovascular risk factors among older adults with self-reported hypertension compared to those without this condition.

**METHODS:** Data used was obtained from the system *Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* (VIGITEL – Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases) referring to the 9,038 older adults living in households with at least one fixed telephone line in the 26 Brazilian state capitals and Federal District in 2006.

**RESULTS:** Prevalence of self-reported hypertension was 55% (95% CI 53;57). The majority of hypertensives showed three or more concomitant risk factors (69%; 95% CI 67;71). It was found a high prevalence of insufficient physical activity during leisure (88%; 95%CI 86;89) and of fruit and vegetable intake below five daily portions (90%; 95% CI: 88;90) among hypertensive subjects, followed by adding salt to meals (60%; 95% CI: 57;63), regular intake of fatty meats (23%; 95% CI: 21;25), smoking (9%; 95% CI: 7;10), and binge drinking (3%; 95% CI: 2;4). With the exception of smoking, these prevalences were similar to those reported by non-hypertensive subjects ( $p>0.05$ ). Prevalence of smoking was lower among hypertensives (adjusted prevalence ratio [APR] = 0.75; 95% CI: 0.64;0.89), whereas prevalence of overweight (APR = 1.37; 95% CI: 1.25;1.49), dyslipidemia (APR = 1.36; 95% CI: 1.26;1.36), and diabetes (APR = 1.37; 95% CI: 1.27;1.37) was higher.

**CONCLUSIONS:** Results suggest that, with the exception of smoking, unhealthy behaviors persist among older adults after hypertension is diagnosed.

**DESCRIPTORS:** Aged. Hypertension, epidemiology. Risk Factors. Chronic Disease, prevention & control. Health Surveys. Brazil. Health behaviors. Telephone interview.

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Received: 11/23/2008

Revised: 8/3/2009

Approved: 8/19/2009

## INTRODUCTION

Worldwide, arterial hypertension is the leading risk factor for mortality, and ranks third among causes of loss of disability-adjusted life years.<sup>8</sup> Global prevalence of this condition in adults is currently at 26%, but is expected to increase in coming decades.<sup>13</sup> Risk of developing hypertension increases with age, making this the most common disease among older adults with prevalence of 60% or more in the developed world and in Latin America and the Caribbean.<sup>13</sup>

Hypertension is not an isolated phenomenon. Most hypertensives also display other risk factors, and the coexistence of such factors increases cardiovascular risk.<sup>12</sup> Since many of these risk factors are modifiable, guidelines for prevention and control of hypertension tend to encompass the multiple risk factors displayed by the individual, including health behaviors.<sup>4,18</sup>

Population strategies for promoting healthy behaviors aim to prevent hypertension. Strategies targeting high-risk groups aim to reduce arterial hypertension, control other risk factors for cardiovascular events, and reduce the dose of medications required for controlling arterial pressure.<sup>4,18</sup> A consensus exists that such strategies must be aimed at smoking cessation, reducing weight among overweight individuals, moderating alcohol intake, encouraging physical activity, reducing salt intake, increasing intake of fruit and vegetables, and decreasing intake of fatty foods.<sup>18</sup>

Health behaviors in the population have become an area of growing interest in several countries, including Brazil.<sup>9</sup> However, studies investigating such behaviors among hypertensive older adults are still scarce.

The aim of the present study was to estimate the prevalence of unhealthy behaviors and other cardiovascular risk factors among older adults with self-reported arterial hypertension, and to compare these prevalences with those of non-hypertensives.

## METHODS

We carried out a cross-sectional study based on data from the Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL) system. VIGITEL is a survey of a representative sample of adults living in households with a fixed telephone line in the 26 Brazilian state capitals and in the Federal District. Sampling consisted of systematically drawing 5,000 telephone lines in each of the 27 cities. Of the total lines selected, 76,330 were eligible to participate in the survey. Household members aged 18 years or older

were then enumerated, and one of the residents was randomly selected for the interview. In total, 54,360 interviews were conducted, corresponding to 71.1% of selected households. Interviews were conducted via telephone between August and December 2006.<sup>b</sup> The present analysis includes data on the 9,038 subjects from the 2006 survey that were aged 60 years or older.

