Race and Hypertensive Target-Organ Damage in Patients from an University-Affiliated Outpatient Care Referral Clinic in the City of Salvador

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Objective - *To assess whether a patient's race is associated with the presence of left ventricular hypertrophy, stroke, and renal failure in hypertensive patients from an outpatient care referral clinic in the city of Salvador in the state of Bahia.*

Methods - *We assessed the data of 622 patients collected during their first visit to the hypertension outpatient care clinic between 1982 and 1986, identifying those with a previous history or sequela of stroke, left ventricular hypertrophy, or renal failure (serum creatinine ³ 1.4 mg/dL). Logistic regression models were used to estimate the odds ratio (OR) of the association between race (mulattos or black vs white individuals) and hypertensive target-organ damage adjusted for sex and age.*

Results - *The mean age of the patients was 53.8±14.3 years, and 74.1% were women. In regard to race, 15.1% were white, 65.9% mulatto, and 19.0% black. Stroke was significantly more frequent in blacks or mulattos than in white individuals [adjusted odds ratio (aOR) = 3.44; 95% confidence interval (CI) = (1.23-9.67). In regard to the associations involving race and the events of left ventricular hypertrophy and renal failure, the aORs were not statistically significant but were consistent with a greater prevalence of left ventricular hypertrophy and renal failure in blacks and mulattos.*

Conclusion - *Hypertensive mulattos and blacks have a greater risk of target-organ damage than white individuals do, with a greater racial difference for nonfatal stroke. Whether racial differences in mortality related to hypertensive complications influence the associations observed between race and target-organ damage should be assessed.*

Key words: race, blacks, arterial hypertension

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Studies carried out in the United States have shown that arterial hypertension is more frequent in black than in white individuals [1], and the racial differences are greater in the more severe forms and in the complications related to the disease, mainly chronic renal failure, stroke, and left ventricular hypertrophy [2-4]. Similarly to that observed in the Unites States, in Brazil, the prevalence of arterial hypertension is greater among black than among white individuals [5-11], the racial differences being greater in the more severe forms of the disease [7].

According to data from the Brazilian Institute of Geography and Statistics, the city of Salvador, in the state of Bahia, has the largest population of black African descendants in Brazil. In 1990, the individuals classified as black or mixed (mulatto) represented approximately 80% of the 2.5 million inhabitants of the city [12]. The ethnic/racial composition of the population in Bahia, and especially in the city of Salvador and in the area of the Reconcavo Baiano, resulted from the intense mixture of white Portuguese men and black African women [13]. However, individuals with very diverse racial characteristics may be identified in the population, which ranges from white individuals, similar to Europeans, to blacks with marked traits of their African ancestors. We compared patients of different racial groups (white, mulatto, black) treated in the hypertension outpatient care clinic of a university-affiliated hospital in the city of Salvador, aiming at assessing whether an association exists between a patient's race and the presence of data indicating stroke, left ventricular hypertrophy, or renal failure.

Methods

This was a cross-sectional study with sampling resulting from demand for medical care, with data from 622 hypertensive individuals who were admitted to the outpatient care referral clinic for arterial hypertension at the Hospital Universitário Professor Edgard Santos of the Universidade Federal da Bahia, from August 1982 to July 1986. The patients' assessment comprised anamnesis and physical examination according to a particular protocol. Laboratory as-

sessment included the following examinations: urinalysis, serum measurements of urea, creatinine, uric acid, sodium, potassium, fasting glycemia, total cholesterol and fractions, triglycerides, and routine electrocardiography.

