

Non-communicable diseases in Brazil: mortality patterns, morbidity studies and risk factors

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SUMMARY. Non-communicable diseases in Brazil: mortality patterns, morbidity studies and risk factors. The aim of this presentation is to give an overview on non-communicable diseases in Brazil and to speculate about singular data that have been described in our country. The high rates of esophageal cancer, the elevated high blood pressure prevalence and some determinants of the decline of cardiovascular mortality are discussed more deeply.

INTRODUCTION

Since the decade of 1940, Brazil has changed from an agricultural-dependent economy to an urban and industrialized country, with an increasing recent substitution of factories by commercial and service activities occurring mainly in the Southeast. A rise in the magnitude of non-communicable diseases and a sharply decrease in water-borne diseases and in infectious and parasitic diseases, made the former the more important disease group in Brazil, particularly after the decade of 1960 (1).

Cardiovascular diseases (CVD), cancer, respiratory diseases and cirrhosis are a set of diseases with common risk factors. In Brazil, these diseases are responsible for more than two-thirds of the deaths. In general, the non-communicable diseases have had a rising significance during the last four decades. Since the end of the seventies, mortality from stroke, coronary disease and gastric cancer has declined in some cities and states. However, total mortality, stroke and coronary heart disease among women are responsible at present for extremely high mor-

tality rates in comparison with other countries, mainly when deaths below age 65 are analyzed (2,3).

MORTALITY PATTERNS

The proportional mortality in the adulthood by non-communicable diseases shows that cardiovascular diseases including stroke, coronary heart disease (CHD) and chronic heart failure, are the more frequent causes of death for both sexes (Table 1). Cirrhosis among men and diabetes and hypertension among women are important causes with more deaths than specific cancers.

In the United States and Europe, CHD is the leading cardiovascular disease, but in Brazil and in Japan, the most prevalent one is stroke, although CHD rates in Brazil are also very high. São Paulo is the only Brazilian state where CHD is more frequent than stroke as the cause of death. In Rio Grande do Sul, Rio de Janeiro and Mato Grosso do Sul there is an equilibrium between these two causes of death (4). Among the nine biggest metropolitan areas of the country, CHD mor-

TABLE 1
The five top death causes classified by ICD-9 Chapters for Brazil (1990-92) for all ages
(mortality proportion in percentage)

MALE	
CARDIOVASCULAR	25,4
EXTERNAL	17,2
CANCER	9,7
RESPIRATORY	8,2
INFECTIOUS	4,9
FEMALE	
CARDIOVASCULAR	31,8
CANCER	11,9
RESPIRATORY	8,6
EXTERNAL	5,2
METABOLIC & IMMUNE DISEASES	5,2

tality surpasses stroke mortality only in the cities of Rio de Janeiro, São Paulo, Curitiba and Porto Alegre (5). Morbidity studies in cardiovascular diseases such as the incidence of coronary and stroke are rare (6,7) and the prevalence studies for risk factors are punctual (8). In the city of São Paulo, the prevalence of angina pectoris using the Rose questionnaire was 6,6% (9). The incidence of stroke in Salvador (Bahia) when compared with other places in the Western hemisphere was the highest among women and classified in second place among men (6).

Opposite to what occurs in the United States or Europe, gastric cancer has still high rates in Brazil, but it is surpassed by lung cancer in men and by breast cancer in women. Among women, liver and biliary tract and uterine cervix cancers are also important causes of death (4). There are no studies exploring specific determinants of hepatic-biliary tract cancer among Brazilian women. Uterine cervix cancer has high rates due to its high prevalence in north-northeast regions where the coverage of preventive measures for all diseases, including immune-preventable is low.

For the "top 5 cancers", gastric cancer and cervix cancer have had downward trends since the seventies. Others (prostate and lung) have increased or have had no temporal changes. The most important studies about cancer etiology were performed using migrants in comparative studies. Brazil has received since the third quarter of the 19th century a large amount of migrants from Europe (Portuguese, Hispanic and Italian) from Middle East (Lebanese) and Asia (Japanese, Chinese and Korean). One study has compared cancer mortality and morbidity among Japanese in Brazil (10); another among Europeans (11).

Cancer incidence rates among first-generation Japanese immigrants in the city of São Paulo were compared with those among Japanese in Japan; cancer of the stomach and rectum revealed signifi-

cantly lower rates, while non-melanoma skin cancer, and prostate and breast cancer showed higher rates. No significant increase of colorectal cancer was recognized among Japanese migrants in São Paulo, contrary to the remarkably high rates of colorectal cancer observed among Japanese migrants in the US (10).