The dependent variable in the present analysis was self-reported arterial hypertension, defined as a history of medical diagnosis of this disease. Independent variables included age, sex, health behaviors, overweight, and self-reported diabetes mellitus and dyslipidemia. Health behaviors investigated included smoking, binge drinking, insufficient fruit and vegetable intake, regular intake of meat with excess fat, addition of salt to meals after served, and insufficient physical activity during leisure time. We considered as smokers all subjects who reported smoking, regardless of frequency and intensity. Binge drinking was defined as intake of more than four (women) or five (men) doses of alcoholic beverage on a single occasion in the 30 days preceding the interview. Insufficient fruit and vegetable intake was defined as daily ingestion of less than five portions of these foods in the same period. Intake of meat with excess fat was defined as eating red meat with apparent fat or chicken with without removing the skin. Salt use was defined as regular or sporadic addition of salt to prepared food on the subject's plate, with the exception of salads. We considered as insufficient physical activity during leisure time subjects who reported not performing light to moderate physical activity for at least 30 minutes per day, five or more days per week, or vigorous physical activity for at least 20 minutes per day, three or more days per week. Overweight was defined as a body mass index (BMI – weight divided by the square of height) equal to or higher than 25 kg/m<sup>2</sup>, calculated based on self-reported weight and height. Further methodological details can be found elsewhere.<sup>b</sup>

For data analysis, we used prevalence ratios and their respective 95% confidence intervals estimated using Poisson regression. Prevalence ratios were adjusted for age (continuous variable) or age and sex, when pertinent. Tetrachoric correlation was used to examine the correlation between different behaviors, health, and excess weight. Survey data were weighted to adjust the sociodemographic distribution of the VIGITEL sample to that of the entire adult population of the city according to the 2000 Demographic Census, and weighted data were used in all analyses.<sup>b</sup>

<sup>a</sup> Ministério da Saúde. Secretaria de Vigilância em Saúde. Secretaria de Atenção à Saúde. Política nacional de promoção da saúde. 2. ed. Brasília, DF; 2007 a. (Série B: Textos Básicos de Saúde. Série Pactos pela Saúde 2007,7).

<sup>b</sup> Ministério da Saúde. Secretaria de Vigilância em Saúde. Secretaria de Gestão Estratégica e Participativa. Vigitel Brasil 2006: vigilância de fatores de risco e de proteção para doenças crônicas por inquérito telefônico. Brasília, DF; 2007.

Analyses were carried out using the complex sample procedures (“svy”) in Stata software, version 10.1.

Since this is a telephone-based system, the signed informed consent was replaced by verbal consent obtained during telephone contact with the subject. The VIGITEL system was approved by the *Comissão de Ética em Pesquisa em Seres Humanos* (Research Ethics Committee for Human Subjects) of the Brazilian Ministry of Health.

## RESULTS

Mean age among the 9,038 subjects (5,973 women and 3,065 men) was 69.7 years (min = 60, max = 101 years). Of the investigated behaviors, fruit and vegetable intake below five portions a day (89.0%) and insufficient physical activity during leisure (86.3%) showed highest prevalence, followed by addition of salt to meal (59.4%), overweight (54.7%), regular intake of meat with excess fat (23.0%), smoking (11.5%), and binge drinking (3.5%). Prevalence of self-reported hypertension was 55.4%, prevalence of diabetes mellitus was 18.2%, and prevalence of dyslipidemia was 35.7%. (Table 1)

Correlations between health behaviors and overweight ranged from weak to moderate (Table 2). Overall, smoking, binge drinking, insufficient fruit and vegetable intake, regular intake of meats with excess fat, insufficient physical activity in leisure, and overweight were

correlated, with few exceptions. On the other hand, addition of salt to meal was the behavior that least correlated with the other variables, being correlated only with eating meat with excess fat and overweight.

