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Profile of children and adolescents affected by chronic rheumatic heart disease in Brazil

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Abstract: Chronic rheumatic heart disease consists of a group of acute or chronic heart diseases that occurs as a result of rheumatic fever. Rheumatic fever is an inflammatory disease triggered by pharyngeal tonsillitis caused by the bacterium Streptococcus pyogenes. It is more frequent in children between 5 and 15 years of age. It can affect skin, joints, brain and heart. The most common complication is the damage to the mitral valve of the heart. To quantify the number of hospitalizations by age, sex and region of children and adolescents affected by chronic rheumatic heart disease. Through the database of the SUS Hospital Information System (SIH/SUS), the hospitalization forms for chronic rheumatic heart disease in Brazil were evaluated from 2016 to 2019, provided by DATASUS/Ministry of Health. The results showed that the most affected sex is female (57.57%), in the region the Southeast region stands out (41.34%). The city with the highest number of registered cases is São Paulo (19.55%), followed by Belo Horizonte (15.81%). Among the age group, it is the 10–14-year-old age group with the highest incidence, totaling 681 reported cases. This study expresses and proves that the female population is quite affected in Brazil. Among the cases analyzed, the female gender predominates in reported cases and the most affected age group is between 10 and 14 years. It was also evidenced that low educational level, as well as low income and poor basic sanitation are factors that influence the onset of the disease.

Keywords: Chronic rheumatic heart disease. Hospitalizations. Children. Teenagers

1. Introduction

Rheumatic heart disease (CR) consists of a group of acute or chronic heart diseases that has as its main cause rheumatic fever. Rheumatic fever (RF) is a systemic inflammatory disease triggered by an immune response to infection caused by the bacterium Streptococcus pyogenes1;2.

Acute RF usually occurs three weeks after pharyngeal tonsillitis, where treatment has not been done or was done incorrectly. Cardiac involvement is due to the inflammatory process affecting the three layers of the heart (pericardium, myocardium and endocardium), these mechanisms can affect coronary microvascular function and the regulatory mechanisms of myocardial blood flow, which may contribute to the development of the most severe form of the disease and/or myocardial ischemia and cardiovascular events. Chronic rheumatic heart disease (CRC) is characterized by fibrosis and valvular calcification, which cause structural deformities in the heart valves. The isolated lesion of the mitral valve is the most common, followed by the aortic valve3.

Currently it is estimated that there are 33 million people worldwide affected by chronic rheumatic heart disease (CKD). Developing countries have high prevalence rates of the disease, Mozambique is an example, with rates of 14 and 30/1000 inhabitants, Ethiopia and Africa comes soon after, with 26.5% and 2.4 – 10.2/1000 inhabitants, respectively10.

Brazil was considered a country with a mean prevalence of the disease with a rate of 3.6/1000 inhabitants in 2017, becoming one of the main causes of cardiovascular death in children and young adults, although it is a 100% treatable and totally preventable disease. In addition, socioeconomic inequality is the main barrier to disease prevention in developing countries. The World Health Organization (WHO) and the World Heart Federation have called for a 25% reduction in premature deaths from RF and CKD 4;5;6 by 2025.

The city of Recife occupies the 3rd place in incidence rate at the national level, totaling 1057 cases, second only to São Paulo, which occupies the 1st place, with 1862 cases representing (19.55%) and Belo Horizonte occupying the 2nd place, with 1506 cases representing (15.81%)8.

As measures to control chronic rheumatic disease, the Ministry of Health can adopt strategies such as medical care and educational programs in the school environment, which are able to identify indication of treatment and /or indication for prevention2.

RF and CKD represent a serious public health problem, being the main cause of death from cardiovascular diseases. This implies great health expenses because it is a chronic disease, which requires clinical follow-up and often a surgical approach is necessary9;10.

In view of the above, it is necessary to carry out this research, which aims to know the current profile of children and adolescents and quantify the number of those affected with chronic rheumatic heart disease in Brazil in the year 2016 to 2019.

2. Methodology

This is a descriptive and quantitative comparative cohort study, whose data were collected through the secondary database of the Hospital Information System (SIH/SUS), provided by DATASUS/Ministry of Health. The population consisted of the records in the records of hospitalization of the disease "CKD" in the SIH/SUS Database in Brazil in the year 2016 to 2019. The Informatics Department of the Unified Health System (DATASUS) provides information that can serve to support objective analyses of the health situation, evidence-based decision-making and the development of health action programs.

Data tabulation in the Informatics Department of the Unified Health System (DATASUS) was performed through SIH/SUS, which is fed by the notification of hospitalization for CKD disease, which is the target of the study. The variables studied in the CKD database were: gender, age group, region, year of notification, municipality of notification.