Blood pressure was measured in the right arm according to the auscultatory method with the patient in 3 positions (lying down, seated, and standing up) at 2-minute intervals, using a mercury-column sphygmomanometer and cuffs for adults, measuring 12 cm wide by 23 cm long. The cuff was inflated up to 30 mmHg above the systolic blood pressure (SBP) previously measured according to the palpation method, and deflation was slowly performed at a rate of 2 to 3 mm Hg per second. Systolic blood pressure was determined by the auscultation of the first continuous sound (phase I of the Korotkoff sounds) and diastolic blood pressure (DBP) by the disappearance of the sound (phase V), and the means of the 3 initial measurements of systolic and diastolic blood pressures were calculated. Arterial hypertension was defined as SBP ≥ 140 mmHg or DBP ≥ 90 mmHg, or both, or the use of antihypertensive medication. The patients were classified according to the etiology of the disease as primary or secondary. In regard to severity, hypertension was categorized as mild, moderate, or severe, according to the classification at the time of data collection [14]. The patient's who already had target-organ damage were considered as having severe hypertension, independent of the blood pressure levels.

The complications of arterial hypertension were assessed through data collected at the initial clinical examination and the complementary methods required in the first outpatient care clinic visit. Left ventricular hypertrophy was diagnosed through electrocardiographic criteria. Stroke was identified through the history of a previous event (including transient ischemic stroke) or its sequela identified on physical examination.

The patients with a history of arterial hypertension in one of the parents, grandparents, or siblings were considered as having a positive familial history. The duration of the disease diagnosed was stratified into 3 levels, < 1 year, ≥ 1 to < 10 years, and ≥ 10 years. The patients' origins were classified as follows: from the state capital (the city of Salvador); from the inner area of the state; and from another state. Race was classified into 3 groups: white, mulatto, and black, according to the classification of Krieger et al [15] modified by Azevêdo [16].

Analysis of variance (ANOVA) was used to compare the means between the 3 racial groups and the chi-square test to compare proportions. When data were not compatible with the use of the chi-square test, the Fisher exact test was used. Multiple logistic regression was used for estimating the odds ratio of the association between race (white as a reference) and each type of target-organ damage. The odds ratio was adjusted for sex and age: < 35 years, 35-49 years, 50-59 years, ≥ 60 years. The Statistical Package for Social Science - SPSS software, version 10.0 for Windows, was used for the parametric tests and multiple logistic regression [17, 18]. The exact2k module of the Computer Programs for Epidemiologists software (PEPI), version 3, was used for Fisher exact test [19].

Results

The sample comprised 622 patients, 94 (15.1%) white, 410 (65.9%) mulatto, and 118 (19.0%) black. Four hundred sixty-one (74.1%) patients were women. Patients from the city of Salvador corresponded to approximately 85.4% of the sample, and no statistically significant difference regarding the patient's origin was found between the racial groups (tab. I). The mean age was 53.8±14.3 (median = 55.0) years in the whites, 47.3±13.3 (median = 47) years in the mulattos, and 48.3±14.1 (median = 48.5) years in the blacks (P<0.001).

Table I shows that approximately 27.1% of the patients knew they were hypertensive at least for 1 year, 50.4% for 1 to 10 years, and 22.5% for more than 10 years, and no significant difference existed between the racial groups (P = 0.809). Secondary forms of arterial hypertension were diagnosed in approximately 2.1% of the white individuals, 3.7% of the mulattos, and 1.7% of the blacks (P = 0.153). Familial history of arterial hypertension was reported by 56.4% of the white individuals, 59.0% of the mulattos, and 50.8% of the blacks (P = 0.283) with a greater prevalence of severe or accelerated forms in the blacks (51.3%) and mulattos (49.9%) than in the white individuals (41.5%); the difference, however, was not statistically significant (P = 0.249). Treatment for arterial hypertension at the time of the first outpatient care clinic visit was reported by 81.9% of the white individuals, 79.3% of the mulattos, and 76.3% of the blacks (P = 0.598). In the patients who were not using antihypertensive drugs, the mean SBP varied significantly (P = 0.048) among the racial groups, being greater in the blacks (174.6 ± 33.5; median = 156) than in the mulattos (159.3 ± 25.3; median = 156) and whites (166.0 ± 28.3 mmHg; median = 163 mmHg). Diastolic blood pressure did not significantly vary among the racial groups.