The mean number of other cardiovascular risk factors among self-reported hypertensives was 2.0 (95%CI: 2.01;2.10). This estimate includes smoking, insufficient physical activity in leisure, dyslipidemia, overweight, and diabetes mellitus). Among hypertensives, 3.1% (95%CI: 2.4;3.9) had no other risk factors, whereas 69.2% (95%CI: 67.2;71.3) displayed three or more other factors (Figure). Mean number of risk factors was higher among women (2.16; 95%CI: 2.11;2.22) than among men (1.92; 95%CI: 1.84;1.99) (<0.001).

Table 3 compares the prevalence of the different risk factors between older adults with and without self-reported hypertension. Hypertensives showed high prevalence of insufficient physical activity during leisure (87.5%) and fruit and vegetable intake below five portions a day (89.5%), followed by addition of salt to meal (59.8%), regular intake of meat with excess fat (23.0%), smoking (8.5%), and binge drinking (3.1%). With the exception of smoking, prevalence of these behaviors did not differ significantly between hypertensives and non-hypertensives (age and sex-adjusted PR ranging from 0.99 [95%CI: 0.81;1.23] to 1.07 [95%CI: 0.95;1.20]). Prevalence of self-reported hypertension was lower among smokers than among non-smokers (PR = 0.75; 95%CI: 0.64;0.89), and

**Table 1.** Characteristics of the sample of older adults.<sup>a</sup> Brazil, 2006. (N=9.038)

Characteristic	% or mean (95%CI)
Age group (years)	
60-69	55.6 (53.6;57.7)
70-79	31.8 (30.0;33.7)
80 +	12.5 (11.2;13.8)
Mean age	69.7 (69.4;70.0)
Females	59.6 (57.5;61.7)
Smoking (current smoker)	11.5 (10.1;13.0)
Binge drinking (> 4 doses[women] or > 5 doses [men] on a single occasion in the last 30 days)	3.5 (2.9;4.2)
Insufficient fruit and vegetable intake (< 5 portions a day)	89.0 (87.8;90.3)
Regular intake of meats with excess fat <sup>b</sup>	23.0 (21.2;24.9)
Addition of salt to meals after serving (always or occasionally)	59.4 (57.3;61.4)
Insufficient physical activity during leisure (light to moderate intensity at least 30 min < 3 times a week)	86.3 (84.8;87.6)
Overweight (body mass index > 25 kg/m <sup>2</sup> )	54.7 (52.4;56.9)
Prior medical diagnosis of arterial hypertension	55.4 (53.3;57.4)
Prior medical diagnosis of diabetes mellitus	18.2 (16.6;19.8)
Prior medical diagnosis of dyslipidemia	37.5 (33.8;37.8)

<sup>a</sup> Sociodemographic distribution of the sample of VIGITEL adjusted to that of the adult population of each city in the 2000 Demographic Census, considering the population weight of each city.

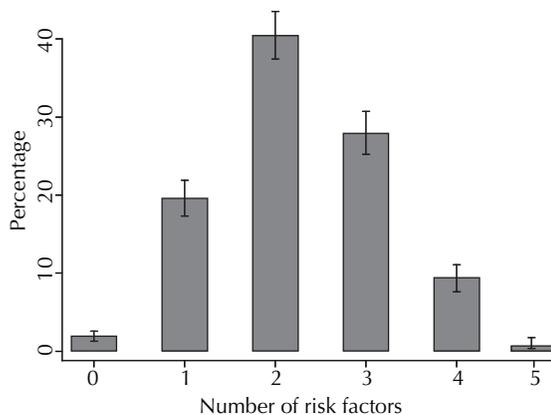
<sup>b</sup> Regular intake of red meat or chicken without skin without removal of apparent fat.