A Data Bank was built in the SPSS Statistical Program version 22 with the variables included in the study. For the analysis of these data, percentage calculations were used to observe the dispersion among the collected variables, analyzed by simple percentage. The information was analyzed through the SPSS version 22 program for data formatting.

3. Results and Discussion

There was a total of 7,323 (Figure 01), cases of rheumatic fever in Brazil from 2016 to 2019, this number increases when we relate the reported cases of chronic rheumatic heart disease in the same period, so we found a total of 23,036 cases (Figure 02). The city with the highest number of registered cases is São Paulo with 1862 cases representing 19.55%, followed by Belo Horizonte with 1506 registered cases, representing 15.81% (Table 1). There was a significant number of cases in the Southeast region, 9524 cases recorded, reaching 41.34% (Table 2). The female gender had a high incidence, totaling 21488 cases, reaching 57.57% in the period from 2016 to 2019 (table 3). Among the age group, it is the 10-14 years that had the highest prevalence, totaling 681 reported cases (Table 4).

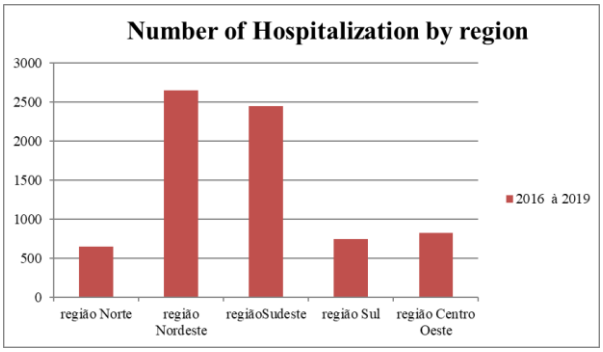

Figure 01. Number of rheumatic fever hospitalizations per region in 2016 to 2019. **Source**: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019

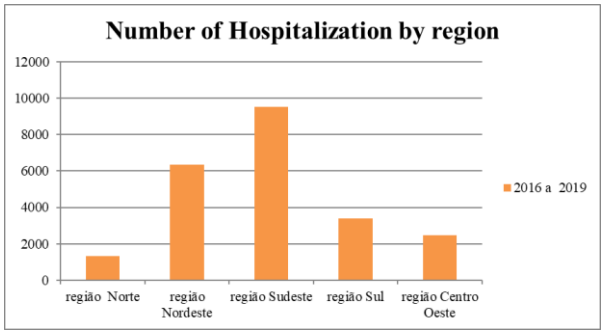

Figure 02. Number of hospitalizations for Chronic Rheumatic Heart Disease by region in 2016 to 2019. **Source**: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019.

Table 1. Distribution of CKD by capital in the period 2016 to 2019

Municipality	Admissions
Porto Velho	34
Rio Branco	96
Manaus	466
Boa Vista	9
Belém	413
Macapá	75
Palmas	19
São Louis	230
Teresina	455
Fortaleza	704
Natal	213
Joao Pessoa	374
Recife	1057
Maceió	420
Aracaju	234
Salvador	1311
London	1506
Vitoria	112
Rio de Janeiro	735
Sao Paulo	1862
Curitiba	280
Florianópolis	27
Porto Alegre	511
Campo Grande	229
Cuiaba	208
Goiânia	1002
Brasilia	619
Total	13201

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019

Table 2. Distribution by CKD region in Brazil from 2016 to 2019.

Regions	Admissions	%
North	1308	5,67

Northeast	6343	27,53
Southeast	9524	41,34
South	3379	14,66
Midwest	2482	10,77
Total	23036	100

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019

Table 3. Distribution by gender of CKD in Brazil from 2016 to 2019.

Year	Male	Female
2016 to 2017	6434	8616
2017 to 2018	5964	8224
2018 to 2019	3338	4648
Total	15736	21488

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019.

Table 4. Distribution by CKD age group in Brazil from 2016 to 2019

Age group	2016 to 2017	2017 to 2018	2018 to 2019	Total
Less than 1 year	81	90	62	233
1 to 4 years	99	107	69	275
5 to 9 years	153	127	67	347
10 to 14 years	259	263	159	681

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019.

Table 5. Male distribution by ckd age group and region in Brazil from 2016 to 2019.

Age group	North	Northeast	Southeast	South	Midwest	Total
Less than 1 year	27	27	37	13	16	120
1 to 4 years	18	40	40	10	21	129
5 to 9 years	17	82	56	14	22	191
10 to 14 years	33	102	88	25	29	277

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019.

