Hypertension among the elderly: comparison between indicators in Ceará, the Northeast and Brazil

Hipertensão arterial entre idosos: comparação entre indicadores do Ceará, do Nordeste e do Brasil

Hipertensión arterial en mayores: comparación de los indicadores de Ceará, del Noreste y de Brasil

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ABSTRACT

Objective: To estimate the prevalence rate and the number of people with hypertension and the free life expectancy and hypertension of the aged population in Ceará, the Northeast Region, and Brazil, for the year 2008, and to present the scenario of indicators for the year 2020. **Methods:** It is a quantitative study based on population data from the National Household Sample Survey and Population Projections provided by the Brazilian Institute of Geography and Statistics. The prevalence and the aged population with hypertension are estimated, and the Sullivan method is used to calculate life expectancy without and with hypertension. **Results**: In the years 2008 and 2020, the prevalence of hypertension among the aged was over 50% among females and 40% among males, as well as the proportion of life expectancy at 60 years of age to be experienced with hypertension, being higher values observed for Brazil compared to the Northeast and Ceará. During this period, the number of hypertension-aged people is expected to increase by more than 40% in Brazil and around 30% in the Northeast and Ceará. **Conclusion:** The pace of population aging contributes to the growth of the aged population with hypertension. The prevalence and life expectancy with hypertension have regional specificities. As a general rule, the prevalence of hypertension is high among the aged, so that a significant part of life expectancy at 60 years old should be lived with the problem of hypertension.

Descriptors: Hypertension; Population Dynamics; Aged; Health Indicators; Life Expectancy.

RESUMO

Objetivo: Estimar a taxa de prevalência e o número de pessoas com hipertensão e a expectativa de vida livre e com hipertensão arterial da população idosa do estado do Ceará, da Região Nordeste e do Brasil, para o ano de 2008, e apresentar o cenário dos indicadores para o ano de 2020. Métodos: Trata-se de estudo quantitativo, elaborado a partir de dados populacionais da Pesquisa Nacional por Amostra de Domicílios e das Projeções Populacionais disponibilizados pelo Instituto Brasileiro de Geografia e Estatística. Estima-se a prevalência e a população idosa com hipertensão, e utiliza-se o método de Sullivan para calcular a esperança de vida sem e com hipertensão. Resultados: Nos anos de 2008 e 2020, a prevalência de hipertensão entre idosos foi superior a 50% entre o sexo feminino e 40% entre o sexo masculino, assim como a proporção da expectativa de vida aos 60 anos a ser vivida com hipertensão, sendo observados valores mais elevados para o Brasil em comparação com o Nordeste e o Ceará. Nesse período, espera-se um aumento do número de idosos com hipertensão em mais de 40% no Brasil e ao redor de 30% no Nordeste e no Ceará. Conclusão: O ritmo do envelhecimento populacional contribui para o crescimento da população idosa com hipertensão. A prevalência e a expectativa de vida com hipertensão apresentam especificidades regionais. Regra geral, a prevalência de hipertensão é elevada entre os idosos, de modo que parte significativa da expectativa de vida aos 60 anos deverá ser vivida com o problema da hipertensão.

Descritores: Hipertensão Arterial; Envelhecimento Populacional; Idosos; Indicadores de Saúde; Esperança de Vida.

RESUMEN

Objetivo: *Estimar la tasa de prevalencia y el número de personas con hipertensión y la expectativa de vida libre y con hipertensión arterial de la población de mayores del estado de Ceará, de la Región Noreste y de Brasil del año 2008 y presentar el escenario de los indicadores para el año 2020.* ***Métodos***: *Se trata de un estudio cuantitativo elaborado a partir de los datos poblacionales de la Investigación Nacional por Muestra de Domicilios y de las Proyecciones Poblacionales disponibles en el Instituto Brasileño de Geografía y Estadística. Se estima la prevalencia y la población de mayores con hipertensión y se utiliza el método de Sullivan para calcular la esperanza de vida de personas sin y con hipertensión.* ***Resultados:*** *En los años 2008 y 2020 la prevalencia de hipertensión entre los mayores ha sido superior al 50% para el sexo femenino y el 40% para el sexo masculino así como la proporción de la expectativa de vida a los 60 años a ser vivida con hipertensión observándose valores más elevados para Brasil comparándose con el Noreste y Ceará. En ese periodo se espera una subida del número de mayores con hipertensión en más del 40% de Brasil y alrededor del 30% en el Noreste y Ceará.* ***Conclusión***: *El ritmo del envejecimiento poblacional contribuye para el crecimiento de la población de mayores con hipertensión. La prevalencia y la expectativa de vida con hipertensión presentan especificidades regionales. En general, la prevalencia de hipertensión es elevada entre los mayores de manera que parte significativa de la expectativa de vida a los 60 años deberá vivir con el problema de hipertensión.*

