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CARDIOVASCULAR DISEASES: MORTALITY TRENDS IN MATO GROSSO: 1996 TO 2016

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Abstract: Cardiovascular Diseases (CVD) are changes in the functioning of the cardiac system and represent a group of diseases of the heart and blood vessels. They constitute the main group of chronic non-communicable diseases (NCDs) and the leading cause of morbidity and mortality in the Brazilian population. In addition, they have a major impact on the economy, health systems and social security. In Brazil, in recent years, CNCDs have represented 69% of hospital expenses in the Unified Health System (SUS), and CVDs are responsible for the high frequency of hospitalizations. To analyze the mortality trend of Cardiovascular Diseases in the State of Mato Grosso, from 1996 to 2016. This is an ecological quantitative approach study using secondary information from the Mortality Information System (SIM), referring to the period of 1996 to 2016 conducted in the State of Mato Grosso. For trend analysis, polynomial regression models were used. The results of the trend analysis of mortality from cardiovascular diseases reveal that the mortality coefficient for CVD showed a statistically significant decreasing trend in all age groups, with the exception of inhabitants older than 60 years, whose coefficient showed an increase. In view of the results presented, it is necessary that the authorities of the State of Mato Grosso invest more in public policies that favor the reduction of the mortality rate for Cardiovascular Diseases, especially in individuals over 60 years of age.
Keywords: Cardiovascular diseases, Risk factor, Time Series Studies.

INTRODUCTION

Cardiovascular Diseases (CVD) are changes in the functioning of the cardiac system and represent a group of diseases of the heart and blood vessels. They include coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis, and pulmonary embolism.[1,2]

Most risk factors are represented by: changes in blood pressure, smoking, high blood glucose, dyslipidemia, overweight and central obesity, with the exception of children where malformations have a greater influence on heart disease. Thus, it is noted that these are etiologies that can be modified through adequate eating habits, physical activity, reduction of abusive consumption of alcohol and smoking. Studies show that the interaction of these factors is more worrying in terms of damage to health than just their sum due to their synergistic effect.[1,3-5]

In addition, the physiological changes related to aging and associated with risk behaviors are related to the high prevalence of CVDs in the elderly. Despite the increase in its incidence with advancing age, it is estimated that most of these morbidities could be avoided, and that three quarters of cardiovascular mortality can be reduced with lifestyle changes aimed at controlling risk factors.[1,3,5-7]

Cardiovascular Diseases are the main group of chronic non-communicable diseases (NCDs) and the leading cause of morbidity and mortality in the Brazilian population. In addition, they have a major impact on the economy, health systems and social security.[1,3,6,7]

In Brazil, in recent years, CNCDs have represented 69% of hospital expenses in the Unified Health System (SUS), with CVDs being responsible for the high frequency of hospitalizations. In 2007, in the state of Mato Grosso, there were 1,155,489 hospitalizations for cardiovascular diseases, with a global cost of R$ 1,466,421,385.12 and a total of 91,182 deaths. It was the main cause of death, corresponding to 27.3% of all deaths in the state, being the second largest hospital expense behind respiratory diseases.[2,3,5,7]

Therefore, this study aims to analyze the temporal trend of mortality from cardiovascular diseases in the state of Mato Grosso, from 1996 to 2016.

MATERIAL AND METHODS

This is an ecological quantitative approach study, which used secondary information from the Mortality Information System (SIM), consisting of 141 municipalities in the State of Mato Grosso, referring to the period from 1996 to 2016.

Ecological studies are centered on the use of a population group as a unit of analysis in their investigation, where the researcher is only aware of the number of individuals exposed to a given event, not knowing their individual characteristics. This way, it is impossible to extrapolate the collective results to the individual level.

Historical series of deaths were used through information from the Mortality Information System, available at the Department of Informatics of the Unified Health System (DATASUS). Thus, mortality rates from diseases of the circulatory system were calculated, where all deaths from Chapter IX of the International Code of Diseases (ICD-10) were included in the numerators, and the population at risk was used in the denominators. This is defined as the one from which the cases originated, obtained by the estimated number of the resident population for each year studied, according to data from the Brazilian Institute of Geography and Statistics. (IBGE)[8,9].