**Table 2.** Tetrachoric correlation coefficient between health behaviors among older adults.<sup>a</sup> Brazil, 2006.

Risk factor	Smoking	Binge drinking	Insufficient fruit and vegetable intake	Regular intake of meat with excess fat	Addition of salt to meals after serving	Insufficient physical activity in leisure
Smoking						
Binge drinking	0.2626*					
Insufficient fruit and vegetable intake	0.1368*	0.0123				
Regular intake of meat with excess fat	0.2646*	0.2654*	0.1635*			
Addition of salt to meals after serving	-0.0477	-0.0093	-0.0074	0.0506*		
Insufficient physical activity in leisure	0.1339*	-0.1369*	0.1660*	0.0970*	-0.0108	
Overweight	-0.2196*	0.0969*	-0.0265*	0.0315	0.0434*	-0.0339

<sup>a</sup> Sociodemographic distribution of the sample of VIGITEL adjusted to that of the adult population of each city in the 2000 Demographic Census, considering the population weight of each city.

\*  $p < 0,05$



**Figure.** Number of risk factors for cardiovascular disease (smoking, insufficient physical activity during leisure, dyslipidemia, overweight, and diabetes mellitus) among older adults with self-reported prior medical diagnosis of arterial hypertension. Brazil, 2006. (N=9,038)

higher among overweight subjects than among those with normal weight (PR = 1.37; 95%CI: 1.25;1.49), as well as in subjects with prior medically diagnosed dyslipidemia and diabetes compared to those without these diagnoses (PR = 1.36; 95%CI: 1.26;1.36 and PR = 1.37; 95%CI: 1.27;1.37, respectively).

Table 4 presents the prevalence of risk factors among hypertensives and non-hypertensives according to sex. Prevalence of all behavioral risk factors was similar between hypertensives and non-hypertensives of both sexes, with the exception of smoking.

Prevalence of smoking was significantly lower among hypertensives than among non-hypertensives, for both men and women. On the other hand, prevalence of overweight and self-reported diabetes mellitus and dyslipidemia were higher among hypertensives of both sexes. There were no significant interactions ( $p \leq 0.05$ ) between sex and cardiovascular risk factors on self-reported hypertension.

## DISCUSSION

The results of the present study, which are based on a large sample of older adults from 27 Brazilian cities, show high prevalence of behavioral and other risk factors for cardiovascular disease among hypertensive and non-hypertensive older adults. With the exception of smoking, prevalence of behavioral risk factors was similar between those who reported prior diagnosis of hypertension and those who did not. This suggests that unhealthy behaviors persist even after hypertension is diagnosed.

Prior studies have shown that the coexistence of cardiovascular risk factors is predominant among hypertensives. In the United States, in the Framingham study, 19% of hypertensives had arterial hypertension in the absence of other risk factors, while 30% displayed three or more such factors.<sup>12</sup> Similar results have been reported in Brazil among the subjects of the Bambuí study (southeastern region). Seven percent of hypertensives in this study had arterial hypertension in the absence of other risk factors, while 41%

**Table 3.** Association between risk factors for cardiovascular disease and medically diagnosed arterial hypertension among older adults.<sup>a</sup> Brazil, 2006. (N=9,038)

