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PREVALENCE OF THE TRANSMISSION TYPE OF CHAGAS DISEASE IN THE BRAZILIAN AMAZON

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Abstract: Chagas disease (CD) is caused by the protozoan Trypanosoma cruzi, whose transmission involves triatomine insects. However, in the Brazilian Amazon there is a predominance of oral transmission through the ingestion of food contaminated with Trypanosoma cruzi. Brazil is one of the largest endemic centers of Chagas Disease in Latin America, and this disease is associated with human actions. An ecological, cross-sectional and retrospective study was designed. The number of diagnosed cases of Chagas Disease in the states of the Brazilian Amazon from 2009 to 2019 were analyzed. The North Region had 2,832 cases of CD in the period in question, corresponding to 94.3% of the total cases in the country. Pará was the state with the highest number of cases (2,251), followed by Amapá (161) and Amazonas (138). Oral transmission was the main means of transmission (76.2%), followed by vectorial (8.43%) and vertical (0.39%). In this scenario, the consumption of açaí was the factor associated with the highest number of cases in the region, since the pulp of this food can be contaminated by waste from reservoir animals or vectors. Thus, the handling of açaí must be carried out properly to prevent this public health problem. Still, it is necessary to carry out further studies in the affected regions, evaluating such preventive measures.
Keywords: Chagas disease, Prevalence, Amazon ecosystem.

INTRODUCTION

Chagas disease (CD) is by definition a parasitic disease caused by the transmission of the protozoan Trypanosoma cruzi. It is estimated that 6 to 7 million people worldwide are infected, and the disease is found mainly in endemic areas of continental Latin American countries (MEDEIROS, 2022). Although triatomine insects are the primary vectors of CD transmission, the oral route through contaminated food was considered the main means of transmission in the Brazilian Amazon (ORTIZ, 2021). Oral transmission has been associated with the consumption of food contaminated with triatomines, their feces, or the ingestion of raw or undercooked meat from reservoirs of infected wild mammals. Among the contaminated foods, due to their wide distribution in the Amazon Basin, açaí (Euterpe oleracea) and bacaba (Oenocarpus bacaba) fruits stand out in terms of the microepidemiology of family outbreaks. In this area, the majority of the population consumes any of these fruits prepared as juice, characteristic of the local culture. (COSTA, 2017).

Brazil is one of the most important endemic centers in Latin America, with 1,190 cases of acute Chagas disease (ACD) reported between 2012 and 2016, 1,156 of them in the North region. It is important to highlight that the presence of the disease is intrinsically linked to areas altered by human actions. In the Brazilian Amazon, deforestation, intense human migration to endemic areas and the diversity of hosts and vectors of T. cruzi have favored the occurrence of outbreaks of Chagas disease in the region (PEREIRA, 2021).

With the control and reduction of intradomiciliary vector transmission (typically by the barber Triatoma infestans, the main vector in the country) and the control of transmission by blood transfusion, the incidence of CD has been drastically reduced in recent years in Brazil. However, there are still a large number of people living with chronic forms of the disease in the country. In addition, due to the lack of up-to-date national or regional serological surveys of T. cruzi infection in the general population, there is no accurate estimate of CD prevalence in Brazil, a worrying lack of information considering that it is among the

top four causes of death from infectious and parasitic diseases in Brazil (MELO, 2021).

Acute infection by T. Cruzi, although usually asymptomatic, can present several signs and symptoms, such as Romanã's sign, hepatosplenomegaly, fever and myalgia (SIMÕES, 2018). The degree of suspicion, therefore, needs to be high for the disease to be recognized at this point. The diagnosis can be made, in the first weeks, with tests that directly detect the parasite in the human circulation, either by blood culture, direct visualization or others. After the first few weeks, serological tests are sufficient to determine the infection (DE SOUSA LIMA, 2019).

The chronic phase of CD can be divided into 4 presentations: cardiac, intestinal, indeterminate (asymptomatic despite parasitologically proven infection) and mixed (NUNES, 2018). Cardiomyopathy induced by Trypanosoma cruzi infection, which results in low-intensity fibrosing myocarditis, can lead to syndromes such as heart failure, arrhythmias, angina and thromboembolic manifestations. The intestinal form of Chagas disease possibly derives from the destruction of the myenteric plexuses of Auerbach and Meissner, causing dilation of organs such as the esophagus (megaesophagus) and colon (megacolon), leading to dyspeptic symptoms (DO CARMO NETO, 2021).