The trend analysis of the coverage of the system was performed using the Software Statistical Package for the Social Sciences (SPSS) version 18.0, using polynomial regression models. The choice of these models was due to the fact that they have high statistical power, in addition to being easily formulated and interpreted. The polynomial model has the property of finding the curve that best fits the data, in order to describe the relationship between the dependent variable Y (mortality rate) and the independent variable X (year of study).

To find the curve that best describes the relationship between the dependent and independent variables, the following polynomial regression models were tested:

1º Degree:
$y = \beta 0 + \beta 1\ x$
2º Degree:
$y = \beta 0 + \beta 1\ x + \beta 2\ x2$
3º Degree:
$y = \beta 0 + \beta 1\ x + \beta 2\ x2 + \beta 3\ x3$
4º Degree:
$y = \beta 0 + \beta 1\ x + \beta 2\ x2 + \beta 3\ x3 + \beta 4\ x3$

The choice of the best model depended on the analysis of the scatter diagram, the value of the coefficient of determination (r2 the closer to 1, the more adjusted the model is) and the analysis of the residuals (assumption of true homoscedasticity). When two models were similar, from a statistical point of view, the simplest model was chosen, that is, of lower order.

In the total: 20 polynomial regression models were developed, having as a dependent variable the mortality rate from diseases of the circulatory system in the following age groups: under 10 years old, 10 to 19 years old, 20 to 29 years old, 40 to 49 years old and 60 years old or more. The independent variable was each year of the historical series comprising the period from 1996 to 2016.

The polynomial regression model was considered capable of describing the relationship between the dependent and independent variables when the p value was <0.05, in situations where more than one model met this condition, the one with the lowest value was chosen. of p, whereas when

the value of p was coincident, the simplest model was chosen.

As for the information on modifiable risk factors, searches were carried out in databases from May 01 to 08, using the keywords "cardiovascular diseases" and "risk factors". It was limited to the period from 2016 to 2020, seeking full-text clinical trial and meta-analysis in any language. The results found were reviewed individually and those that addressed relevant outcomes related to the topic of work were included. In total, 674 studies were found and 4 were chosen for this article.

The accomplishment of this work did not require the application of the Free and Informed Consent Term (Res. CNS 466/2 in its chapter IV.8), as it is an analysis of data in the public domain (SIM) of unrestricted access, where data are not informed records and, according to Resolution 510/2016, Law 12,527/2011, it was not necessary to submit this research for the evaluation of the CEP-CONEP System.

RESULTS

ANALYSIS OF THE HISTORICAL SERIES FROM 1996 TO 2016

The results of the trend analysis of cardiovascular disease mortality coefficients for the period from 1996 to 2016 are shown in Table and Figure 1.

The mortality rate from cardiovascular diseases in the age group < 10 years was 4.38, reducing to 2.65 per 100,000 inhabitants, which represents a decrease of 60.5% in the mortality rate, with a downward trend with an annual average not constant of 3%.

In the same period, the mortality coefficient in the age group of 10 - 19 years presented a value of 4.11, reducing to 2.26 per 100,000 inhabitants, representing a decrease of 54.98%, being statically significant and decreasing trend, with an average decrease not constant rate of 2.74% per year.

The mortality rate in the 20-39 age group, on the other hand, had a value of 17.34 to 11.75 per 100,000, representing a decrease of 67.7% with a statistically significant downward trend and a non-constant mean decrease of 3.38 % per year.

Regarding the mortality rate for the 40-59 age group, it dropped from 163.83 to 109.88 per 100,000 inhabitants, this reduction was 67% with a decreasing trend, statistically significant and with a non-constant mean decrease of 3, 35.

The age group >60 years showed an increasing trend and an increasing mortality coefficient from 1,095.64 to 1,233.73 per 100,000, the increase was 11.2% with a statistically significant increasing trend and a non-constant average growth of 0.56% per year.