Risk factor	Prior medical diagnosis of arterial hypertension		PR (95% CI)
	Yes % (95% CI)	No % (95% CI)	
Smoking	8.5 (7.1;10.3)	15.1 (12.7;17.9)	0.75 (0.64;0.89)
Binge drinking	3.1 (2.3;4.1)	3.9 (3.0;5.1)	0.99 (0.81;1.23)
Insufficient fruit and vegetable intake	89.5 (87.7;90.2)	88.4 (86.3;90.2)	1.07 (0.95;1.21)
Regular intake of meat with excess fat	23.0 (21.2;24.9)	20.6 (18.3;23.1)	0.92 (0.83;1.02)
Addition of salt to meals after serving	59.8 (57.1;62.5)	58.8 (55.7;61.9)	1.02 (0.95;1.10)
Insufficient physical activity in leisure	87.5 (85.7;89.1)	84.7 (82.2;87.0)	1.07 (0.95;1.20)
Overweight	62.4 (59.5;65.3)	45.3 (41.9;48.8)	1.37 (1.25;1.49)
Prior medical diagnosis of diabetes mellitus	23.6 (21.3;26.1)	11.5 (9.7;13.6)	1.37 (1.27;1.47)
Prior medical diagnosis of dyslipidemia	43.7 (41.0;46.5)	26.0 (23.3;28.8)	1.36 (1.26;1.36)

<sup>a</sup> Sociodemographic distribution of the sample of VIGITEL adjusted to that of the adult population of each city in the 2000 Demographic Census, considering the population weight of each city.

PR (95%CI): sex and age-adjusted prevalence ratios estimated by Poisson regression (reference category is non-hypertensive)

displayed three or more factors.<sup>1</sup> These studies differ from the present one because they were conducted among adults of all ages ( $\geq 18$  years) and were based on objective measures of arterial pressure, dyslipidemia, and BMI in addition to information on health behaviors. In the present study, clustering of cardiovascular risk factors was higher: 3% of hypertensives showed no other risk factors, while 69% showed three or more factors. Considering that cardiovascular risk increases progressively along with the number of risk factors present,<sup>12</sup> the distribution of these factors in the study population characterizes a high-risk scenario for cardiovascular events.

Physical activity is the most consistent predictor of healthy ageing, as reported by several cohort studies with older subjects.<sup>10,11,14,22,25,a</sup> Physical activity reduces cardiovascular mortality independently of arterial pressure and other risk factors.<sup>18</sup> Moreover, there is strong evidence that physical exercise can reduce blood pressure.<sup>5</sup> Light to moderate physical exercising is recommended for preventing the development of arterial hypertension and controlling hypertension that is already established.<sup>18</sup> In the present study, prevalence of insufficient physical activity during leisure was equally high among hypertensives (88%) and non-hypertensives (85%) of both sexes. High prevalence of insufficient physical activity during leisure has also been reported for other populations (82% among older adults in the United States, for example).<sup>a</sup> Such prevalences reflect the insufficiency of effective measures to increase physical activity among the population to adequate levels.

The influence of dietary habits on cardiovascular mortality and morbidity is well documented. Diets rich in fruit and vegetables and with low fat content can reduce cardiovascular risk, contribute to weight loss, and directly lower blood pressure.<sup>18,a</sup> As a strategy for primary and secondary prevention, the daily ingestion of five portions a day of fruit and vegetables, corresponding to roughly 400 g, is recommended.<sup>18,28,a</sup> In the present study, inadequate intake of fruit and vegetables was one of the behavioral factors with highest prevalence among hypertensives (90%) and non-hypertensives (88%) alike. Improving this dietary pattern is not a trivial task. In spite of the goals established in the Healthy People 2010 document with respect to increasing intake of fruit and vegetables, prevalence of insufficient intake among the adult population of the United States has not changed in the last ten years.<sup>2</sup> In the present study, regular intake of meat with excess fat was equally reported by hypertensives (23%) and non-hypertensives (21%). This behavior showed the greatest disparity between sexes, a difference which should be considered when devising measures aimed at reducing this habit.

