Article

Overview of mortality due to chronic rheumatic heart disease between 2017 and 2021, in Rio Grande do Sul*

Panorama da mortalidade por cardiopatia reumática crônica entre 2017 e 2021, no Rio Grande do Sul

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ABSTRACT: Introduction: Chronic rheumatic heart disease is a complication of rheumatic fever (RF), a disease that results from pharyngotonsillitis, causing acquired heart disease in young people and can lead to valvular sequelae and death. The objective of the study is to evaluate mortality from rheumatic heart disease in Rio Grande do Sul, with emphasis on voluntary involvement, and to analyze a possible association between age group and sex. **Material and Methods:** This research consists of a cross-sectional study using the database of the Department of Information Technology's Unified Health System (DataSUS). Deaths from rheumatic heart diseases were included, divided by sex and age, during the period from 2017 to 2021 in Rio Grande do Sul. For statistical analysis, the Chi-Square test (χ^2) was used, using the software SPSS. **Results:** 321 deaths from rheumatic valve disease were found between 2017 and 2021, the majority of which were caused by mitral valve disease. Women had a higher number of deaths from mitral valve disease and men from other heart diseases. Regarding the age group, deaths due to mitral valve disease were more prevalent among those aged 40 to 49 years, while in tricuspid valve disease, there was a greater association with individuals aged 80 years or older. In other diseases, no association was demonstrated. **Conclusion:** From this, an association was established between sex and age group in the incidence of rheumatic heart disease among the studied population. Therefore, a more comprehensive therapeutic approach is needed, associated with the development of campaigns that publicize the importance of correct treatment in order to reduce mortality rates.

KEY WORDS: Rheumatic diseases; Mitral valve; Aortic valve; Public health.

RESUMO: Introdução: A cardiopatia reumática crônica é uma complicação da febre reumática (FR), doença que sucede quadro de faringoamigdalite, sendo causa de cardiopatia adquirida em jovens e pode evoluir com sequelas valvares e morte. O objetivo do estudo é avaliar a mortalidade por cardiopatia reumática nos gaúchos, com destaque para o acometimento valvar e analisar possível associação entre faixa etária e sexo. **Material e Métodos**: Esta pesquisa consiste em um estudo transversal com uso do banco de dados do Departamento de Informática do Sistema Único de Saúde (DataSUS). Incluiu-se os óbitos por doenças reumáticas cardíacas, divididas por sexo e idade, durante o período de 2017 a 2021, no Rio Grande do Sul. Para a análise estatística, empregou-se o teste Qui-Quadrado (χ^2), sendo utilizado o software SPSS. **Resultados**: Encontrou-se 321 óbitos por doença valvar reumática entre 2017 e 2021, dos quais a maioria foram ocasionados por valvulopatia mitral. As mulheres apresentaram maior número de óbitos por valvulopatia mitral e os homens por outras cardiopatias. Referente à faixa etária, os óbitos por valvulopatia mitral foram mais prevalentes entre os 40 a 49 anos, já na valvulopatia tricúspide houve maior associação com indivíduos de 80 anos ou mais. Nas demais doenças, não se demonstrou associação. **Conclusão**: A partir disso, estabeleceu-se uma associação entre sexo e faixa etária na incidência de cardiopatias reumáticas entre a população estudada. Dessa forma, é necessário uma abordagem terapêutica mais abrangente associada à elaboração de campanhas que divulguem a importância do tratamento correto a fim de reduzir os índices de mortalidade.

PALAVRAS-CHAVE: Doenças Reumáticas; Valva Mitral; Valva Aórtica; Saúde Pública.

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INTRODUCTION

Rheumatic heart disease (RHD) is a long-term consequence of a heightened immune response to the bacterium *Streptococcus pyogenes* (group A beta-hemolytic streptococcus), found in cases of pharyngitis or impetigo, that, when left untreated, leads to scarring and dysfunction of heart valves[1]. This condition remains a prominent cause of cardiovascular disease in underdeveloped countries, accounting for approximately 15% of all patients with heart failure (HF) in endemic countries[2]. The condition has a biphasic nature. The acute phase presents with arthritis, carditis, chorea, and cutaneous and subcutaneous lesions, as well as myocarditis, which occurs in 50% of patients. Among these cases, 50% progress to chronic carditis, a late-stage manifestation characterized by mitral and/or aortic valve disease[3].