The results of the association between race and hypertensive target-organ damage adjusted and nonadjusted for sex and age with multiple logistic regression analysis are shown in table II. The frequency of stroke was significantly greater in patients classified as mulatto or black than in those classified as white [adjusted odds ratio (aOR) = 3.44; 95% confidence interval (CI) = 1.23-9.67; P = 0.013). The comparison between mulatto and white individuals showed the greatest difference in the prevalence of stroke (aOR = 3.64; 95% CI = 1.29-10.34; P = 0.01). The frequencies of left ventricular hypertrophy (aOR = 1.10; 95% CI = 0.69-1.76) and renal failure (aOR = 1.27; 95% CI = 0.52-3.07) were also greater in the patients classified as black or mulatto; the differences in regard to white individuals, however, were not statistically significant.

Discussion

In the present study, the prevalence of stroke was significantly greater in hypertensive blacks or mulattos than in white individuals treated in a referral service for arterial hypertension in the city of Salvador, in the state of Bahia. This was observed despite the lower age of the blacks and mulattos at the time of the first outpatient care clinic visit. As the

Table I - Characteristics of the patients [a]

Characteristics	Race White N=94	Mullato N=410	Black N=118	P Value	Total
Age (mean±SD)	53.8±14.3	47.3±13.3	48.3±14.1	<0.001	48.4±13.8
Median	55.0	47.0	48.5		48.0
Origin					
Salvador	83 (88.3)	346 (84.4)	102 (86.4)	0.622[b]	531 (85.4)
Inner state of Bahia	9 (9.6)	61(14.9)	16(13.6)		86(13.8)
Other states	2 (2.1)	3 (0.7)	-		5 (8.0)
Familial history	53(56.4)	242(59.0)	60(50.8)	0.283	355(57.1)
Secondary AH [c]	2 (2.1)	15 (3.7)	2 (1.7)	0.153	19 (3.1)
Duration of AH (years) [d]					
< 1	24(26.1)	113(28.4)	26(23.4)	0.809	163(27.1)
1 a < 10	49(53.3)	197(49.5)	57(51.4)		303(50.4)
≥ 10	19(20.7)	88(20.7)	28(25.2)		135(22.5)
Classification of AH [e]					
Mild	39(41.5)	129(32.0)	31(26.5)	0.249	199(32.4)
Moderate	16(17.0)	73(18.1)	26(22.2)		115(18.7)
Severe	37(39.4)	193(47.9)	55(47.0)		285(46.4)
Accelerated/malignant	2 (2.1)	8 (2.0)	5 (4.3)		15 (2.4)
Use of antihypertensive drugs	77(81.9)	325(79.3)	90(76.3)	0.598	492(79.1)

[a] Except for age, the other results are represented by absolute numbers (%); [b] Fisher exact test comparing Salvador versus other origins; [c] no data for 3 mulattos and 1 black; [d] no data for 2 white individuals, 12 mulattos, and 7 blacks; [e] no data for 7 mulattos and 1 black.