Italian and Spanish migrants in Brazil show changes in cancer risks, with an increase in rates of oropharyngeal, esophageal, cervical and breast cancers and a decrease in rates of lung cancers. However, for cancer of the esophagus, the changes are greater in São Paulo, where migrants acquire rates similar to those of Brazilians. For colon cancer, rates in Italian migrants decrease in São Paulo. Changes in Portuguese migrants are less evident: their rates of colorectal cancer remain high, and they also retain their higher risks of gastric cancer (11).

RISK FACTORS

All published studies about primordial risk factors and non-communicable diseases in Brazil have cross-sectional designs. There are no cohort-studies published and no ongoing observational studies about the relationship between risk factors and major outcomes as cardiovascular diseases and cancer. A summary of risk factors, except high blood pressure, is given in Table 2.

A seminal study was performed in Porto Alegre to assess the degree to which the prevalence of five risk factors for non-communicable diseases (hypertension, smoking, obesity, sedentary lifestyle, and excessive alcohol consumption) varied individually and in combination for urban Brazilians with differing socioeconomic status in terms of educational achievement, income, and social class. It was found that less privileged socioeconomic situations tended to be associated with higher

TABLE 2
Frequencies of obesity, smoking, alcoholism and hypercholesterolemia obtained from different and non-comparable cross-sectional studies.

PLACE	SEX	OBESITY	SMOKING	ALCOHOL ADDICTION	HIGH CHOLESTEROL
P.ALEGRE	M	15	52	13	
	F	24	33	3	
P.ALEGRE	M/F				34
S.PAULO	M/F	18	38	8	
R.JANEIRO	M/F	46	30		
FORTALEZA	M/F	40			6
R.JANEIRO	M/F	55			26

Source: Lessa, 1993 (34)

risk factor prevalence. However, this was not the case for obesity and sedentary lifestyle among men, and may not have been the case concerning hypertension among women. When the effects of education, income, and social class were considered simultaneously, higher risk factor prevalence was most strongly associated with low educational

attainment. Important exceptions to this rule were found for smoking among women and excessive alcohol consumption among men, where higher risk factor prevalence was mostly associated with social class. Once the effects of education and social class were accounted for, low income generally tended to be associated with lower prevalence of the

risk factors studied (12). The age- and sex-adjusted prevalence of smoking was 40%, hypertension 14%, obesity 18%, overall sedentary lifestyle 47%, and excessive alcohol consumption 7%. Thirty-nine percent of the sample presented two or more of these five risk factors, and only 22% of men and 21% of women had none of them. The high frequencies and simultaneous presence of these risk factors indicate their importance for programs aimed at the prevention of non-communicable diseases and the promotion of adult health (13). In the city of São Paulo, one cross-sectional study showed the prevalence of hypertension (22.3%), smoking habit (37.9%), obesity (18.0%), alcoholism (7.7%) and physical inactivity (69.3%) (14).

An important modification in dietary patterns was detected in the southeast of the country between 1960 and 1988: an important decrease both for the relation of ingestion of polyunsaturated-saturated fat (P/S ratio) (-60,7%), as well as for the ingestion of cholesterol (-19,8%) (30). Today, Brazil has a favorable P/S ratio when compared with countries in the northern hemisphere, but the high intake of polyunsaturated fat could be one of the many reasons for the increase of obesity in all regions of the country. Considering that coronary heart disease presents an "incubation period" of about 10 years (31), we could credit the alteration of the dietary pattern of the Brazilian population since the seventies as responsible for the decrease in mortality rates of this disease at the end of the decade in the state of São Paulo. According to Rose (32) "the mass diseases can only be controlled by mass actions", which are usually the result of governmental actions for promotion of health and medical activities, determined by economic, social and cultural factors. For instance, the decrease of consumption of saturated fats would be an economic phenomenon resulting from the replacement of pork fat (reduction of 79.7%) by vegetable oils (rise of 91%), mainly soy bean oil.