Epidemiologically, RHD primarily affects individuals residing in poverty, lacking adequate healthcare access, and subjected to uncontrolled exposure to the etiological agent[4]. The influence of socioeconomic status was demonstrated in a study conducted by Bayecula et al. in the city of Kinshasa (Democratic Republic of Congo). The study assessed 4,848 children attending schools in both central and peripheral areas of the municipality, and revealed a prevalence of rheumatic heart disease of 14.03/1,000, with a higher incidence among children attending schools in the outskirts (22.2 per 1,000) compared to those studying in the central zone (4 per 1,000)[5].

Since 1955, the World Health Organization has recommended treating pharyngotonsillitis caused by Group A β-hemolytic Streptococcus with Benzathine Penicillin G (PGB) within nine days of symptom onset, which can eradicate the infection and prevent initial or recurrent acute episodes of rheumatic fever. Unfortunately, the expected outcomes do not seem to be achieved in Brazil, as indicated by analyses of the Hospital Information System (SIH) of the Unified Health System (SUS)[4]. The prevalence of rheumatic carditis in Brazil is unknown; however, data indicates that it is a frequent and underdiagnosed disease. It is estimated that, in Brazil, there are 10 million cases of streptococcal infection per year, of which 30,000 progress to rheumatic fever and 15,000 to RHD, generating significant expenses for the country's SUS[6].

A study conducted by Figueiredo et al. (2018) presented a model outlining the disease burden and expenses associated with rheumatic fever (RF) and RHD, using data from the Brazilian Hospital Information System (SIH). Their findings revealed that mortality rates from RF and RHD increased by 215% and 42.5%, respectively, from 1998 to 2016. Additionally, the estimated cost for procedures associated with RF/RHD, interventions such as valve surgery, and hospitalizations for RHD complications such as stroke and endocarditis, amounted to approximately US$27 million in 2019[6].

Chinelatto and Reis (2023) found that rheumatic heart disease is more prevalent among females across all regions of Brazil, except for the Southeast Region. Data from the state of Minas Gerais indicates that out of 6,631 hospitalizations recorded between 2016 and 2022, 538 resulted in fatalities, representing an average mortality rate of 8.3[7]. An analysis conducted by Sarraf, Barros and Ribeiro (2018) using data from the state of Bahia found that death attributed to chronic rheumatic heart disease was prevalent among the female population, though the gender disparity was not significant, and neither was the reason for the deaths in this population. Regarding age demographics, there was a predominance of individuals aged between 40 and 49 years, with mortality rates being notably higher among those aged over 60 years[8]. In this context, RF remains a neglected disease, and the prevalence of chronic RHD poses a significant public health challenge, entailing substantial social and economic costs.

OBJECTIVES

This study employs metadata analysis with the objective of evaluating mortality attributed to rheumatic heart disease within the population of the state of Rio Grande do Sul, from 2017 to 2021, with emphasis on assessing valve involvement and investigating potential associations of mortality with age groups and gender.

METHODS

This is a cross-sectional study using the TabNet tool database, provided by the Department of Informatics of the Unified Health System (DataSUS). Deaths attributed to rheumatic heart diseases were included, with the corresponding codes from the 10th edition of the International Classification of Diseases (ICD-10): I05 (Rheumatic mitral valve diseases), I06 (Rheumatic aortic valve diseases), I07 (Rheumatic tricuspid valve diseases), I09 (Other rheumatic heart diseases). The data referring to the period from 2017 to 2021, in the state of Rio Grande do Sul, were stratified by gender and age. The information collected were stored in an Excel spreadsheet.

