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PREVALENCE OF CARDIOVASCULAR RISK FACTORS WORLDWIDE AND IN BRAZIL

PREVALÊNCIA DE FATORES DE RISCO CARDIOVASCULAR NO MUNDO E NO BRASIL

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ABSTRACT

Cardiovascular disease is the leading cause of death worldwide and also in Brazil. However, a key point is that despite elevated mortality, it is highly preventable. The relationship between risk factors and cardiovascular disease is a constantly evolving process. This justifies the need to reassess risk factors over time so that preventive strategies can also be adapted to these changes in the profile of risk factors. The article analyzes the prevalence of cardiovascular disease risk factors in Brazil and worldwide, using four different scenarios: Surveillance system for risk and protective factors for chronic diseases by telephone survey (VIGITEL), Global Burden of Diseases, Longitudinal Study of Adult Health (ELSA-Brazil), and National Health Survey (PNS). The declining prevalence of tobacco smoking in the world and particularly in Brazil stands out in all these scenarios. The presence of social inequality was associated with a higher prevalence of risk factors among the less educated and in lower income brackets. All other risk factors associated with cardiovascular disease are highly common, a fact that may jeopardize the decrease in mortality associated with cardiovascular disease in Brazil and worldwide in the near future.

Keywords: Risk Factors; Cardiovascular Disesases; Prevalence; Brazil.

RESUMO

A doença cardiovascular é a primeira causa de morte em todo o mundo e também no Brasil. Entretanto, um ponto fundamental é que, apesar da mortalidade elevada, ela é altamente passível de prevenção. A relação dos fatores de risco com a doença cardiovascular é um processo em constante evolução. Isso justifica a necessidade de reavaliação dos fatores de risco ao longo do tempo para que as estratégias de prevenção também possam adequar-se a essas mudanças no perfil dos fatores de risco. O artigo analisa a prevalência dos fatores de risco de doenças cardiovasculares no Brasil e no mundo utilizando quatro cenários diferentes: Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (VIGITEL), "Global Burden of Diseases", Estudo Longitudinal de Saúde do Adulto (ELSA-Brasil) e Pesquisa Nacional de Saúde (PNS). Em todos esses cenários, destaca-se a queda da prevalência de tabagismo no mundo e particularmente no Brasil. A presença de desigualdade social associou-se à prevalência maior dos fatores de risco nos menos escolarizados e nas faixas de menor renda. Todos os outros fatores de risco associados à doença cardiovascular apresentam frequências elevadas que podem colocar em risco a queda da mortalidade associada a doenças cardiovasculares no Brasil e no mundo em futuro próximo.

Descritores: *Fatores de Risco; Doença Cardiovasculares; Prevalência; Brasil.*

INTRODUCTION

Cardiovascular disease is the leading cause of death, both globally and in Brazil. However, despite its high mortality rate, it is highly preventable. The development of public policies for the prevention of cardiovascular diseases should be based on the risk profile of each country. Although risk factors are very similar in all countries, their distribution varies with location. A simple example is the impact of the risk factor arterial hypertension in Brazil and the United States. While hypertension is the main risk factor in Brazil, its impact as a risk factor is lower than that of dyslipidemia in the United States.

The association between risk factors and cardiovascular disease is constantly evolving. Consequently, risk factors should be reassessed over time so that preventive measures can also be revised accordingly.[1] Risk factors for cardiovascular diseases can be divided into non-modifiable factors, such as age, ethnicity, and family history of cardiovascular

disease, and into modifiable factors, such as hypertension, diabetes, dyslipidemia, and smoking. Diet and physical activity are considered primary risk factors for all chronic diseases, including cardiovascular diseases, and represent a prior determination in the causal chain regarding hypertension, diabetes, and dyslipidemia.