There is a cluster of high-incidence areas of esophageal cancer in South America, including Southern Brazil, Uruguay and parts of Argentina. Drinking hot mate (a traditional beverage drunk at a very high temperature) and eating barbecue, are daily living habits in those places. One case-control study failed to show the use of hot mate as a risk factor when it was adjusted for smoking habit, alcoholism, and dietary habits. Although the study failed to provide evidence of a strong association between drinking mate and esophageal cancer, the cluster of high rates could be explained by relative risks of the magnitude observed. This is because approximately 70% of adult males and 50% of females are daily drinkers. In addition, this study revealed that alcohol, tobacco smoking and rural residence are the main risk factors for esophageal cancer in this population and the fruit consumption gives some degree of protection (15). However, a cross-sectional design had detected that esofagitis (as cancer precursor) is more prevalent in hot-mate drinkers than in controls (16). In São Paulo, where the hot mate is not a habit and the rates are high, but lower than in Southern states, one case-control study revealed that alcoholism, smoking habit and the frequent eating of hot pepper, are important risk factors for the disease. The estimate of odd ratios for smoking ordinary cigarettes was 3.4 and for smoking corn-straw hand-rolled cigarettes was of 4.2 (17).

In Southern Brazil, in spite of heavy consumption of meat and milk, there is a high mortality from esophagus cancer associated with a very low mortality from colon cancer, posing a most interesting epidemiological problem.

In general, there are conflicting data of risk factors of esophageal/colon cancer in Brazil. However, for breast cancer, it seems that risks (monthly family income; being a housewife; parity of less than six deliveries and nulliparous women; history of breast cancer among first degree female relatives and use of oral contraceptives) or protective factors (irregular menstrual cycle) are similar to those previously demonstrated elsewhere in the world (18).

HYPERTENSION AS A MAJOR RISK FACTOR

The assumption that cardiovascular diseases are the products of affluence, based on the British and North American examples, is contradicted by two other experiences: in Japan, the country with the greatest post-war economic development, cardiovascular death rates diminished vertiginously, whereas in countries of eastern Europe, which suffered great deprivations during the seventies and eighties, death rates increased (33). An observation supporting the view that the "American-Northern European" pattern cannot be generalized emerges from the comparison between the Brazilian experience in São Paulo and in Great Britain. The period of rise of CHD mortality in Great Britain is concomitant with the decrease of infant mortality rate, whereas in São Paulo the mortality from cardiovascular disease and the infant mortality rate showed similar behaviors during the seventies and eighties.

In São Paulo, a peculiar pattern of cardiovascular death rate is observed, with the decrease in CHD mortality being similar to that of cerebrovascular diseases. The decrease of stroke mortality is also described both in the western (with higher rates for CHD than stroke) and Japanese (rates for stroke superior to CHD) countries. The explanation for this particular behavior could be related to the distribution of arterial hypertension: the decline of mortality from cerebrovascular diseases was related to the rise on detection, treatment and control of high blood pressure. Arterial hypertension is highly prevalent in the Brazilian population (34) and is unequally distributed in the population, being more frequent among the poorer (2,21,23). Therefore, the risk of developing cerebrovascular disease would be greater in the low income group. Comparison of the curve of systolic pressure according to age, as standardized by Epstein-Eckoff, obtained in a prevalence study in Araraquara, which showed a very high blood pressure-age relationship, with the INTERSALT study, revealed that it was only surpassed by a community in Portugal (32). On the other side, other two risk factors for CHD, cholesterol levels and smoking, which also show a differentiated social distribution, have lower contributions than arterial hypertension. The few studies that correlate cholesterol levels with social strata showed no differences among poor, middle or rich people (23). Smoking is nowadays a habit with a higher prevalence in the poorer (2). Thus, in theory, the social differences for the risk of developing coronary disease are less apparent than for stroke.

Using the Omran theory for the epidemiological transition under the Latin-American viewpoint, it could be said that, among the cardiovascular diseases, there is a "polarized and prolonged transition" (36) between coronary and cerebrovascular diseases that could explain the slow decline of cerebrovascular when compared to coronary disease. The main determinant for this peculiar characteristic would be the difference among the several social strata of the population with a differentiated pattern of risk factors, mainly arterial hypertension.

SOCIAL DETERMINANTS OF HYPERTENSION

Many population-based studies of hypertension in Brazil were performed using cross-sectional designs. The majority of these studies were conducted in the south-southeast regions or among natives living in the rain forest. The most recent population study was carried out in Rio de Janeiro, where the prevalence of hypertension increased 2.4 fold from the lowest (25kg/m²) to the highest (30kg/m²) range of body mass index. This increase persisted after adjusting for sex, age, skin color, smoking, physical activity and level of education. Interaction of obesity with sex, age and skin color was found. The association between hypertension and obesity was stronger for men (19).

