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RACE, GENDER AND STROKE SUBTYPES MORTALITY IN SÃO PAULO, BRAZIL

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ABSTRACT - Stroke mortality rates have a discrepant distribution according to socioeconomic variables as social exclusion in Brazil. Recently, data from race has been available from the official health statistics considering five categories: White, Mixed, Black, Asian and Native. We addressed in the city of São Paulo, Brazil, an analysis of cerebrovascular mortality according to race (excluding Asian and Native due to small number of events) and gender during 1999-2001 for people aged 30 to 79 years-old. For all cerebrovascular diseases, age-adjusted mortality rates (x 100,000) for men were higher for Black (150.2), intermediate for Mixed (124.2) and lower for White (104.5) people. These gradient patterns were similar for all stroke subtypes, except for subarachnoideal hemorrhage in which no differences were detected. For women, the rates were lower compared to men and the same pattern was observed among Black (125.4), Mixed (88.5) and White (64.1) women. Compared to White men, the risk ratio of Black men was 1.4. However, compared to White women, the risk ratio for Black women was 2.0. Concluding, there is a significant gradient of stroke mortality according to race, mainly among women.

KEY WORDS: cerebrovascular diseases, race, gender, mortality.

Raça, gênero e mortalidade por subtipos da doença cerebrovascular em São Paulo, Brasil

RESUMO - As taxas de mortalidade pela doença cerebrovascular apresentam distribuição diferenciada de acordo com variáveis socioeconômicas. Informação sobre raça é nova no sistema de informação de mortalidade do Ministério da Saúde. Na cidade de São Paulo foi verificada entre três categoria de raça – branca, parda e negra – a taxa específica de mortalidade nos anos de 1999-2001 para pessoas entre 30 e 79 anos. Para o conjunto das doenças cerebrovasculares as taxas de mortalidade ajustadas para idade (x 100.000) para homens foram maiores entre os negros (150,2), intermediária para os pardos (124,2) e menor para brancos (104,5). Esse gradiente foi o mesmo para todos os subtipos, excluindo a hemorragia subaracnoídea. Para as mulheres, as taxas foram menores quando comparada aos homens e, o mesmo padrão foi observado para negras (125,4), pardas (88,5) e brancas (64,1). A razão de risco para homens negros quando comparado aos brancos foi 1.4, mas entre as mulheres negras e as brancas foi o dobro. Concluindo, houve um gradiente significativo da mortalidade cerebrovascular de acordo com raça, principalmente entre mulheres.

PALAVRAS-CHAVE: doença cerebrovascular, raça, gênero, mortalidade.

Stroke mortality rates in Brazil are the highest in Latin America for men and women due to not very well explained reasons[1]. One possible cause described in the city of São Paulo was the higher burden among people living in areas of social exclusion[2]. Recently, an analysis about racial differences of mortality pattern in Brazil revealed that among people aged 40 to 69 years-old, Black and Mixed people have higher cerebrovascular disease mortality rates when compared to the White one[3]. Elevated stroke mortality rates among Black people when compared to White people have been described since much time ago in the United States[4]. In Brazil, the health official statistics are considering race as a variable to be described on the death notification only since 1996, thus there is a little time to consider for mortality trends analyses. Moreover, there is a regional difference considering the fulfillment of a question about race on the death notification: in 2003, for all country 10.3 percent of the notifications did not have data about race, but in São Paulo State this frequency was 1.8 percent (in our analyses, from 1999-2001, this proportion was higher, 6.7% in the city of São Paulo)[5]. The pattern of mortality in São Paulo State shows dif-

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ferences according to race including a higher rates of ill-defined deaths among Black and Mixed people, and significant elevated rates from external, perinatal and infectious causes in the same group[6].