DISCUSSION

The analysis performed showed a reduction in mortality rates from cardiovascular diseases in the state of Mato Grosso, between 1996 and 2016. However, when the age group older than 60 years was evaluated, it was found to be associated with an increase in deaths from CVDs.

In this sense, it is important to emphasize that despite the reduction in the number of deaths per 100,000 inhabitants, this group of diseases continues to be the main cause of death, even in developed countries. [1,2,5-7]

In addition, cardiovascular health is directly related to the length of time an individual is exposed to different risk factors, which increase mortality over time. Thus, the prevalence of these diseases increases with increasing age.[2-7].

NIn the age group <10 years, congenital heart disease is responsible for about 40% of birth defects, being one of the most frequent malformations, corresponding to 19% of

Age group	Model	R^2	Trend
< 10 years	$y=0,0002x^4+0,1511x^2+0,8668x+2,8643$	$R^2 = 0,4071$	descending
10-19 years	$y=0,0032x^2-0,1897x+4,7509$	$R^2 = 0,5089$	descending
20-39 years	$y=0,0246x^2+0,1352x+19,679$	$R^2 = 0,828$	descending
40-59 years	$y=0,03x^3-1,2977x^2+12,015x+152,1$	$R^2 = 0,8894$	descending
> 60 years	$y=0,4552x^2-16,873x^2+164,49x+100,9$	$R^2 = 0,7573$	descending

Table 1 - Results of the trend analysis of mortality rates for cardiovascular diseases in the State of Mato Grosso from 1996 to 2016.

* Model: y = mortality coefficient (per 1000 live births); x = year-2005; **r2 = coefficient of determination.
*Model: y = mortality rate (per 1,000 new-born); x = year - 2005; **r^2 = determination coefficient.