Descriptores: *Hipertensión; Dinámica Poblacional; Anciano; Indicadores de Salud; Esperanza de Vida.*

INTRODUCTION

Population aging in Brazil occurs rapidly, and the changes in population structure in the coming decades will be significant. The growth of the elderly population generates economic impacts on areas such as public health. In this sense, adjusting to the health system to the demands generated by a progressive population aging challenges the public sector[1].

In the transition process from a young population to an older one, there is a change in the population mortality and morbidity profile associated with diseases that prevail in older ages. This scenario impacts an increase in non-communicable chronic disease cases related to the individuals' senescence[2,3]. The evolution of chronic diseases in the population is a relevant problem in the public health area, as these diseases can lead to morbidities, disabilities, and deaths[3,4].

Hypertension is a health problem that has a high prevalence among the elderly and can compromise their quality of life[2,3]. In addition to the aging of the individual, the development of the hypertension problem is related to other factors, such as physical inactivity, obesity, and heredity[3,5]. Hypertension and diabetes *mellitus* are chronic diseases that, combined with other factors, increase the risk of acute myocardial infarction and stroke, which reveals the importance of monitoring these diseases in the context of public health[6].

Estimates indicate that hypertension affected just over 25% of the world's adult population in 2000, and projections suggest that this proportion is expected to rise in the coming years. In their demographic aspects, these estimates reveal that the prevalence of hypertension tends to increase with increasing age[7].

For the year 2010, estimates are 1.39 billion adults worldwide with hypertension. Its global distribution stands out since low and middle-income countries concentrate around 75% of the adult population with hypertension, and this group of countries has less favorable indicators on diagnosis, treatment, and control of the disease compared to the group of high-income countries[8].

Understanding the characteristics of the prevalence of hypertension in the population is pertinent for the development of health policies aimed at preventing and reducing the problems caused by this disease. In the coming years, Brazil will experience rapid growth of the elderly population, a group with a higher risk of morbidities and disabilities related to degenerative diseases.

Regarding the availability of indicators on hypertension among the elderly in Brazil, it appears that information on the hypertensive population can be found in several studies. But there are limitations related to the period of the survey and the spatial breakdown.

Considering this context, the objective of this study is to estimate the prevalence rate of hypertension, the amount of people with hypertension, and the free life expectancy and arterial hypertension of the elderly population of the state of Ceará, the Northeast Region and Brazil, for the year 2008, and present a scenario on these indicators for the year 2020.

METHODS

This study is characterized as quantitative research, carried out based on population data from the National Household Sample Survey (PNAD) 2008 and the 2013 and 2018 Population Projections provided by the Brazilian Institute of Geography and Statistics (IBGE)[9-11].

Information on the hypertensive population can be found in some research, but PNAD 2008 was used here because of the possibility of calculating rates for long-lived age groups for the different spatial units of interest in this study. For these conditions, more recent research on hypertension was not chosen for use in the study, such as the National Health Survey 2013 and the Risk and Protection Factors Surveillance System for Chronic Diseases by Telephone Survey (Vigitel).

We used the Sullivan method to estimate free life and with hypertension expectancy. This method allows the estimation of life expectancy, considering a given health condition, by combining cross-sectional data on the prevalence of that health condition and data from the mortality table for the analyzed group[12-14]. This method has the advantage of the simplicity of calculation and interpretation, in addition to the availability of data required for its application[15-17].

For the calculation of hypertension-free life expectancy (EVLH), the Sullivan method is applied as follows:

$$\text{EVLH}_x = \frac{\sum \left(1 - {}_n h_x\right) \; {}_n L_x}{l_x}$$

In the formula, EVLH_x, is hypertension-free life expectancy at age x; ${}_n h_x$ is the prevalence of hypertension in individuals aged x and $x+n$; ${}_n L_x$ corresponds to people-years lived between x and $x+n$, and l_x is the number of people alive in age x. ${}_n L_x$ and l_x being functions of the mortality table.