The prevalence of high blood pressure – the most relevant risk factor for cerebrovascular diseases – was determined in three Brazilian surveys in Rio de Janeiro[7] , Salvador[8], and Pelotas[9]. The first two studies revealed differences according to gender when race is associated to hypertension. In Rio de Janeiro, Black women showed a 75 percent increase of hypertension prevalence independent of socioeconomic factors or overweight status when compared to White women. This pattern did not repeat when only men were considered for analyses[7]. In Salvador, the prevalence of hypertension was 31.6% for Black men (compared to % among White ones) and 41.1% for Black women (compared to among White ones)[8]. In Pelotas, only data for both sexes and race was categorized as "White" and "non-White", and the prevalence rates were 22.6%, and 28.%, respectively[9].

We addressed in the city of São Paulo, a place with good reliability of health statistics, a comparison of stroke (and its subtypes) death rates according to race and gender to verify a gradient according to these three categories: White, Mixed (or Mulatto) and Black people. Asian and Natives were not considered due to the small number.

METHOD

We used the Tenth Revision International Classification of Diseases (ICD-10) considering all causes of death; non-external deaths (all chapters, except XX chapter); all cardiovascular diseases (chapter IX); coronary heart disease (ICD-10:I-20-I-25), all types of stroke, and following stroke subtypes: ill-defined stroke (ICD-10:I64); intracerebral hemorrhage (ICD-10:I61); cerebral infarction (ICD-10:I63); and subarachnoideal hemorrhage (ICD-10:I60). The quality of stroke mortality data after the beginning of the 10th revision of the ICD as well as temporal trends of subtypes were analyzed previously[10,11].

Mortality data from the 1999, 2000 and 2001 were obtained from the city of São Paulo health statistic system (PRO-AIM, *"Programa de Aprimoramento das Informações de Mortalidade"*) and they were categorized by gender, race and 10-year age-strata (from 30-39 years-old to 70-79 years-old). We analyzed all deaths from 1996 to 2003. The race categories indicated by the system were White (69.4%), Mulatto or Mixed (15.9%), Black (6.0%), Yellow or Asian (1.9%) and Native (0.1%). Race was not declared in 6.7% of death notifications, in 1999-2001.

Data from population were obtained directly from the Brazilian National Census in which race was self-reported by the interviewees. For the same age-strata (30 to 79 years-old), the proportion of races was White (71.1%), Mulatto or Mixed (22.3%), Black (5.6%), Yellow or Asian (2.3%) and Native (0.1%).

Mortality rates were calculated using the weighting average of deaths occurred in 1999, 2000, and 2001 divided by the data from the Brazilian National Census in 2000. Adjustment for age was calculated by direct method using as weight 0.31 (30-39 years-old); 0.26 (40-49 years-old); 0.21 (50-59 years-old); 0.14 (60-69 years-old) and 0.08 (70-79 years-old).

To compare death rates between gender and race, we applied two plain calculations: the absolute risk measure in 100,000 inhabitants and the risk ratio, always considering the White population as the reference. We did not apply any inference statistical method to verify differences.

RESULTS

The progression of stroke mortality rates according to race is showed for male (Fig 1) and for female (Fig 2). A comparison of these figures clarified that racial differences of stroke mortality are more im-