Table II - Odds ratio of the association between race and target-organ damage

Target-organ damage	(n/N) %	Logistic model Nonadjusted	Logistic model Adjusted
Stroke (N=590)			
White	4/89 (4.5)	Reference = 1	Reference = 1
Mulatto	57/388 (14.7)	4.02 (1.41-11.56)	3.64 (1.29-10.34)
Black	13/113 (11.5)	3.01 (0.93-9.68)	2.76 (0.87-8.76)
Mulatto or black	70/501 (14.0)	3.78 (1.32-10.77)	3.44 (1.23-9.67)
Left ventricular hypertrophy (N = 552)			
White	33/87 (37.9)	Reference = 1	Reference = 1
Mulatto	141/360 (39.2)	1.27 (0.77-2.11)	1.05 (0.65-1.71)
Black	46/105 (43.8)	1.49 (0.82-2.73)	1.28 (0.71-2.28)
Mulatto or black	187/465 (40.2)	1.33 (0.80-2.16)	1.10 (0.69-1.76)
Renal failure (N = 590)			
White	6/89 (6.7)	Reference = 1	Reference = 1
Mulatto	35/386 (9.1)	1.49 (0.59-3.79)	1.38 (0.56-3.38)
Black	7/115 (6.1)	1.06 (0.33-3.36)	0.90 (0.29-2.77)
Mulatto or black	42/501 (8.4)	1.40 (0.55-3.50)	1.27 (0.52-3.07)

study has a cross-sectional design, it is not clear to which extent the differences in survival among the patients of the different racial groups may have interfered with the association between race and stroke. The lethality of the disease should be lower in black and mulatto patients as compared with that in white ones, so that survival could contribute to a greater prevalence of the event in those groups. No evidence supports this hypothesis. In fact, the data indicate that mortality due to stroke is greater in black than in white individuals. In the United States, mortality related to strokes of different etiologies, except for cerebral infarction due to the extracranial occlusion of the carotid artery, is greater among blacks [20]. It has been known that mortality due to the disease in the city of Salvador, where the population is predominantly composed of blacks and mulattos, is one of the greatest in Latin America. This was confirmed in a study comparing the mortality in the city of Salvador with that in 7 Latin American countries, the city of Salvador having the greatest mortality, 3 times greater than that observed in Mexico, after correcting for age [21]. In approximately 80% of the cases of stroke in the city of Salvador, the patients are estimated to be hypertensive [22]. However, in an international comparative study [21], the influence of race on mortality due to stroke in the city of Salvador could not be assessed.

In the present study, the associations of race and the events of left ventricular hypertrophy and renal failure were not statistically significant. The adjusted odds ratio, however, was consistent with a greater prevalence of the event and renal failure in blacks and mulattos than in white individuals. It is worth noting that the odds ratios were more ex-

pressive when comparing mulatto with white individuals than black with white individuals. In fact, in the nonadjusted comparison between black and white individuals for renal failure, the odds ratio (OR = 1.06) was consistent with the lower prevalence in blacks (OR = 0.9) after adjusting for age and sex through logistic regression. However, in agreement with that which has been reported in other countries, our data suggest a greater prevalence of left ventricular hypertension and renal failure in the blacks and mulattos who sought medical care due to arterial hypertension in the city of Salvador. Previous studies have shown that hypertensive blacks have a greater risk for the event than hypertensive white individuals, even after adjusting for blood pressure levels [23]. This greater predisposition of the blacks for the disease has been observed even in normotensive individuals [24,25]. Several North American studies have shown that the risk for the end-stage of renal disease, particularly for hypertensive nephropathy, is much greater among black than among white individuals [26-33]. The racial difference in the end-stage of renal disease due to hypertensive nephropathy is not eliminated after adjusting for the differences in arterial hypertension, suggesting the existence of more severe forms or differences in the quality of the antihypertensive treatment between black and white individuals [30]. In accordance with the North American data, Noblat & Lopes[34] reported an incidence of the end-stage of renal disease attributed to hypertension 45% greater among black than among white individuals. In addition, in black and mulatto patients with primary glomerulonephritis, the presence of arterial hypertension observed at the time of the first nephrologic consultation was an important risk factor for the end-stage of renal disease [35,36]. An interaction between biological and environmental factors, as well as racial differences in the treatment of arterial hypertension, seem to contribute to more severe forms of arterial hypertension and a greater risk of target-organ complications in blacks and mulattos than those in white individuals [37,38].