The presence and distribution of classic risk factors were evaluated by the following: 1) Surveillance of risk factors and protective factors for chronic diseases using a telephone survey,[2] 2) the Global Burden of Diseases (GBD), 3) a Longitudinal Study of Adult Health (ELSA-Brazil), and 4) the 2013 National Health Survey (PNS).

The objective of this study was to determine the prevalence of risk factors using different samples and methodologies to comprehensively assess the prevalence of cardiovascular disease in Brazil and in the world.

Surveillance of risk factors and protective factors for chronic diseases using a telephone survey (VIGITEL)

The best strategy for assessing the prevalence of risk factors is to conduct several serial cross-sectional studies over time. In 2006, in an effort to organize the surveillance of chronic non-communicable diseases, the Brazilian Ministry of Health developed a surveillance system for risk and protective factors for chronic diseases using a telephone survey (VIGITEL). VIGITEL follows the Behavioral Risk Factor Surveillance System (BRFSS) guidelines. This system, developed by the Center for Disease Control in 1984, performs surveillance of risk factors for chronic diseases and the use of prevention services in the United States and completes 400,000 telephone interviews per year.[3]

In Brazil, VIGITEL includes not only the surveillance of diseases, such as cardiovascular disease, but also their risk factors. VIGITEL aims to monitor the frequency and distribution of these factors and to protect against chronic non-communicable diseases in all 26 capitals of the Brazilian states and the Federal District. Telephone interviews are conducted throughout the year in samples of the adult population ($\geq$ 18 years of age) residing in households with a fixed telephone line. For the results to be representative of the entire population, the telephone numbers that enter the survey are randomized based on the numbers registered in the country's capitals. In each city, stratification is performed based on postal codes. In total, approximately 41,000 interviews are conducted each year with a success rate of approximately 65%. More recent studies have confirmed the benefits of including a sub-sample of 200 adults in the VIGITEL system, primarily in the capitals of the North and Northeast regions, who only have mobile phones.[4]

Data from VIGITEL in 2014 showed a 10.8% prevalence of smoking (9% in women and 12.8% in men) with a significant proportion (approximately 10%) of exposure from secondhand smoke at home or work. The prevalence of alcohol abuse was reported to be 16.5% (9.4% in women and 24.8% in men). The prevalence of being overweight and obese was 52.5% and 17.9%, respectively (49.1% and 18.2% in women vs. 57.5% and 17.6% in men, respectively). Regarding protective factors related to diet, only the consumption of vegetables exceeded 50%. Other protective habits, such as regular and recommended consumption of fruits and vegetables, were below 50%. The results also showed a prevalence of inappropriate habits in the sample, such as consuming meat with excess fat, whole milk, soft drinks, sweets, and replacing meals with snacks. Table 1 describes the protective and risk factors associated with diet and its frequency in the entire population.[5]

Regarding physical activity, 35% of the sample practiced physical activity during their leisure time (30% in women and 29.4% in men); 12.3% (11.6% in women and 13% in men) practiced some type of physical activity at work; 48.7% (56% in women and 40.1% in men) reported insufficient physical activity; and 15.4% declared themselves to be sedentary (14.7% in women and 16.2% in men).[5]

In the same study, the presence of risk factors for hypertension, diabetes, and dyslipidemia were evaluated. The frequency of hypertension was reported to be 24.8% (26.8% in women and 22.5% in men); similarly, the frequency was 8% for diabetes (8.7% in women and 7.3% in men) and 20% for dyslipidemia (22.2% in women and 17.6% in men).

It is important to remember that VIGITEL only surveyed adults over 18 years of age; hence, it includes many young people in the sample causing the overall prevalence to appear low. Another important aspect of the survey is that it is a self-reported diagnosis by the interviewee. For example, the higher frequency of hypertension, diabetes, and dyslipidemia in women probably reflects women's better understanding of the risk factors because they actively seek health services more often than men.

The data reported annually in each VIGITEL survey can be used to trace risk factor behavioral trends over time. VIGITEL data were used to describe the smoking trends between 2006

Table 1. Diet and its prevalence in men and women in the Brazilian general population using VIGITEL data.