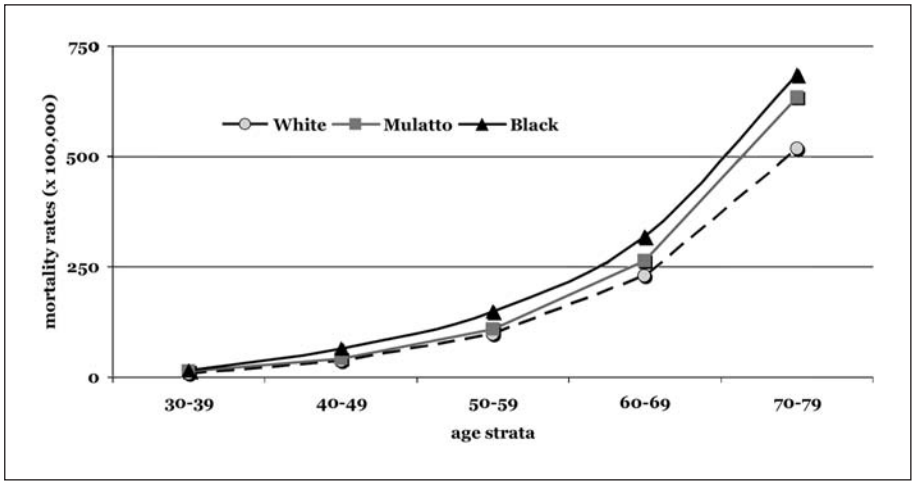

Fig 1. Stroke mortality rates for the male population of the city of São Paulo, Brazil (1999-2001) according to age-strata.

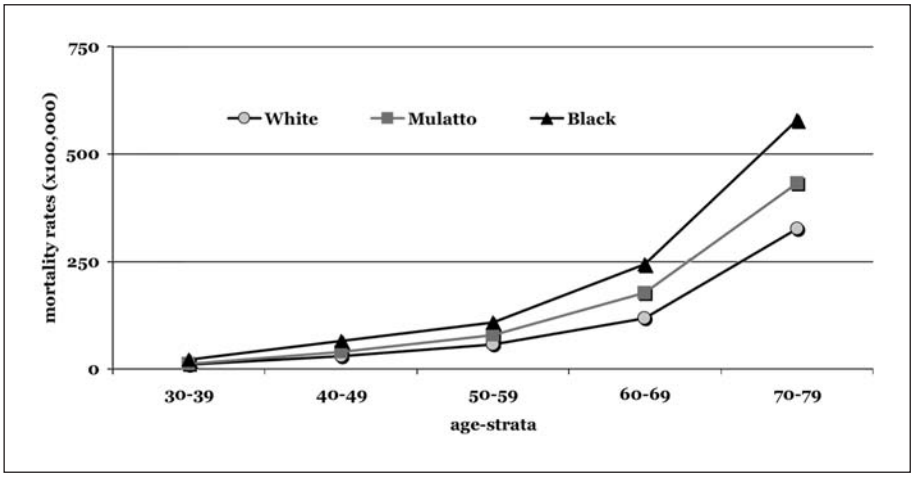

Fig 2. Stroke mortality rates for the female population of the city of São Paulo, Brazil. (1999-2001) according to age-strata.

Table 1. Age-adjusted mortality rates (x 100,000), absolute risk (x 100,000) and risk ratio for all cerebrovascular diseases and its subtypes for male population aged 30 to 79 years-old in the city of São Paulo (1999-2001).

	White	Mixed	Black
All cerebrovascular diseases	104.5	124.2	150.2
Absolute risk	0	19.7	45.7
Risk ratio	1	1.2	1.4
Subarachnoideal hemorrhage	7.7	6.9	7.0
Absolute risk	0	–0.8	–0.7
Risk ratio	1	0.9	0.9
Intracerebral hemorrhage	27.0	34.2	37.3
Absolute risk	0	7.2	10.3
Risk ratio	1	1.3	1.4
Cerebral infarction	21.2	23.7	29.5
Absolute risk	0	2.5	8.3
Risk ratio	1	1.1	1.4
Ill-defined stroke	34.3	39.3	52.8
Absolute risk	0	5.0	18.5
Risk ratio	1	1.1	1.5

The reference for risk indicators are the mortality rates for white men.