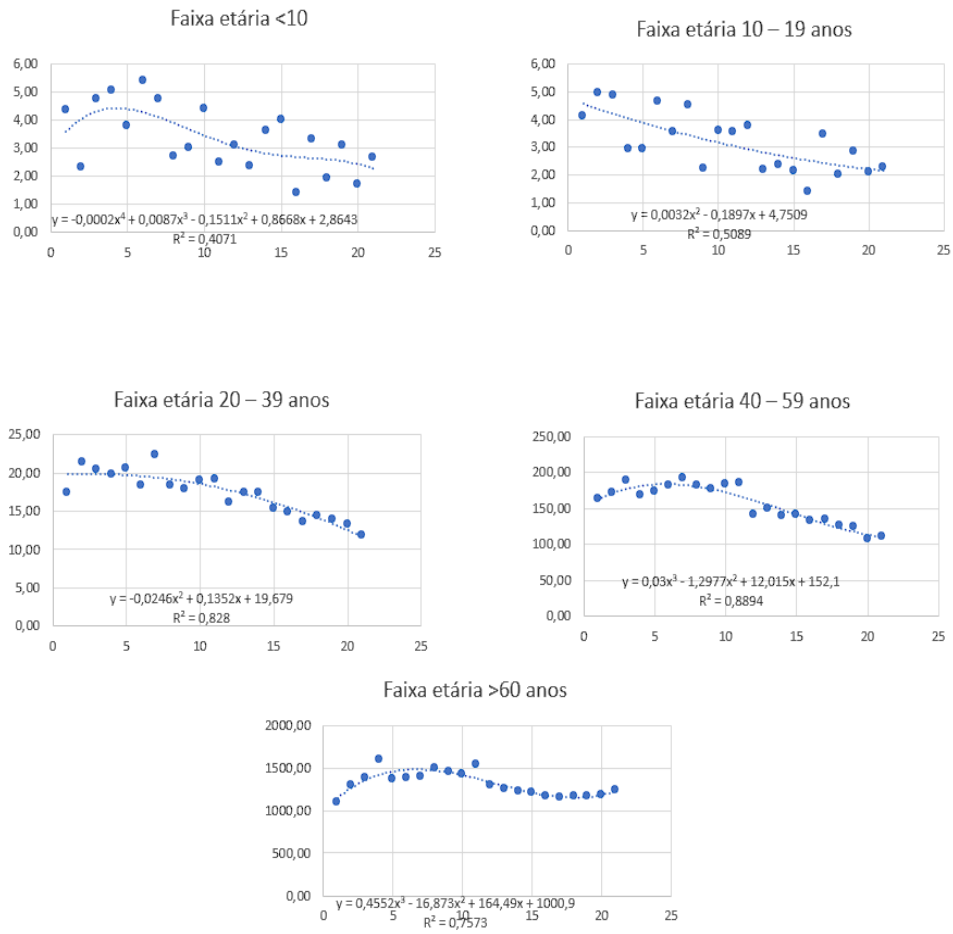

Figure 1 - Trends in mortality rates for cardiovascular diseases in the State of Mato Grosso from 1996 to 2016.

Faixa Etária = Age Group

mortality in this age group.[3,4]

The reduction in the number of deaths is mainly related to the structuring of the service network for detection/clinical genetic counseling in the Unified Health System of congenital malformations, increased adherence to prenatal care and greater adherence of parents in the control of chronic diseases. In addition, the increase in the practice of sports in this age group proves to be important in the prevention of diseases.[3,5,10,11,13]

Among the 10-19 age group, the importance of preventing and/or controlling childhood obesity is due to the fact that obesity acquired at this stage of life tends to persist into adulthood. Childhood obesity is a risk factor for dyslipidemia, hypertension and glucose metabolism disorders. On the other hand, lifestyle changes and weight loss improve the lipid profile and reduce the risk of cardiovascular diseases, in addition to preventing hypertension and Diabetes Mellitus.[5,7,10,12-14]

Changes in eating habits related to processed foods, sedentary lifestyle and increased use of electronic devices are related to the development of risk factors for cardiovascular disease in adults.[3,11,12]

The mortality rate from cardiovascular diseases reduced in the 20-39 age group, and it is possible to emphasize that this drop in mortality can be explained, in part, by technological advances and expansion of access to health services, which allows for early diagnosis. and the treatment of comorbidities common to this population, such as overweight, smoking, high blood pressure and diabete[2,5,7,10,14,15]

Cardiovascular complications are associated with the duration of the disease, where the population aged 20-39 years has a shorter time of exposure to risk factors when compared to individuals with long-standing chronic diseases.[6,7,10]

Similar to what was found in this study, when analyzing the question that relates the temporal trend of CVD in the age group from 40 to 59 years of age, a decrease in the mortality rate is identified in both men and women[5,10,15,16]

The aspects that support these facts are related to changes in eating habits, such as increased intake of polyunsaturated fats, moderation in alcohol consumption, improvement in socioeconomic conditions that occurred both in this and in previous age groups, attention to supports in medical technologies and the reduction of smoking[2,5,6,7,10,14,15]

The increase in mortality in the elderly from CVDs is mainly related to increased life expectancy and greater access to health care. The presence of other comorbidities further increases the complexity of CVD in this age group, both for patients and professionals. The diagnosis and management of these diseases in this group is more difficult due to the heterogeneity of patients, accumulation and progression of chronic and acute conditions, functional status, polypharmacy, and social factors.[5,6,7,10,14,16-20].

The possible limitations found in this ecological study are due to the use of secondary data sources: problems of underreporting, misclassification and estimation of population numbers[7]

CONCLUSION

Despite the reduction in mortality from CVDs in most age groups in the state, individuals over 60 years of age still represent the main risk group for cardiovascular diseases. Therefore, it is still necessary for the authorities of the State of Mato Grosso to invest more in public policies that favor the reduction of the mortality rate for CVDs in the elderly population.

However, in order to avoid an increase in the prevalence of deaths from CVDs in people over 60 years of age, risk factors present in childhood, adolescence and adulthood must be avoided, as they tend to persist until adulthood, increasing the risk of morbidity and mortality in adulthood.

Thus, strategies must be adopted for early detection and adherence to the treatment of chronic diseases and changes in life habits, such as healthy eating and encouraging sports practice, as well as moderation in the use of alcohol and tobacco.

INTEREST CONFLICTS

The authors declare no conflicts of interest. They are responsible for the content and writing of the article. There were no sources of funding.

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