The statistical analysis was conducted using the SPSS software (IBM Statistics). The categorical variables (Gender; Age group), as well as the four categories of rheumatic diseases (CID-10 I05, I06, I07, and I09), were analyzed using the Chi-square test (χ^2) with adjusted residual z, employing a post-hoc criterion for residual values of ±1.96. A significance level of P≤0.05 was considered statistically significant.

Since the research used publicly available information, it was exempt from submission to an Ethics Committee.

RESULTS

In the state of Rio Grande do Sul, a total of 321 deaths were attributed to rheumatic valve disease between 2017 and 2021. Among these deaths, 72.3% were caused by mitral valve disease, 10.6% by aortic involvement, 9.3% by tricuspid valve involvement, and 7.8% by other rheumatic heart diseases. The year with the highest number of deaths from chronic rheumatic heart disease was 2021, while the lowest number occurred in 2018. This data suggests that there was no observable progressive trend of increased mortality over the period, as detailed in Table 1.

Table 1 - Deaths by Residence by Year of Death according to ICD-10 Category

ICD-10 Category	2017	2018	2019	2020	2021	Total
TOTAL	72 (22,4)	51 (15,9)	55 (17,1)	59 (18,4)	84 (26,2)	321 (100)
I05 Rheumatic mitral valve diseases	55 (23,7)	30 (12,9)	40 (17,3)	45 (19,4)	62 (26,7)	232 (100)
I06 Rheumatic aortic valve diseases	9 (26,5)	13 (38,2)	5 (14,7)	4 (11,8)	3 (8,8)	34 (100)
I07 Rheumatic tricuspid valve diseases	2 (6,7)	3 (10)	7 (23,3)	9 (30)	9 (30)	30 (100)
I09 Other rheumatic heart diseases	6 (24)	5 (20)	3 (12)	1 (4)	10 (40)	25 (100)

Data provided by DataSUS. The percentage values are arranged horizontally, in their respective lines.

The analysis of deaths by age group using the Chi-Square test revealed an association between age group and rheumatic diseases ($X^2 =36.41$; df =24; p=0.05). A higher frequency of deaths attributed to rheumatic mitral valve diseases was observed in the age group of 40 to 49 years. Additionally, individuals aged 80 years and older exhibited a higher expected frequency of rheumatic tricuspid valve diseases. No significant difference in frequencies among age groups was observed for other rheumatic diseases, as shown in table 2.

Table 2 - Deaths by Residence by Age Group according to ICD-10 Category, in the years 2017 to 2021

ICD-10 Category	10 - 14	15 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 or more	Total
TOTAL	1 (0,3)	3 (0,9)	6 (1,9)	3 (0,9)	25 (7,8)	45 (14,1)	77 (24)	88 (27,4)	73 (22,7)	321 (100)
I05 Rheumatic mitral valve diseases	1 (0,4)	2 (0,9)	3 (1,3)	2 (0,9)	23 (9,9)	32 (13,8)	55 (23,7)	68 (29,3)	46 (19,8)	232 (100)
I06 Rheumatic aortic valve diseases	-	1 (2,9)	-	-	1 (2,9)	3 (8,8)	7 (20,6)	10 (29,4)	12 (35,3)	34 (100)
I07 Rheumatic tricuspid valve diseases	-	-	1 (3,3)	-	-	4 (13,3)	5 (16,7)	6 (20)	14 (46,7)	30 (100)
I09 Other rheumatic heart diseases	-	-	2 (8)	1 (4)	1 (4)	6 (24)	10 (40)	4 (16)	1 (4)	25 (100)

Data provided by DataSUS. The percentage values are arranged horizontally, in their respective lines. The Age Range is arranged based on years of age.

As for the gender distribution, the Chi-Square test revealed an association between gender and rheumatic diseases ($X^2 =8.14$; df =3; p=0.04). A higher frequency of deaths attributed to rheumatic mitral valve diseases was observed in women, whereas a higher frequency of deaths due to other rheumatic heart diseases was expected in men. There was no significant difference between the groups for other rheumatic diseases during the years analyzed, as shown in Table 3.