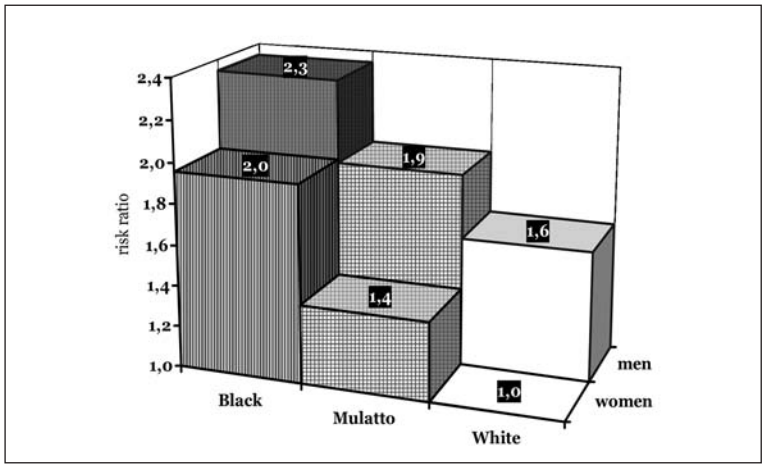

Fig 3. Risk ratio for stroke mortality rates according to gender and race for men and women in the city of São Paulo, Brazil (1999-2001). The reference group is white female age-adjusted mortality rate.

Table 2. Age-adjusted mortality rates (x 100,000), absolute risk (x 100,000) and risk ratio for all cerebrovascular diseases and its subtypes for the female population aged 30 to 79 years-old in the city of São Paulo (1999-2001).

	White	Mixed	Black
All cerebrovascular diseases	64.1	88.5	125.4
Absolute risk	0	24.4	61.3
Risk ratio	1	1.4	2.0
Subarachnoideal hemorrhage	6.1	6.0	6.2
Absolute risk	0	–0.1	0.1
Risk ratio	1	1.0	1.0
Intracerebral hemorrhage	16.9	22.4	28.4
Absolute risk	0	5.5	11.5
Risk ratio	1	1.3	1.7
Cerebral infarction	11.6	14.9	23.2
Absolute risk	0	3.3	11.6
Risk ratio	1	1.3	2.0
Ill-defined stroke	19.3	29.1	40.5
Absolute risk	0	9.8	21.2
Risk ratio	1	1.5	2.1

The reference for risk indicators are mortality rates for White women.

Table 3. Male excess death (x 100,000) and male-female ratio of age-adjusted mortality rates for all cerebrovascular diseases and its subtypes for population aged 30 to 79 years-old in the city of São Paulo (1999-2001).

	White	Mixed	Black
All cerebrovascular diseases			
Male excess death	40.3	35.7	24.8
Male/female ratio	1.6	1.4	1.2
Subarachnoideal hemorrhage			
Male excess death	1.6	0.9	0.8
Male/female ratio	1.3	1.1	1.1
Intracerebral hemorrhage			
Male excess death	10.1	11.8	8.9
Male/female ratio	1.6	1.5	1.3
Cerebral infarction			
Male excess death	9.6	8.8	6.3
Male/female ratio	1.8	1.6	1.3
Ill-defined stroke			
Male excess death	14.9	10.2	12.3
Male/female ratio	1.8	1.4	1.3

pressive for women than for men in all age-strata analyzed. For men, there is only a more pronounced difference for the oldest stratum when the lowest rate for White men is clearer.

Table 1 shows the difference of stroke mortality rates among men. There is a slight gradient of risk ratio from the White to Black men. Differences of stroke subtypes could be biased by an excessive ill-defined stroke mortality rates among Black men. The situation of women is displayed at Table 2. In contrast to men, except by subarachnoideal hemorrhage death rates, all categories of stroke subtypes demonstrate a gradient of higher risk from White to Black women, mainly for ill-defined stroke, and cerebral infarction.

Figure 3 shows the relation of stroke mortality rates for gender and race considering rates from White women as the reference. It is possible to verify that Black men had the worst relative association. Table 3 discloses that male excess death was higher for White men when compared to women for all stroke subtypes.