	Prevalence (%)			Prevalence ratio (PR)	
	Total	**Men**	**Women**	**PR**	**IC95%**
Regular consumption of fruits and vegetables	36.5	42.5	29.4	1.39	1.32-1.47
Recommended consumption of fruits and vegetables	24.1	28.2	19.3	1.41	1.31-1.52
Regular consumption of vegetables	66.1	60.5	72.7	0.84	0.82-0.86
Meat with excess fat	29.4	21.7	38.4	0.59	0.55-0.63
Whole milk	52.9	50.4	55.7	0.92	0.89-0.96
Regular consumption of soft drinks	20.8	18.2	23.9	0.80	0.74-0.87
Regular consumption of sweets	18.1	20.3	15.6	1.34	1.22-1.46
High salt consumption	15.6	14.1	17.4	0.85	0.77-0.93
Meal replacement for snacks	16.2	18.8	13.1	1.41	1.31-1.52

Adapted from Surveillance of risk factors and protection for chronic diseases by telephone survey (VIGITEL). CI: Confidence Interval.

and 2014 in Brazilian capitals. The prevalence of smoking decreased from 15.6% in 2006 to 10.8% in 2014. There was a decline of the prevalence when considering gender, education, regions of the country, and most of the age groups. The prevalence of former smokers decreased from 22.2% in 2006 to 21.2% in 2014. The proportion of smokers of more than 20 cigarettes per day also declined from 4.6% in 2006 to 3% in 2014. The decline of passive smoking in the home was higher in women (from 13.4% in 2009 to 10% in 2014) and in individuals with zero to eight years of education (from 12.7% in 2009 to 9% in 2014). Passive smoking in the workplace declined from 12.1% in 2009 to 8.9% in 2014 and was higher in men than in women. This declining trend was observed in both men and women and in all regions of Brazil in most of the age groups. These data indicate that the goal of reducing smoking by 30% by 2025 is attainable, and this reflects the effectiveness of tobacco control actions in the country.[6]

The trend of alcohol intake was also evaluated using VIGITEL data between 2006 and 2013 according to socio-demographic, socio-economic, and regional characteristics. Alcohol abuse was defined as ≥ 5 doses in men and ≥ 4 doses in women on a single occasion in a period of 30 days prior to the interview. The prevalence of alcohol abuse was 15.6% in 2006 and 16.4% in 2013 with a trend towards stability in the sample. There was a trend of increased alcohol abuse in the elderly and in adults aged 30-39 years for both genders and in women in the Southeast region of the country. The incidence as well as the risk of developing the diseases were independent of the education level of the study subjects. No declining trend was observed at any time in the analyzed period in any subgroup.[7]

The VIGITEL survey included the prevalence of hypertension in Brazilian capitals in 2013 and its association with socio-demographic variables, lifestyles, and other chronic diseases. Approximately one-quarter of the sample reported hypertension. The prevalence of hypertension was associated with an increase in age and was higher in individuals > 65 years of age. In addition, hypertension was associated with low education, black ethnicity, obesity, diabetes, high cholesterol, and in former smokers.[8]

Using data from 2012-2013, VIGITEL tracked the association of risk factors according to gender and education. Smoking, alcohol intake, and consumption of meat with visible fat were more frequent in men, whereas medical diagnoses of chronic diseases such as hypertension, diabetes, and dyslipidemia were more frequent in women. For both genders, higher education levels were associated with a lower prevalence of smoking and a higher consumption of soft drinks and alcoholic beverages as well as with an increased amount of time watching television.