Salt intake in Brazil is high, and exceeds the maximum recommended ingestion in all of the country's regions and across all socioeconomic strata.<sup>24</sup> Restricting salt in the diet has an antihypertensive effect,<sup>7</sup> especially when combined with other healthy dietary habits, and can lead to reductions in the dose of medication required to control arterial pressure.<sup>18</sup> The habit of adding salt to food, either regularly or sporadically, was reported by over half of hypertensives (60%) and non-hypertensives (59%) in the present study. This was the

<sup>a</sup> U.S. Department of Health & Human Services. Agency for Healthcare Research and Quality. U.S. Preventive Services Task Force (USPSTF). [cited 2005 Nov 13]. Available from: <http://www.ahrq.gov>

**Table 4.** Association between risk factors for cardiovascular disease and prior medical diagnosis of arterial hypertension among older adults, according to sex.<sup>a</sup> Brazil, 2006. (N=9,038)

Risk factor	Male		PR (95% CI)	Female		PR (95% CI)
	Medically diagnosed arterial hypertension			Medically diagnosed arterial hypertension		
	Yes % (95% CI)	No % (95% CI)		Yes % (95% CI)	No % (95% CI)	
Smoking	12.9 (9.8;16.8)	19.8 (15.7;24.7)	0.76 (0.59;0.98)	6.2 (4.8;8.0)	11.1 (8.7;14.9)	0.75 (0.61;0.91)
Binge drinking	7.4 (5.3;10.1)	7.0 (5.1;9.4)	1.06 (0.83;1.36)	0.8 (0.5;1.4)	1.3 (0.8;2.1)	0.83 (0.58;1.20)
Insufficient fruit and vegetable intake	90.9 (87.8;93.2)	91.2(88.1;93.5)	1.00 (0.78;1.27)	88.8 (86.6;90.7)	86.0 (82.9;88.5)	1.11 (0.97;1.28)
Regular intake of meat with excess fat	31.9 (27.1;37.1)	37.7 (32.8;42.9)	0.87 (0.73;1.03)	14.6 (12.4;17.1)	15.1 (12.6;18.0)	0.98 (0.88;1.10)
Addition of salt to meals after serving	61.7 (56.7;66.5)	58.2 (53.0;63.3)	1.07 (0.92;1.26)	58.8 (55.6;62.0)	59.4 (55.6;63.0)	0.99 (0.91;1.07)
Insufficient physical activity in leisure	83.4 (78.3;85.8)	80.5 (75.7;84.5)	1.07 (0.87;1.31)	90.2 (88.5;91.7)	88.6 (86.3;90.6)	1.07 (0.95;1.21)
Overweight	59.5 (54.2;64.5)	43.5 (38.3;48.9)	1.42 (1.20;1.66)	64.4 (61.0;67.7)	47.5 (43.3;51.8)	1.33 (1.21;1.47)
Prior medical diagnosis of diabetes mellitus	20.2 (16.5;24.6)	11.5 (8.9;14.8)	1.37 (1.16;1.60)	25.4 (22.6;28.4)	11.6 (9.2;14.5)	1.36 (1.26;1.48)
Prior medical diagnosis of dyslipidemia	35.9 (31.1;41.0)	18.8 (15.0;23.2)	1.52 (1.31;1.76).	47.9 (44.7;51.2)	32.3 (28.9;36.0)	1.29 (1.19;1.39)

<sup>a</sup> Sociodemographic distribution of the sample of VIGITEL adjusted to that of the adult population of each city in the 2000 Demographic Census, considering the population weight of each city. PR (95%CI): sex and age-adjusted prevalence ratios estimated by Poisson regression (reference category is non-hypertensive)

only behavioral variable that did not correlate with the remainder (except with intake of meat with excess fat and overweight). The definition of salt use adopted in the present study was limited, and did not allow us to quantify intake levels. However, the high prevalence of salt addition among both hypertensives and non-hypertensives is indicative of a preference for salting foods.

Obesity and overweight have been described as risk factors for unhealthy ageing in different studies.<sup>3,6,10,22,24</sup> Risk of death shows a linear relationship with BMI. Individuals who are overweight are more likely to develop hypertension, type 2 diabetes, and risk factors for other chronic conditions such as dyslipidemia. Losing weight leads to a reduction in blood pressure.<sup>18</sup> In the present study, prevalence of overweight was significantly higher among hypertensives (62%) than among non-hypertensives (45%), as expected.