DISCUSSION

This preliminary analyses of stroke mortality in the city of São Paulo provided a confirmation of the higher burden of cerebrovascular diseases among Black people and also a gradient according to skin color because death rates among Mixed are intermediate between White and Black subgroups. Although men had higher rates when compared to women, the differences of stroke mortality rates according to race for female were more impressive than for men. Our results can lead to a conclusion different from expressed by Batista et al[6]. that classified the mortality among Black basically as due to ill-defined and external causes. According to our data, stroke is also a differential to explain the racial gap of mortality rates in São Paulo, Brazil.

The association of skin color/race/ethnicity with cerebrovascular diseases is not new[4]. However the presentation of stroke mortality rates among the Brazilian population deserves more comments considering that skin color/race is recent information on official health statistics. Mortality studies are always encompassing two different rate components: incidence and case-fatality. There are reasons to consider that both factors are influencing the elevated stroke mortality rate among Black and Mixed subgroups. A higher stroke incidence must be supposed by the differences of high blood pressure prevalence rates according to race, mainly among women as described in Rio de Janeiro[7] and Salvador[8]. A higher case-fatality rate must be inferred from other data not previously shown about mortality data: the ill-defined deaths proportional mortality rates are higher among Black (2.0%) and Mixed (2.1%) subgroups when compared to White (1.2%) ones. In the United States, 3,136 stroke cases enrolled in of the "Greater Cincinnati/Northern Kentucky Stroke Study" revealed that incidence rates were higher for Black people at every age when compared to White people, with the greatest risk (2- to 5-fold) having been observed in young and middle-aged Black people (<65 years of age). In contrast case-fatality rates did not differ significantly in Black people compared to the White ones[12].

The quality of death notification is improving for stroke, mainly among women as described previously in the city of São Paulo[10]. However, there are questions considering the quality of skin color/notification that is somewhat different from the Census. Race in death notification is filled up by the hospital staff or physician from data reported by relatives or by nurse staff. Thus, it is plausible to consider some kind of differential misclassification of race. Two reliability tests addressing race/skin color were performed in Porto Alegre, Rio Grande do Sul and in Rio de Janeiro with different methods[13,14]. Both studies showed a fair level of agreement. In Porto Alegre, the assessment of skin color based on the race of the ascendants informed by the individual has a reasonable agreement with the ascertainment done by trained interviewers and with the self-report of race[13]. In the Rio de Janeiro, there was a good concordance of self-report of race considering the method of "open" versus "closed' questions[14]. In summary, only two studies addressed the accuracy of self-reported skin color, and race information obtained from large demographic databank has not been validated in Brazil.

Although these results are relevant for epidemiologic studies, their application for public health policy and medical care must be inappropriate. The most important question to be considered in future studies addressing mortality is how much race is a surrogate for deprived social conditions. In the city of São Paulo, there is a consistent gradient between stroke mortality rates and the index of social exclusion[2]. Moreover, an ecological study comparing socioeconomic indicators and cardiovascular death rates among 98 most important municipalities in Brazil revealed an inverse association between years of formal education and stroke mortality rates, reinforcing social instead of racial determination[15]. Unfortunately, information about years of school is only available on death certificates beyond 2003. So, we have no other information about social exclusion on death certificates that could clarify the deprived social conditions as a possible surrogate for race in this analysis. Consequently, we are not comfortable to consider that race or skin color must be considered as an independent variable in the causal pathway of cardiovascular diseases in Brazil. There are some highly regarded Brazilian scholars disputing the conception of race as an epidemiological category[16] and, mainly as the genetic connection between skin color and hypertension among Brazilians[17]. One different point of view was hypothesized by Faerstein to explain the association between social exclusion and stroke mortality is that not skin color is the main link of this casual pathway, but a different variable, the act of racism that victimize Black people[18].

Concluding, there is a gradient of stroke mortality considering the White to Black skin color in São Paulo, Brazil. Although the stroke mortality rates are higher in men compared to women the gradient of stroke mortality rates are more pronounced in wom-

en than men. However, these data were not adjusted for other socioeconomic variables, and some kind of detection bias is possible.

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