The GBD is a hierarchical network of risk factors organized by the University of Washington, Seattle, Washington, US that contributes to the quantification of health outcomes. Based on data from the governments of several countries, such as DATASUS in Brazil and other sources, the GBD allows the quantification of risks and causes of death for each country and also globally. Risk factors were grouped into several categories. Table 2 shows the risk factors associated with cardiovascular diseases or with other risk factors for cardiovascular diseases worldwide.[9] Table 3 shows the largest worldwide percentage changes in risk factors associated with cardiovascular diseases from 1991 to 2016.[9]

Considering Disability-Adjusted Life Years (DALYs: years lived with an impairment of the quality of life plus years of life lost by death) in 1990, smoking was in the third position, hypertension was in the fourth, alcohol use in the eighth, and impaired fasting glycemia in the tenth. The first thirty risk factors associated with years lived with an impairment of the quality of life also included the following: high total cholesterol and body mass index (BMI); low consumption of fruits, whole grains, nuts and seeds, vegetables, fiber, and omega 3s; exposure to secondhand smoke; a sedentary lifestyle; and high salt consumption. Of the first 30 risk factors that contributed most to DALYs in 1990, fifteen were related to chronic diseases. In 2006, smoking rose to the top position, hypertension to the third, alcohol to the fifth, impaired fasting glycemia to the sixth, a high BMI to the ninth, and an elevated total cholesterol to the tenth.

The total number of risk factors for chronic diseases among those associated with the highest number of DALYs increased to 16. In 2016, five of the top six risk factors were related to chronic diseases: smoking was in the first position, hypertension in the second, alcohol in the fourth, high impaired fasting glycemia in the fifth, and a high BMI was in the sixth. Although the number of chronic disease-related risk factors remained steady at 15 on the list of the first 30, they moved to the top positions.

The results showed that the risk factors for chronic diseases had a more significant role in the last decades. Several factors can also be interrelated, such as an increased BMI, changes in diet, increased impaired fasting glycemia, and increased blood pressure. In addition, the prevalence of a sedentary lifestyle remains high.

The frequency of smoking has declined in several countries, but has increased in many others, especially in low-income countries. An global decline of 1.9% is considered to be very slow, but nevertheless consistent. Exposure to secondhand smoke has also declined and the use of nicotine patches, chewing gum, and other smokeless tobacco products greatly increased in Asia. In Brazil, the risk factors for chronic diseases that were most associated with DALYs included alcohol consumption, elevated blood pressure, and increased BMIs.[9]

CONTRIBUTIONS OF THE LONGITUDINAL ADULT HEALTH STUDY (ELSA-BRAZIL)

Blood pressure is the risk factor that most correlates with years-of-life-lost in Brazil. ELSA-Brazil is a prospective cohort study of public employees from six Brazilian capitals (Salvador, Vitória, Belo Horizonte, Rio de Janeiro, São Paulo, and Porto Alegre).[10,11] ELSA-Brazil analyzed 15,103 participants (54% were women) to determine how many knew how to report the diagnosis of hypertension; the prevalence and associated risk factors; how many were being treated; and how many factors were under control. Of the total number of participants, 35.8% were hypertensive and, among these, 76.8% knew they were hypertensive, with women being more aware than men (84.8% in women vs. 75.8% in men) and with higher drug use for the treatment of hypertension (83.1% in women vs. 70.7% in men). Regarding ethnicity, black individuals

Table 2. Main risk factors associated with chronic diseases worldwide.

