AN OVERVIEW OF VISCERAL LEISHMANIASIS IN THE CITY OF GURUPI, SOUTH REGION OF TOCANTINS

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Abstract

Visceral leishmaniasis (VL) is an endemic disease in the region of Gurupi, with higher prevalence in the pediatric age group, aggravated by the high morbidity and low prophylaxis and prevention strategies of this anthropozoonosis. To characterize the data reported in the municipality of Gurupi - TO in the years

2013 to 2020 and to outline the epidemiological profile of the disease by determining the risk factors for high prevalence of the disease in this locality. This is a cross-sectional descriptive epidemiological research, retrospective and documental based, extracted from the database of SINAN (Notifiable Diseases Information System) of Gurupi in the interval between 2013 and 2020. Evaluative questionnaires were applied to all patients notified and found, analyzing the variables described in the study and subsequent statistical application of the chi-square test. In the city of Gurupi, the most affected age group was between 2 and 9 years (37.29%); the most affected gender was male (66.10%); the year of highest prevalence was the year 2017 a total of 37.28% of cases in the analyzed period; and the location of highest prevalence in the municipality were the neighborhoods farthest from the city center.   As for the probable sites for contamination, most people point to their own home as a source of contamination. The epidemiological cut shows the prevalence of VL in the city of Gurupi and highlights the need for preventive intervention protocols for the prevention of the disease in endemic areas to decrease morbidity and mortality and control the number of cases.

Descriptors: Epidemiology, visceral leishmaniasis, prevalence.

INTRODUCTION

Visceral leishmaniasis (VL) is an infectious and systemic disease caused by protozoa of the genus *Leishmania*, transmitted by the bite of infected female sand fly mosquitoes (straw mosquitoes, birigui etc.), whose main reservoir is the dog. It is an important public health problem, since untreated cases lead to lethality of 90% (1;2). It has a wide distribution worldwide, being more prevalent in tropical and subtropical regions or temperate regions, thus generating one of the biggest challenges for global public health among the zoonoses transmitted by vectors, and man as an accidental reservoir (3).

Over the years, the Northeast Region had the highest incidence (cases per 100,000 inhabitants) of VHL in Brazil, particularly in the states of Piauí and Maranhão. However, in the period from 2007 to 2014, the North Region surpassed the Northeast Region in LVH incidence, due to the high incidence in the State of Tocantins (4).

In Tocantins, 3,015 cases and a total of 152 deaths were recorded from 2009 to 2018, expressive numbers compared to Brazil, which recorded 37,499 and 2,620 deaths in the same period (5; 6; 7).

The disease is more frequent in children under 10 years old (41.9%) and males are proportionally the most affected (62.8%) (1; 8).

Currently, the control of the disease has been done by adopting basic measures such as: the treatment of human cases, euthanasia of seropositive dogs, reduction of the vector population through the application of insecticide in homes, and elimination of risk factors (9; 10; 11; 12).

Despite efforts to combat human visceral leishmaniasis, it has been increasing significantly in urban and peri-urban areas of the tropics. Data from the Ministry of Health (MH) in 2015 evidenced the State of Tocantins in first place in the national ranking (13; 2; 11).

Clinically, VL presents itself in a generalized form, with chronic and systemic evolution, and can reach 90% mortality if not properly treated (14). In humans, fever is the most evident symptom, being of irregular

type and long duration, followed by hepatosplenomegaly, muscle atony, anemia, signs of protein-calorie malnutrition, varying with other less frequent manifestations (15).

The hemorrhages are usually secondary to thrombocytopenia, being epistaxis and gingivorrhage the most found and digestive hemorrhages and jaundice indicate severity of the case. That is why, 90% of cases when left untreated, can evolve to death (16).

In relation to risk factors, the association with comorbidities and the presence of complications collaborate to the increase of lethality by the pathology. Among the comorbidities, malnutrition and late diagnosis of the disease stand out; as for the complications, we can point out the bacterial infections mainly by *Staphylococcus aureus* and *Pseudomonas aeruginosa* and hemorrhages (14; 17).

Due to the nonspecificity of symptoms and the broad differential diagnosis of visceral leishmaniasis, complementary methods are needed to diagnose this condition (18). The diagnostic methods can be direct, which include the identification of amastigotes in bone marrow, spleen, liver or lymph node aspirates; isolation in culture; polymerase chain reaction; and indirect methods, which include serology (ELISA or indirect immunofluorescence-IFI) and immunochromatographic test, using the recombinant antigen rK39 (19).