After calculating hypertension-free life expectancy (EVLH), life expectancy with hypertension (EVCH) can be calculated from the difference between life expectancy observed in the mortality table and hypertension-free life expectancy (EVLH).

In calculating life expectancy with and without hypertension, the functions nLx and lx refer to data from the mortality tables used in the 2013 Population Projections, available by IBGE[11]. Mortality tables for the years 2008 and 2020 were used. In preparing the mortality tables for the projections, IBGE uses data from the 2000 and 2010 Censuses, the Civil Registry, and the Mortality Information System of the Ministry of Health, and assumes the continuity of the decline in mortality over the projection time[18].

Data from the 2008 National Household Sample Survey were used to estimate the prevalence of hypertension in the population of Ceará, the Northeast, and Brazil, the item referring to the diagnosis of hypertension being used: "did any doctor or health professional say that he/she has hypertension (high blood pressure)?"[9].

The prevalence of hypertension in 2008 corresponds to the proportion of the elderly who answered positively to the PNAD item related to the theme. The prevalence of hypertension, for the year 2020, refers to a scenario, which was elaborated based on the hypothesis that the age-specific rates of hypertension will be the same as those observed in 2008. This type of hypothesis can be used to build scenarios because of the uncertainties about future changes in the prevalence of a health condition in the population[19]. Data from the population aged 60 or over, available in the Population Projections 2018 of the IBGE, were considered for the 2020 scenario elaboration[10].

The scope of the hypertensive elderly population, in 2008, is calculated from PNAD data, corresponding to individuals aged 60 or over who responded positively to the question of hypertension. In 2020, this indicator results from the combination of age-specific hypertension prevalence rates observed in 2008 and the elderly population projected for 2020.

The results obtained for Brazil, the Northeast Region, and Ceará, for the years 2008 and 2020, will be described considering the following indicators: prevalence of hypertension among the elderly, scope of the hypertensive elderly population, life expectancy at 60, free life expectancy and life expectancy at hypertension at 60. Life expectancy refers to the average number of years that an elderly expects to live, this measure being distributed between the average number of years that an elderly expects to live with and without the problem of hypertension.

RESULTS

Considering the results presented in Table I, it seems that the prevalence of hypertension reaches high proportions among the elderly, but with relevant differences in the comparison between men and women. Besides, as a general rule, the prevalence of hypertension is higher in Brazil compared to the Northeast Region and the state of Ceará.

Among the elderly, in 2008, females had a higher prevalence of hypertension compared to men, for the country, the Northeast, and Ceará. In Brazil, the prevalence of hypertension reached 59% among females and 46% among males. In the Northeast, the proportions were 56% and 43% for females and males, respectively. And, in the state of Ceará, 51% among females and 43% among males (Table I).

Considering the volume of the population aged 60 or over with hypertension, depending on the results observed for 2008, it appears the amount of elderly with hypertension reached 11.3 million people in the country, 2.7 million in the Northeast, and, in Ceará, 433 thousand seniors. Female elderly account for most of this population, with a relative weight of around 60% of elderly with hypertension in Brazil, the Northeast, and Ceará.

Analysing the scenario for 2020, the hypertensive elderly population is projected to grow. This number can reach 16 million elderly with hypertension in the country, 3.6 million in the Northeast, and 561 thousand in Ceará. In this scenario, the gender composition of the hypertensive elderly population does not undergo significant changes, remaining a proportion just above 60%, corresponding to the women participation in the elderly population with hypertension in the country, in the Northeast and Ceará.

It should be noted that, despite considering as hypothesis specific rates of prevalence of hypertension without changes between the years 2008 and 2020, the growth of the elderly population implies an increase in the amount of elderly with hypertension in the comparison between the periods.

Table I - Prevalence and number of people aged 60 or over with hypertension in Brazil, the Northeast and Ceará in 2008 and in the scenario for 2020.