Risk factors associated with cardiovascular diseases	Outcome
Environmental pollution	Ischemic heart disease, ischemic stroke, hemorrhagic stroke
In-house pollution by solid fuels	Ischemic heart disease, ischemic stroke, hemorrhagic stroke
Lead exposure	Hypertension
Smoking	Ischemic heart disease, ischemic stroke, hemorrhagic stroke, atrial fibrillation/flutter, peripheral arterial disease, other cardiovascular diseases, and diabetes
Passive smoking	Ischemic heart disease, ischemic stroke, hemorrhagic stroke and diabetes
Alcohol	Ischemic heart disease, ischemic stroke, hemorrhagic stroke, hypertensive heart disease, atrial fibrillation/flutter, and diabetes
Diet poor in fruits	Ischemic heart disease, ischemic stroke, hemorrhagic stroke and diabetes
Diet poor in greens	Ischemic heart disease, ischemic stroke, hemorrhagic stroke
Diet poor in whole grains	Ischemic heart disease, ischemic stroke, hemorrhagic stroke and diabetes
Diet poor in vegetables	Ischemic heart disease
Diet poor in nuts and seeds	Ischemic heart disease and diabetes
Diet rich in red meat	Diabetes
Diet rich in processed foods	Ischemic heart disease and diabetes
Diet rich in sweetened drinks	Increased BMI
Diet poor in fibers	Ischemic heart disease
Diet poor in omega-3 fatty acids	Ischemic heart disease
Diet poor in polyunsaturated fatty acids	Ischemic heart disease
Diet rich in trans fat	Ischemic heart disease
Diet rich in sodium	Hypertension
Little physical activity	Ischemic heart disease, ischemic stroke and diabetes
Elevated fasting glycemia	Ischemic heart disease, ischemic and hemorrhagic stroke, and peripheral arterial disease
High Total Cholesterol	Ischemic heart disease
	Ischemic stroke
High systolic blood pressure	Ischemic heart disease, ischemic and hemorrhagic stroke, cardiomyopathies and myocarditis, atrial fibrillation/flutter and other cardiovascular diseases
High BMI	Ischemic heart disease, ischemic and hemorrhagic stroke, atrial fibrillation/flutter, and diabetes
Renal insufficiency	Ischemic heart disease, ischemic and hemorrhagic stroke, and peripheral arterial disease

Data adapted from Global Burden of Disease, Risk factors, 2016, reference[1]. BMI: Body Mass Index.

(49.3%) were more hypertensive than Pardo (38.2%) or white (30.3%) participants. Hypertension was better controlled by participants with higher education levels than those with lower education levels, by white or yellow individuals than black people; moreover, social and racial inequalities were significantly associated with poorer control of hypertension.[12]

ELSA-Brazil also analyzed the profile of dyslipidemia in the study by assessing low-density lipoprotein-cholesterol (LDL-C) levels using the 2004 update of the National Cholesterol Education Program Adult Treatment Panel III (ATP-III). A total of 14,648 participants, aged 35–74 years were included. They were divided into four groups: 0 to 1 risk factors, 2 or more risk factors, ischemic heart disease or the equivalent, and a very high risk of ischemic heart disease. The socio-demographic characteristics evaluated were gender, age, ethnicity, income, education, and whether or not they had health insurance. The frequency of participants of high LDL-C levels was 45.5%. Among individuals with elevated LDL-C levels, 58.1% knew they had hypercholesterolemia, 42.3% were receiving treatment, and 58.3% had their cholesterol levels under control. After adjusting for socio-demographic characteristics, elevated LDL-C levels were more pronounced in men, blacks, the elderly, and individuals with lower education levels. Limited knowledge regarding dyslipidemia, lack of treatment, and lack of control of LDL-C levels were also observed in men, pardo, and black individuals with low incomes and low education

Table 3. Percentage changes in the frequency of risk factors between 1991 and 2016 according to gender.