Table 3 - Deaths by Residence by Gender according to ICD-10 Category, in the years 2017 to 2021

ICD-10 Category	2017		2018		2019		2020		2021	
	M	F	M	F	M	F	M	F	M	F
TOTAL	26	46	16	35	24	31	20	39	32	52
I05 Rheumatic mitral valve diseases	17	38	9	21	16	24	14	31	29	42
I06 Rheumatic aortic valve diseases	6	3	4	9	3	2	3	1	1	2
I07 Rheumatic tricuspid valve diseases	1	1	1	2	3	4	2	7	4	5
I09 Other rheumatic heart diseases	2	4	2	3	2	1	1	-	7	3

Data provided by DataSUS. The percentage values are arranged horizontally, in their respective lines. ''M'' refers to the male gender and ''F'' to the female gender.

DISCUSSION

RHD is one of the most prevalent non-communicable diseases in low- and middle-income countries, being responsible for over one million deaths annually. Despite the availability of therapies that could prevent much of its morbidity and mortality, their implementation remains challenging and varies significantly within and between countries. Moreover, there is a lack of recent data on the disease[9].

The advanced phase of the disease, which is associated with high mortality rates among individuals with symptomatic RHD (16.9% in two years), is common in endemic areas. The frequency of symptoms and the development of complications are directly correlated with the extent of valve involvement at the time of diagnosis[9]. Consequently, regions lacking access to imaging methods with high diagnostic sensitivity, such as echocardiography, are prone to unfavorable prognoses due to the limited availability of resources[10,11].

In Brazil, there is a rising trend in mortality rates attributed to RHD, with a notable increase of 27.3% between 2017 and 2019, as reported by Figueiredo et al. (2019)[6]. Even though the present study did not reveal an increase in mortality during the period analyzed, there are noteworthy observations concerning the characteristics of the deaths recorded in the state of Rio Grande do Sul.

It was found that most of the deaths recorded were among older adults, specifically in the age group of 70 to 79 years. Additionally, in the age group of 40 to 49 years, there was a higher frequency of deaths due to rheumatic mitral valve diseases when compared to other valves. Furthermore, mitral valve disease was associated with 73% of all deaths due to RHD in the present study. According to Passos et al. (2020), the mitral valve is affected in nearly all cases, suggesting that its anatomical characteristics may contribute to its preferential involvement in this disease, although the underlying mechanisms remain unknown[12].

The predominance of RHD among females is well documented, with studies like the REMEDY indicating that over 60% of cases occur in women, for example[9]. Another study mentioned earlier, by Chinelatto and Reis (2023), found a higher prevalence of the disease in females across all regions of Brazil, except for the Southeast[7]. In fact, this trend was further confirmed by the present study, which found a higher frequency of deaths from rheumatic mitral valve diseases among women. In contrast, deaths from other rheumatic heart diseases were more common in men.

The limitations of these findings include incomplete vital registration systems and the possibility of misclassifying deaths as resulting from other causes.

CONCLUSION

The present study revealed a total of 321 deaths from chronic rheumatic valve disease in the state of Rio Grande do Sul from 2017 to 2021, with the highest incidence in 2021, representing 26.2% of the total deaths analyzed. The data indicates that most deaths attributed to RHD in the 40 to 49 age group were associated with mitral valve involvement. The analysis of the distribution by gender showed that women were the most affected. Therefore, this analysis established an association between the number of deaths due to RHD and both gender and age group among residents of the state of Rio Grande do Sul between 2017 and 2021.

The epidemiological context is crucial for encouraging investments in public health policies aimed at implementing a more comprehensive and effective therapeutic approach to disease management and prevention. This is essential for reducing mortality rates attributed to rheumatic heart disease in this population and, consequently, alleviating the substantial burden on the financial resources of the SUS, considering this is a preventable chronic disease.

Therefore, a more comprehensive therapeutic approach, along with the development of awareness campaigns emphasizing the importance of proper treatment even during the acute phase, is necessary to reduce mortality attributed to rheumatic heart disease within this population.

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