Sex	Brazil	Northeast	Ceará
Prevalence of hypertension among people aged 60 and over - 2008			
Male	46.3%	42.9%	42.9%
Female	58.7%	56.1%	51.2%
People aged 60 or over with hypertension - 2008			
Male	4.310.849	1.030.724	172.006
Female	7.009.066	1.710.769	261.794
Total	11.319.915	2.741.493	433.800
Scenario: people aged 60 or over with hypertension - 2020			
Male	6.148.800	1.350.552	218.914
Female	9.889.969	2.302.172	342.141
Total	16.038.769	3.652.724	561.055

Source: Based on data from PNAD 2008 and population projections from IBGE, 2018

In addition to the scope of the elderly population with hypertension, it is also important to consider the average lifespan that the elderly should spend with and without the hypertension problem. Table II shows the estimates of total life expectancy (EV), hypertension- free life expectancy (EVLH), and hypertension (EVCH) at 60 years.

Life expectancy at 60 years of age in Brazil, in the Northeast, and Ceará, in 2008 and 2020, is higher for women compared to men. For both men and women, this life expectancy is expected to increase in this period.

In Brazil, the total life expectancy of women at 60 years of age is expected to increase from 22.5 to 24.5 years and of men, from 19.0 to 20.8 years. In the Northeast, life expectancy for women at the age of 60 is expected to increase between 2008 and 2020, from 21.5 to 23.4 years, and for men, from 18.2 to 19.5 years. In Ceará, this increase in life expectancy among women is expected to raise from 21.8 to 23.3 years and, among men, from 18.9 to 20.0 years (Table II).

Considering the elderly population's health conditions, the results achieved based on the proposed scenario indicate that the higher life expectancy at 60 years old for women compared to men is accompanied by a longer lifespan with the hypertension problem. However, it should be noted that the lifespan with the hypertension problem reaches high proportions in the total life expectancy of men and women.

In 2008, life expectancy with the hypertension problem at the age of 60 was, in Brazil, 13.3 years for women and 8.9 years for men. In the Northeast, it was 12.2 years for women and 7.9 years for men. In Ceará, it was 11.2 and 8.2 years for women and men, respectively. Considering the relative weight of years of life with hypertension in total life expectancy at 60 years of age, it appears that, in Brazil, this proportion reached 59.2% among women

and 46.7% among men. In the Northeast, 56.6% among women and 43.6% among men. In Ceará, 51.6% among women and 43.1% among men (Table II).

The projections for the year 2020 do not show marked changes in the proportion of life expectancy at 60 years of age, corresponding to the time to be lived with the hypertension problem, for both men and women. But it was observed that the increase in total life expectancy between the years 2008 and 2020 is combined with an increase in years of life with hypertension.

It is pertinent to note the differences between the sexes. In both 2008 and 2020, life expectancy with hypertension at age 60 is higher for females, while life expectancy free from hypertension is higher for males.

In the comparison between space units, it is noted that life expectancy with hypertension at 60 years is higher for men and women in Brazil compared to Ceará and the Northeast in 2008 and the scenario for 2020. These results are influenced by higher rates of hypertension and a longer life expectancy among the elderly in the country.

Table II - Life expectancy, hypertension-free life expectancy and life expectancy with hypertension at 60 years of age in Brazil, the Northeast and Ceará in 2008 and the scenario for 2020.

Unit	EV	EVLH	EVCH	% EVLH	% EVCH
Brazil - year 2008					
Male	19.0	10.1	8.9	53.3%	46.7%
Female	22.5	9.2	13.3	40.8%	59.2%
Brazil - scenario 2020					
Male	20.8	11.1	9.7	53.2%	46.8%
Female	24.5	10.0	14.5	40.9%	59.1%
Northeast - year 2008					
Male	18.2	10.3	7.9	56.4%	43.6%
Female	21.5	9.3	12.2	43.4%	56.6%
Northeast - scenario 2020					
Male	19.5	11.0	8.6	56.3%	43.7%
Female	23.4	10.1	13.3	43.3%	56.7%
Ceará - year 2008					
Male	18.9	10.8	8.2	56.9%	43.1%
Female	21.8	10.5	11.2	48.4%	51.6%
Ceará - scenario 2020					
Male	20.0	11.4	8.6	56.8%	43.2%
Female	23.3	11.3	12.0	48.5%	51.5%

EV: total life expectancy; EVLH: hypertension-free life expectancy; EVCH: life expectancy with hypertension; % EVLH: proportion of total life expectancy free from hypertension; % EVCH: proportion of total life expectancy with hypertension
Source: Based on data from PNAD 2008 and population projections from IBGE, 2018.