	Percentage changes		
Risk factor	**Men**	**Women**	**Total**
Environmental pollution	11.6 (9.5-13.5)	11.6 (9.4-13.6)	11.6 (9.5-13.6)
In-house pollution	-44.3 (-47.2 a -41.8)	-42 (-44.5 a -39.5)	-43.1 (-45.6 a -40.7)
Lead exposure	-25 (-32.8 a -18.9)	-18.5 (-24.5 a -10.3)	-22.7 (-30.1 a -17.1)
Smoking	-29.6 (-34 a -24.1)	-28.6 (-34.5 a -20.9)	-29 (-33 a -24.3)
Passive smoking	-18 (-20.7 a -15.1)	-23 (-25.2 a -20.6)	-21.4 (-23.6 a -18.8)
Alcohol	1.7 (-4 a 8.8)	-15 (-20.5 a -9)	-2.8 (-8.1 a 3.4)
Diet poor in fruits	-17.5 (-23.6 a -11)	-21.4 (-28.1 a -15)	-19.4 (25.8 a -13)
Diet poor in greens	-23.3 (-28.4 a -19.7)	-22.4 (-27.6 a -18.9)	-22.8 (-27.9 a -19.3)
Diet poor in vegetables	8.8 (4.5 a 14.8)	8 (4.9 a 12.7)	8.2 (4.9 a 13)
Diet poor in whole grains	-9.6 (-10.8 a 8)	-7.3 (-8.5 a -6.2)	-8.4 (-9.6 a -7.1)
Diet poor in nuts and seeds	-8.4 (-11.7 a -4.5)	-7.9 (-11.2 a -4.2)	-8.2 (-11.4 a -4.3)
Diet poor in milk	2.7 (2.11 a 3.43)	2.7 (2.2 a 3.2)	2.7 (2.2 a 3.2)
Diet rich in red meat	26.8 (20.7 a 34.2)	-19.7 (-27.7 a -10.9)	-20.5 (-27.4 a -12.4)
Diet rich in processed foods	-21.1 (-29.6 a -12.4)	-19.7 (-27.7 a -10.9)	-20.5 (-27.4 a -12.4)
Diet rich in sweetened drinks	46.9 (38.5 a 55.2)	42 (31.4 a 52.4)	44.7 (36.1 -52.7)
Diet poor in fibers	-10.1 (-14 a -7.5)	-7.8 (-11 a -5.3)	-8.9 (-12.3 a -6.5)
Diet poor in omega-3 fatty acids	-5.3 (-8.4 a -2)	-3.9 (-6.6 a -1.2)	-4.6 (-7.6 a -1.6)
Diet poor in polyunsaturated fatty acids	-12.1 (-15.5 a -8.3)	-9 (-13.1 a -4.8)	-10.7 (-13.3 a -7.8)
Diet rich in trans fat	-52.1 (-73 a -33.8)	-50.5 (-68.5 a -34)	-51.3 (-70.1 a -34.1)
Diet rich in sodium	-9.9 (-40.4 a 0.12)	-17.3 (-44.8 a -4.8)	-13.6 (-42.2 a -2.3)
Little physical activity	1.3 (0.9 a 1.7)	-1.8 (-2.3 a -1.3)	0.07 (-0.32 a 0.38)
Elevated fasting glycemia	29.2 (21.3 a 40)	27.7 (18.5 a 42.3)	28.8 (21.3 a 39.9)
High Total Cholesterol	-3.9 (-4.9 a -3)	-5.4 (-6.7 a -4.3)	-5.1 (-6.2 a -4.2)
High systolic blood pressure	1.8 (1.4 a 2.3)	-5.1 (-5.6 a -4.7)	-2 (-2.3 a -1.6)
High BMI	60.8 (45.3 a 81.3)	60.7 (45.9 a 79.7)	60.3 (45.1 a 79.1)
Renal insufficiency	2.4 (1.1 a 3.3)	1.4 (-0.05 a 3.3)	1.6 (0.4 a 3.1)

Data adapted from Global Burden of Disease, Risk factors, 2016, reference1. BMI: Body Mass Index[1].

levels and in those without private health insurance, which again shows the influence of social inequality on the lack of diagnosis, treatment, and poor control of dyslipidemia.[13]