Table 6. Female distribution by ckd age group and region in Brazil from 2016 to 2019

Age group	North	Northeast	Southeast	South	Midwest	Total
Less than 1 year	22	24	35	12	20	113
1 to 4 years	22	45	45	8	16	136
5 to 9 years	17	46	51	12	31	157
10 to 14 years	35	153	112	16	33	349

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019

Table 7. Distribution of municipalities with the highest number of CKD cases from 2016 to 2019

Municipality	Number of cases
Sao Paulo	1862
London	1506
Recife	1057
Maceió	420
Vitória da Conquista	342
Aracaju	234
São José do Rio Preto	196
Sorocaba	144
São Carlos	50
Barbacena	49
São José dos Campos	37
Santos	28
Petrolina	24
São José do Rio Pardo	18
Santo André	17
São Bernardo do Campo	10
Arapiraca	10
Taboão da Serra	10

Source: Ministry of Health/SVS - Hospital Information System - SIH/SUS Net. Accessed: 27/04/2019.

CKD continues as a global health hazard, reaching millions of cases in annual incidence rates, with progression to death. CKD reports show significant and alert data for public health, as there is a gradual evolution in the three years observed. Ending CKD is a challenge, it is estimated that by 2025 there will be a 25% reduction in mortality rates8,10.

It was observed that in total there is a higher incidence of CKD in females, however different results were perceived in other studies, where it has a higher incidence in males, however our study shows a relevant difference between the sexes, reaching 15%8,11,17.

Pernambuco is in an endemic area and can confirm through the high notification rates that increases every year, this can be confirmed through the database to which our research is based, the Hospital Information System / SIH provided by DATASUS /SUS8.

Schooling was also evidenced as a risk factor for acquiring CKD, because the higher prevalence rate is associated with low education, a characteristic of low- and middle-income countries, which can be observed in a report by other authors, who show that the less educated the population is in relation to the onset of the disease, the higher the risk of illness will be, thus confirming our studies13,14.

CKD appears to be the leading cause of cardiovascular mortality in children and young adults reported with the disease. There are approximately 33 million affected by CKD, about 4 million disabilities and/or premature deaths. Although there is an effective treatment widely available in the public

health network and is a totally preventable death, there is still a high number of affected 15,16.

Regarding the socioeconomic factors that influence both the onset and severity and evolution of the disease, the lack of basic sanitation leads, followed by lack of education of the population and low income5,6,7.

When we relate the type of population exposed, the rural population stands out with the highest rates, low income and with little or no education, typical of developing countries11,12,13.

Among the strategies for achieving global prevention goals, it is necessary to integrate a set of surveillance actions, which identify the points of capture and notification of new cases of the disease. Health information should aim to reduce uncertainties and the identification of priority situations with a view to supporting an adequate planning for the execution of actions that condition reality to the necessary transformations10,17.

The treatment of CKD is free through the single health system; however, its efficacy is questionable, due to the fact that the population has a deficiency regarding information about when and how this treatment should be performed1,2,4,5.

It is extremely important to monitor the clinical evolution of CKD, through follow-up tests, since it has no cure, however it can be controlled. A good prognosis depends a lot on the time of patient involvement by the disease10,17.

CKD is a chronic disease, which has as its main determinant factor rheumatic fever. This, in turn, has as a triggering factor the pharyngeal tonsillitis caused by the bacterium Streptococcus pyogenes, which annually affects thousands of people. Although treatment is offered free of charge by the Ministry of Health, there is still a significant increase in incidence rates, and evolutions for deaths due to the disease, which may attribute this to socioeconomic and environmental factors, such as: lack of resources in medical care, inadequate treatment, lack of knowledge of cases in the community and lack of training of the health team are some examples that influence the severity of the disease1,2.

Given the above, it is necessary to plan strategic actions to control CKD and reduce these numbers, and if this surveillance allows the adoption of measures aimed at interrupting its evolution. Another relevant point is the process of producing the information, because there are failures in filling out the notification form in some variables, thus which may compromise a safe monitoring.

In turn, it is suggested to carry out educational campaigns that aim to guide the population about the disease, its treatment and means of prevention, as well as the training of health teams in order to fill out the notification forms adequately. Other forms of action to reduce CKD cases is to invest in improvements in infrastructure, basic sanitation, family income, food and early treatment.

4. Conclusion

The present study expresses and proves that the female population is quite affected in Brazil. Among the cases analyzed, the female gender predominates in reported cases and the most affected age group is between 10 and 14 years. It was also evidenced that low educational level, as well as low income and poor basic sanitation are factors that influence the onset of the disease.

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