DISCUSSION

In the present study, an estimate was made of the prevalence rate of hypertension among the elderly, the amount of hypertensive elderly, and life expectancy at 60 years of age with and without hypertension for Brazil, the Northeast Region, and Ceará. These indicators were estimated for 2008 and calculated for the year 2020 from a scenario. It is interesting to note that, even if a hypothesis of prevalence rates of hypertension without changes between 2008 and 2020 was adopted, only the growth rate of the population aged 60 and over, in this period, leads to an increase in the number of hypertensive elderly. In this sense, in a pessimistic scenario, of an increase in the prevalence of hypertension, the amount of elderly with this health problem will become even higher.

Despite not being directly comparable to the results presented here, Vigitel data indicate that, among people aged 65 and over living in state capitals and the Federal District, the prevalence of hypertension was 60.9% in 2018. This research also shows differences between the sexes, with women aged 65 and over showing a prevalence of hypertension of 63.6% and men, of 56.7%[20].

Analyzing these data on the prevalence of hypertension among the elderly, it can be concluded that the prevalence can reach high levels in advanced ages. Furthermore, regional inequalities must be considered. The

prevalence of hypertension can be influenced by demographic, socioeconomic aspects, and conditions of access to health services[21,22].

In this study, the prevalence of hypertension among the elderly was shown to be higher in Brazil compared to the Northeast Region and the state of Ceará. It is found, in a study based on the National Health Survey 2013, that the prevalence of hypertension among adults is also higher in Brazil compared to the Northeast and Ceará[21,23].

The life expectancy of the elderly increased during the period under analysis. Studies show that the elderly mortality rate shows a declining trend over time[24,25]. However, for a better understanding of health conditions, it remains to be seen if this increase in the future average lifespan occurs with quality of life. The increase in longevity can be combined with different health conditions. Healthy life expectancy corresponds to a part of the life expectancy of the elderly, representing the average number of years to be lived in good health[12].

In this study, it was found that individuals who reach 60 years are expected to live a significant part of life expectancy with hypertension. These results corroborate other studies, which show that the percentage of life expectancy at 60 years of age to be lived with chronic diseases can reach high values[14].

In the present study, it was found that women live longer than men, but they have a longer life expectancy with hypertension. These results corroborate other studies on healthy life expectancy among the elderly, which show that women, in comparison with men, tend to have a longer life without good health conditions[14,26].

Life expectancy with and without hypertension showed differences between Ceará, the Northeast, and Brazil. In another study, using other indicators on the elderly health condition, significant variations were found in life expectancy and healthy life expectancy between the federation units[26].

In the elderly population, women predominate, as well as among the elderly with hypertension. The higher relative weight of women in the composition of the elderly population is influenced by the bigger female survival compared to the male. These results follow data from other surveys[2,3].

In this study, a higher prevalence of hypertension was found among women compared to men. These differences were observed for Brazil, the Northeast and Ceará. Other studies show a higher prevalence of hypertension among women compared to men and point out that these differences may be due to the women behavior concerning health care and seeking medical assistance since they are factors that can be reflected in the proportion of diagnoses of hypertension[3,23,27].

It is interesting to note that the criteria adopted for the survey of hypertension information in the population can also influence the prevalence data. Studies show differences in the prevalence of hypertension when obtained by self-reported information, measured by an instrument, and by the combination of medication use and/or measurement by instrument[23]. Despite the differences between the criteria for surveying hypertension cases, self-reported information can be considered a useful measure for monitoring the population disease[21,23].

Finally, it should be noted that the results presented here for the year 2020 are limited by the assumptions adopted for the elaboration of a scenario. New studies should assess changes in the prevalence of hypertension in the population, even considering alternative scenarios related to the possibilities of decline or increase in the hypertension prevalence among the elderly.

CONCLUSION

Based on the results obtained, it is possible to conclude that the population aging pace contributes to the growth of the elderly population with hypertension. The prevalence and life expectancy with hypertension have regional specificities. As a general rule, the prevalence of hypertension is high among the elderly, and a significant part of life expectancy at 60 years of age should be experienced with the problem of hypertension.

CONTRIBUTIONS

Alane Siqueira Rocha and **Breno Aloísio Torres Duarte de Pinho** contributed to the preparation and design of the study; the acquisition, analysis and interpretation of data; and the writing and / or revision of the manuscript. **Érica Nobre Lima** contributed to the preparation and design of the study; and the writing and / or revision of the manuscript.

CONFLICTS OF INTEREST

The authors state that there were no interest conflicts in carrying out this research.

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