The first population-based study cross-sectionally designed was performed in Rio Grande do Sul (20). In this study, a geographical

analysis was done in four regions with specific characteristics patterns: the highest rate was detected in the surrounding cities of the state capital Porto Alegre (13.8%), Porto Alegre had the second rate (12.3%), people living in inner towns had 11.4% of hypertensives and the lowest rate was detected among rural people (9.2%). The migrants from the rural areas to the city acquired the urban level of blood pressure (21). This study was analyzed also by social stratification revealing higher hypertension rates among factory workers and clerks than among other professionals (22). A relationship between hypertension and social stratification was detected also in the Northeast (Fortaleza, CE) (23), where a specific neighborhood was studied, divided based in housing quality. The highest rate was detected among people living in slums (18%), the median rate was among poor people living in projects (14.9%) and the lowest was detected among people living in houses (9%). In another study carried out in Araraquara (SP) (24), there was a greater percentage of hypertensives in the mulatto and black groups, in the obese, and among those of lower family income, with a lower level of school education and with less well paid jobs. Another view about social differences in hypertension prevalence was shown in São Paulo, where steel workers, media professionals and bus drivers had higher blood pressure levels than teachers, physicians and lawyers (25).

The most impressive study was one of anthropological-epidemiological design, done in the most affluent region of the country, Ribeirão Preto (SP). Its aim was to study ethnicity and psychological resources and hypertension. The results were very important because social support (mainly kin support and coping style) were positive and strongly related to people with low blood pressure. These factors deny the importance of black skin color or African ancestry as determinants of hypertension (26). Although hypertension was detected more in black and mulatto population in all studies, social support and coping style could be confounding factors, since all black people in Brazil are descendants from African slaves and have a lower economic and social level than white people, although there is a lesser prejudice load than in the United States. An observational study confirms the hypothesis that hypertension is more related to psychological resources than ethnicity. An isolated community of black people whose ancestors escaped from the farms where they were slaves and settled in a town surrounded by mountains near the rain forest, was studied. The prevalence of hypertension was lower than in the cities (6.2%), body mass index had also lower levels, sodium intake was low, physical activity was high, but alcohol intake was higher than in the cities (27).

Many studies were performed among natives living in the rain forest. The more important was the INTERSALT-Brazilian branch, that detected no high blood pressure among Yanomamo, with no salt and alcohol intake and body mass index not higher than 25 kg/m² (28). Another study among Xavantes evaluated the influence of new habits (changing from hunting to a rural style with rice and bean cultures) on blood pressure and during fifteen years (1975-90) no changes were detected. Obesity, tobacco, alcoholic beverage consumption and social organization also did not change and sodium intake did not increase during that period (29).

RESEARCH AGENDA

Many studies with several designs need to be planned for future widening of the comprehension about Brazilian mortality and morbidity patterns as well as to contribute to the universal knowledge. The non-communicable disease epidemiology has been based solely in the "American- Western European" experiences, with some comparative studies in Japan and China. Thus, collaborative research with other South-American countries, mainly observational studies, could be a useful proposal for American and European epidemiologists.

The data from Brazil suggest that future studies should be pursued on why stroke mortality is higher than CHD and to evaluate if alcoholism has an important gender gap prevalence, explaining the high mortality by cirrhosis and upper-respiratory and digestive cancers among men. Moreover, it would be necessary to improve the comprehension about the influence of social inequalities in our epidemiological pattern. Social, economical and educational differences among Brazilians are wider and deeper than abroad, mainly when compared with countries with the same gross national product per capita.

PUBLIC HEALTH AGENDA

In conclusion, the orientations that could be derived from the analysis of cardiovascular mortality in Brazil are useful for future measures since with few policies from the Ministry of Health it seems possible to reduce mortality.

The public health service is responsible for the coordination of efforts of the society, aiming at a greater reduction of mortality and morbidity from non-communicable diseases, with a priority for stroke, using what has been learned from almost 40 years of systematization of cardiovascular disease epidemiology. A mass program for detection, treatment and control of high blood pressure by means of dietary, sanitary and pharmacological measures, will be useful for the reduction of mean values of high blood pressure in the whole population.

The efforts for control and eradication of alcoholism and smoking could be a useful tool for decrease cancer and cirrhosis.

Promotion of proper dietary habits with a specific target on obesity prevention, and premature diabetes diagnosis would be the more important programs for the first quarter of the 21th century in our country.

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