In view of the above, the relevance of Chagas Disease in the contemporary scenario is clear, in addition to the need to gather information about the prevalence of this infection in its main region in Brazilian territory, to help, in some way, the elaboration of strategies to contain dissemination and recognition of the main types of transmission of the aforementioned disease.

METHODOLOGY

This is an ecological, cross-sectional and retrospective study based on the analysis of secondary data such as: States with the highest prevalence and modes of infection (oral, vectorial, vertical and accidental) provided by the Department of Informatics of the Unified Health System (DATASUS), such data will refer to the years 2009 to 2019.

The number of cases of Chagas Disease notified in the states that make up the North region, entirely inserted in the Brazilian Amazon, in the period between 2009-2019, considering the mode of transmission, based on official information made available on DATASUS, was analyzed.

All cases of Chagas disease diagnosed in the Brazilian Amazon (referring to the states of the northern region of Brazil) within the aforementioned period and whose data were made available in DATASUS were included in the research.

Data were analyzed descriptively, using the BioStat 5.3 program, adopting a confidence level of $p < 0.05$, which provided information for the preparation of tables and graphs in Microsoft Office Excel 2016 and Microsoft Office Word 2016.

RESULTS

Region	n	%
North	2.671	94,3%
TOTAL	2.832	100%

TABLE 1 – Total value of cases in relation to the North Region.

SOURCE: DATASUS.

State*	Number	%
Pará	2.251	79,48%
Amapá	161	5,68%
Amazonas	138	4,87%
TOTAL	2.832	100%

*Acre, Rondônia, Roraima and Tocantins: no case notification

TABLE 2 – States with the highest number of cases

SOURCE: DATASUS

Kinds	n	%
Oral	2.158	76,2%
Vector	239	8,43%
Upright	11	0,39%
Accidental	5	0,18%
Ignored/White and others	419	14,8%
TOTAL	2.832	100%

TABLE 3 – Total value of probable routes of infection.

SOURCE: DATASUS.

DISCUSSION

Oral transmission of Chagas disease had a significant predominance among the cases reported during the study period, corresponding to more than half of the sample (76.2%). This expressive amount was also found in an epidemiological bulletin carried out by the Ministry of Health in 2021, where the form of oral transmission represented 75.34% of the reported cases in Brazil.

According to the epidemiological bulletin on acute Chagas Disease of the Ministry of Health (2019), in Brazil, the largest proportion of cases historically belong to the North Region and in this bulletin the region presented 97.1% of Brazilian cases, highlighting Pará as the state with the highest incidence (2.9/100,000 inhabitants). In the present study, of the 2,832 cases reported in Brazil, 2,671 (94.3%) were registered only in the North Region, constituting an endemic character.

Studies have shown that açaí is the food associated with the highest number of cases of Chagas disease in recent years, and this fact is related to pulp contamination by waste from reservoir animals or infected vector insects from endemic areas. (Carvalho et al, 2018).

The warning that T. cruzi can resist being transported to other locations may justify the involvement of açaí in the transmission of Chagas Disease in other regions of Brazil and the world, since it is imported from the states of the North region. This way, the handling of this food has become a public health problem, which can harm its commercialization, especially in the international market (Cardoso et al, 2021).

Regarding vector transmission, the insects best known as triatomines, due to the name of the subfamily Triatominae, are the classic vectors of the disease. And, despite the program developed by the World Health Organization (WHO) to eradicate vectors, whether through chemical means, improvement of the population's housing conditions or the promotion of health education, transmissions through vectors still present themselves as an important way of dissemination of the disease (SILVA, Brígida Adriene Muniz et al, 2021).

Vertical transmission of CD was also found by the study, representing 0.39% of the probable transmission routes within the studied period. It occurs mainly due to the transient depression of the immunity of the pregnant woman, which predisposes to greater susceptibility to infection and occurs via the transplacental hematological route, where it will proliferate in its amastigote form and can generate negative outcomes for the mother and the fetus. (RAMOS, C. L. P. et al.)

CONCLUSION

Chagas disease continues to be a parasitic disease of notable importance, which, despite improvements in the fight against the parasite and the clarification of forms of prevention, have increased over the last few years. That said, oral contamination stands out from other forms of dissemination. In addition, the Northern region of Brazil still remains as the most affected by the disease. Therefore, robust studies are needed within the most affected regions that aim to assess whether prevention and surveillance against oral contamination is being carried out properly.

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