The greater prevalence of strokes in blacks and mulattos cannot be explained by differences in the duration of hypertension nor in the proportion of patients using antihypertensive drugs at the time of the outpatient care clinic visit. As shown in table I, the duration of hypertension and the proportion of patients using antihypertensive drugs were similar in the racial groups. However, among the patients not using antihypertensive drugs, the mean SBP was significantly greater in blacks and mulattos, which is consistent with the more severe forms found in these patients than in the white ones. These data also suggest that arterial hypertension developed earlier in mulattos and blacks than in white individuals, considering the lower mean ages of the first 2 groups by the time they seek medical treatment in the hypertension outpatient care clinics. This finding is consistent with previous reports on an earlier start of arterial hypertension in blacks [39]. Evidence exists that the risk of target-organ damage can be drastically reduced in blacks through strict control of blood pressure levels, the choice of antihypertensive drugs, and considering the characteristics of each patient and the strategies to increase adherence to treatment [38,40]. It has already been shown that when the access to health service and the quality of the antihypertensive treatment are similar in black and white individuals, the racial differences in stroke and hypertensive heart disease are eliminated [41]. The importance of the choice of the antihypertensive drug to reduce renal events in black patients with hypertensive nephropathy was highlighted in the African American Study of Kidney Disease and Hypertension (AASK) [42], which showed that a treatment regimen based on an angiotensin-converting enzyme inhibitor has a significantly greater effect on the reduction of the progression of renal failure and of the risk of the end-stage of renal disease than regimens based on calcium-channel blockers or beta-blockers [40,43,44].

Although our study had interesting findings, limitations cannot be ignored, particularly when the results are extended to a general population of hypertensive individuals or compared with the results of other studies. It is worth noting that our sample was determined by the demand for medical care, which may explain, at least partly, the much higher frequency of illness in women compared with that observed in the general population of hypertensive individuals. In addition, the fact that ours is a referral service for the treatment of arterial hypertension may have contributed to the higher frequency of more severe forms of the disease than that observed at other services. The distribution of patients into racial groups observed in the present study may be different from that occurring in the general population of hypertensive individuals and in the group of patients treated in the outpatient care clinics of private hospitals or medical offices. Hypertensive blacks and mulattos, compared with whites, seek public health services more frequently due to their lower income levels. It is important to note that the racial classification used in the present study differs from that used in other studies. Outside Brazil, particularly in the United States, race is frequently declared by the patient himself. In the present study, however, race was classified by the investigator according to predefined criteria [15,16]. In addition to skin color, the type of hair, angulation of the wing of the nose, and labial thickness were characteristics used for classifying the patient's race. These criteria are believed to more accurately capture the differences in the phenotypical characteristics linked to the racial groups than is self-declaration and classification based only on skin color. In addition, studies carried out in the state of Bahia showed a high interobserver concordance in regard to the racial classification used. Despite the differences existing in the criteria for defining race in the studies, the results are in accordance with those reported in our study in regard to the greater prevalence of hypertensive target-organ damage in blacks and mulattos compared with that in white individuals.

In conclusion, in our study, a greater prevalence of stroke was observed in blacks and mulattos than in white individuals, and this difference cannot be explained by age and percentages of men and women in the racial groups. The re-

sults are also consistent with a greater prevalence of left ventricular hypertrophy and renal failure in blacks and mulattos. More severe forms of arterial hypertension or an earlier start of blood pressure elevation, or both, adherence to treatment, and greater obstacles for a good-quality medical follow-up may be contributing to a greater prevalence of alterations in target organs in arterial hypertension in blacks and mulattos. Prospective studies should be carried out in Brazil to assess the existence of racial differences in the lethality of arterial hypertension and in the complications of the disease. These studies should also clarify whether the differences in survival between hypertensive blacks, mulattos, and white individuals have any influence in the racial comparisons of the prevalence of complications in target organs in patients treated in outpatient care hypertension clinics. Further studies should also be carried out to identify treatment strategies that may eliminate the racial differences in target-organ damage due to arterial hypertension.

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