The prevalence of dyslipidemia, the incidence of which is confirmed by LDL-C levels ≥ 130 mg/dL or the use of prescribed drugs, lower high density lipoprotein-cholesterol (HDL-C) levels (< 40 mg/dL in men and < 50 mg/dL in women), and triglycerides above 150 mg/dL, also differs according to gender and ethnicity. High levels of LDL-C and triglycerides and low levels of HDL-C were less common in black individuals, when determined using the white sample population as a reference and after adjustment for socio-economic characteristics and adiposity. The prevalence of dyslipidemia among pardo individuals was similar to that of white individuals than to the trend observed in black individuals.[14]

Data from the same study for diabetes revealed a prevalence of 19.7% for diabetics and 50.4% of these had not been previously diagnosed. The definition of diabetes included a prior medical diagnosis, a fasting blood sugar level ≥ 126 mg/dL, blood sugar level ≥ 140 mg/dL after 2 hours, or a hemoglobin A1c (HBA1c) ≥ 6.5 mg/dL. The frequency of hyperglycemia, determined according to various definitions, was 79.1% and the most affected groups were men, the obese, non-whites, and participants with lower education levels.[15]

Regarding physical activity, a cross-sectional analysis of 10,585 participants, aged 35–74 years without a previous history of cardiovascular disease, in the ELSA-Brazil was performed according to the criteria of the American Heart Association (AHA) and the World Health Organization (≥ 150 minutes per day of moderate physical activity or ≥ 75 minutes per day of vigorous physical activity). It was found that a total of 21% of the women and 29% of the men were physically active. After adjusting for confounding factors, the favorable effect of leisure time physical activity on cardiometabolic parameters was quite evident. The mean blood pressure, heart rate, and the Framingham score for cardiovascular disease were significantly lower in active men and women than in those who were inactive.[16]

NATIONAL HEALTH SURVEY

The National Health Survey (NHS) is a periodically-conducted cross-sectional study of the population which uses a representative Brazilian sample; the last survey was conducted in 2013. It is conducted by a partnership between the Ministry of Instituto Brasileiro de Geografia e Estatística (IBGE) which collects information regarding the perception of the health status and chronic diseases of the country. The sample was selected in three stages: census districts, houses, and inhabitants aged ≥ 18 years.[17]

Primordial prevention is defined by the adoption of healthy lifestyle habits. The AHA has defined seven key metrics for optimal cardiovascular health.[18]

The study used data from the 2013 NHS to analyze four lifestyle habits (smoking, physical activity, body mass index, and diet) and three clinical factors (hypertension, diabetes, and hypercholesterolemia) according to the AHA criteria. Only 1% of the population analyzed in the NHS showed ideal conditions for the seven factors and 2.2% were on a diet, 23.6% practiced physical activity, 43.7% had BMIs within normal limits, 76.4% did not have hypertension, 92.8% did not have diabetes, and 85.1% did not have hypercholesterolemia. It is important to remember that this survey included younger individuals $\geq$ 18 years of age, with lower risks of diseases such as hypertension, diabetes, or hypercholesterolemia. However, the low frequency of ideal lifestyle habits suggests that the risk of diseases will greatly increase with aging.[19]

Comparison of NHS data on the prevalence of smoking from 2008 and 2013 revealed changes in the frequency of smoking in Brazil. The results showed that the prevalence of smoking decreased 19%, from 18.5% in 2008 to 14.7% in 2013. The results also showed a decline in the prevalence of smoking in all regions of the country and for all socio-demographic characteristics, such as gender, ethnicity, age, and education, including urban and rural areas in most states. It decreased 17.5% in men and 20.7% in women in all age groups, with a more relevant decrease in the 25–39 year age group for both genders. Regarding ethnicity, the highest prevalence was observed for pardo and black individuals. This decrease was observed at all education levels, with a more pronounced decline in individuals with lower education levels. In 2013, the prevalence of smoking was 19.7% in individuals with low education levels and 8.7% in those who reported having a university degree. This decline in the prevalence of smoking over time is a consequence of control, regulation, and prevention policies.[20]