Smoking is the leading cause of cardiovascular mortality worldwide.<sup>10</sup> Even though quitting smoking does not reduce arterial pressure,<sup>23</sup> it is likely to be the most effective single measure for reducing risk

the cardiovascular risk.<sup>9,18</sup> Binge drinking is associated with higher risk of cerebrovascular diseases,<sup>27</sup> the most severe consequence of arterial hypertension.<sup>17</sup> For these reasons, quitting smoking and moderating alcohol intake are recommended for both primary and secondary prevention. In the present study, smoking was the only behavior less prevalent among hypertensives (9%) when compared to non-hypertensives (15%). Prevalence of binge drinking was similar in the two groups (3% and 4%, respectively). This result is consistent with the hypothesis that hypertension diagnosis may have encouraged subjects to quit smoking. The results of a recent study corroborate this hypothesis, showing an association between having attempted to quit smoking and medical history of tobacco-related diseases.<sup>6</sup>

The present study has strengths and limitations. The major strength is the coverage of our database, which includes data on 27 Brazilian cities. Another strength is the large number of older subjects, which allowed us to make estimates that are quite precise. Furthermore,

there is evidence that the instruments used by the VIGITEL system show good reproducibility and adequate accuracy,<sup>20,21</sup> ensuring the quality of the information. On the other hand, the sample is composed only of persons living in homes with a fixed telephone line, being this a limitation of the study. To overcome this limitation, the sociodemographic distribution of the VIGITEL sample was adjusted to match that of the entire population of the studied cities.<sup>8</sup> However, it is impossible to guarantee that health behaviors and self-reported morbidity in the sample did not differ from those of households without fixed telephone. Another limitation is the use of self-reported arterial hypertension as the dependent variable, as opposed to objective measures of this condition (such as blood pressure measurements and use of antihypertensive drugs). Although there is evidence that self-reported hypertension shows good sensitivity and specificity in another Brazilian study,<sup>15</sup> we do not know whether these results can be generalized. Moreover, the diagnosis of arterial hypertension is influenced by health care service usage,<sup>15</sup> which may at least partly explain its higher prevalence among women.<sup>16</sup> Together, all these factors may have led to an underestimation of prevalence of hypertension and to a weakening of the associations detected, making our estimates conser-

vative. However, the prevalence of arterial hypertension found in the studied population (55%) was only slightly lower than that observed in studies based on objective measures of arterial pressure among older adults carried out in Brazil<sup>1</sup> and in Latin America and the Caribbean.<sup>13</sup>

Health behaviors begin to take shape already in early life, and their effects are cumulative.<sup>26,29,b</sup> Thus, although interventions aimed at improving these behaviors have greater impact when targeting young and middle-aged populations, changes made at older ages also show clear benefits to health.<sup>19</sup> Moreover, since morbidity and mortality increase with age – and hypertension is emblematic of this condition – the attributable risk associated with these behaviors is high among older age groups. Adopting healthy behaviors is widely acknowledged as a primary preventative strategy. However, the adoption of such behaviors among hypertensives as a secondary prevention measure has received little attention. Our present results reveals the magnitude of this problem, supporting the need for strategies aimed at encouraging healthy behaviors among hypertensive older adults. Strategies targeting multiple risk factors may be more effective, given the level of correlation between the different behaviors.

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MF Lima-Costa and CC Cesar were supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq – National Council for Scientific and Technological Development, 305227/206-8 and 307715/2008-6, respectively; research productivity grants).

This study was partially undertaken by the Núcleo de Estudos em Saúde Pública e Envelhecimento of the Fundação Oswaldo Cruz and Universidade Federal de Minas Gerais, Centro Colaborador da Secretaria de Vigilância em Saúde do Ministério da Saúde em Saúde do Idoso e Epidemiologia do Envelhecimento

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The authors declare that there are no conflicts of interest.