The NHS data were also used to analyze alcohol consumption trends in the Brazilian adult population. The prevalence of alcohol consumption was 26% with a mean onset age of alcohol consumption of 18.7 years. The frequency of alcohol abuse was 51% and, among those, 43% reported this behavior more than four times a week. About a quarter of the sample reported driving after drinking. The prevalence of alcohol use was higher in men, individuals aged 25–34 years, single people living in urban areas, and individuals with higher education levels. The frequency of alcohol abuse was higher in men, older individuals, and individuals who reported starting alcohol consumption before 18 years of age. Alcohol use and driving or driving after drinking was more frequent in men, individuals with higher education levels, and individuals living in rural areas.[21]

A cross-sectional analysis of the NHS assessed the frequency of a prior medical diagnosis of hypertension, the use of drugs for the treatment of hypertension, and the control of blood pressure levels in the country in a sample of 81,254 participants. Of the total, 43.2% reported a prior medical diagnosis of hypertension and this frequency was higher in men than in women (25.8% vs. 20.0%, respectively). Of the hypertensive individuals, 81.4% reported the use of prescribed drugs for the treatment of hypertension and, of these, 69.6% had visited the doctor in the previous year for blood pressure monitoring.[22]

Regarding diabetes, the prevalence detected in the NHS was 6.2%, which was higher in women than in men (7.0% vs. 5.4%, respectively). The prevalence was higher in the elderly, reaching 19.8%, and in black individuals with lower education levels. Among obese individuals, 11.8% reported diabetes, and individuals who previously smoked, did not practice sufficient physical activity, or abused alcohol reported a higher frequency of diabetes. Regarding diet, no differences were observed between diabetics and non-diabetics.[23]

Among the 60,202 individuals from the 2013 NHS, 14.3% reported never having their cholesterol levels measured. Of those who reported having their cholesterol levels measured in the previous year, there was a higher frequency of women, white individuals, the elderly, and individuals with higher education levels. The prevalence of a prior medical diagnosis of hypercholesterolemia was 12.5% (9.7% in men vs. 15.1% in women). Moreover, women showed a 60% higher probability of a prior diagnosis of hypercholesterolemia compared to men. The frequency of a medical diagnosis of hypercholesterolemia increased with age and was higher in white and Asian individuals, individuals with higher education levels, and residents in the Southeast and Southern regions of Brazil.[24]

The NHS data were also used to study multimorbidity (the presence of various diseases and risk factors in the same person). Multimorbidity was confirmed based on the report of two or more chronic diseases including self-reported diagnoses and the presence of symptoms in a psychiatric morbidity questionnaire. The frequency of multimorbidity in the sample was 24.2% and was higher in women, the elderly, and individuals with lower education levels. According to the combination of symptoms, participants with multimorbidity belonged to three physiological groups: cardiometabolic, musculoskeletal, mental health, and respiratory. Within the cardiometabolic group, risk factors for hypertension, diabetes, and hypercholesterolemia were associated with stroke and cardiovascular disease showing the presence of several risk factors grouped in the same individual.[25]

CONCLUSION

The results of the various strategies used to assess the risk factors for cardiovascular disease showed a high frequency of risk factors in differentiated samples and their association with cardiovascular diseases both in Brazil and worldwide. The role of socio-demographic characteristics, such as gender, age, ethnicity, and education, on risk factors and associated diseases is also very clear. Social inequality corresponds to less healthy profiles with increased risk factors.

It is crucial to control the risk factors to prevent cardiovascular diseases. However, changes in lifestyle are the most difficult implement and the implementation of population strategies is extremely important. In Brazil, the strategy used to control smoking was an example of success. Blood pressure control has improved, but requires continued refinement. On the other hand, the increase in obesity in the population can soon lead to an increase in risk factors, such as hypertension and diabetes, and this can consequently lead to an increase in cardiovascular diseases.

CONFLICTS OF INTEREST

The author declares that he has no conflicts of interest in this work.

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