Pentavalent antimonials have been used for the treatment and, in Brazil, the marketed one is N-methyl glucamine antimonate (Glucantime®) as the first-choice drug, and amphotericin B and derivatives as second choice drugs, according to the Ministry of Health (20; 10).

The use of spatial analysis is an alternative that contributes to the understanding of the dynamics of the disease, since it allows mapping and identifying areas at higher risk for the occurrence of new cases (21). From this perspective, epidemiological studies that address the spatial patterns of VL distribution have been widely used (22).

Thus, the present work performed a spatial analysis of cases in humans of visceral leishmaniasis in Gurupi -TO, in the period from January 2013 to December 2020, with the aim of expanding the knowledge about the epidemiological aspects of the disease, diagnosis and treatment conducts with data that can subsidize the construction of effective public policies aimed at the prevention and control of VL in the municipality.
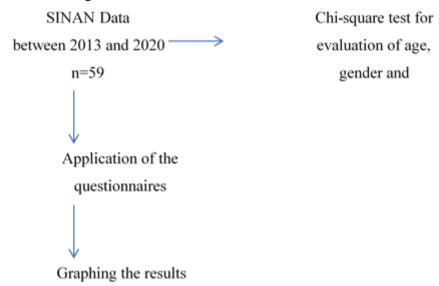

METHODOLOGY

It comprises a descriptive, retrospective, cross-sectional epidemiological research based on a document extracted from Gurupi SINAN (Information System for Notifiable Diseases) database in the interval between 2013 and 2020. Data were collected between February 2021, covering all occurrences of visceral leishmaniasis, proven and reported to the SINAN database, between January 2013 and December 2020. This research is possible a substantiated opinion of the Ethics Committee for Research with Human Beings of the UnirG University Center (CEP-Unirg) with the number of the opinion: 3.993.748 (Annex 1).

Subsequently, questionnaires were applied to the patients who were located by their registration data in the SINIAN notification lists to evaluate the most frequent symptoms, the performance of confirmatory tests, places suspected by the patient of contamination with the disease, animals raised in their homes, in those of their neighbors or at work, whether tests were performed on these domestic animals and what was the conduct if the result was positive, in addition to whether the patient received a visit from the zoonosis

center, whether any guidance was provided by a health professional and whether the patient is preventing the disease.

The statistical investigation was performed using the chi-square test of adherence to verify whether or not there was divergence between the arithmetic mean of confirmed cases of visceral leishmaniasis, expected values, and the number of cases observed in the SINAN data. Subsequently, if there was evidence of significant differences between these two values ($p<0.05$), the Residuals Analysis test was performed to demonstrate in which segments the greatest divergence between the expected and observed values occurred. Data were tabulated using Excel 2019 software.

SINAN Data
between 2013 and 2020 ⟶
n=59

Chi-square test for
evaluation of age,
gender and

↓

Application of the
questionnaires

↓

Graphing the results

RESULTS AND DISCUSSION

During the research, a high number of cases of VL were reported in the SINAN platform, thus fomenting a great quantity of morbidity of the disease in Gurupi-TO, an endemic region for this disease.

According to data from the World Health Organization, VL reaches 5000,000 cases with a mortality rate of 59,000 per year in Brazil. It is estimated that 96% of reported cases are in Brazil, with 3.2% in Paraguay, followed by 0.4% in Colombia (18).

In a global perspective, it is known that VL affects approximately 50 to 90 thousand people per year (23). At the national level in Brazil, VL has high incidence and lethality rates, with a greater territorial expansion of the disease to areas and localities not previously affected by the disease. (18; 22).

In Tocantins, a high number of VL cases has been observed in recent years, highlighting an endemic region with this problem as in the state of Pará where the incidence in the last five years was 3.3 to 4.7 cases/100,000 in habitant (24). The state of Tocantins denoted in the prevalence of VL cases with a sum of 12.2 cases, subsequent to him has the state of Maranhão 7.8 cases, however the region that stands out with maximum incidence is the Northeast with 3.2 cases for 100,000 inhabitants (16).

In the Tocantins region it was observed that the largest quantity of notifications occurred in the years 2017 with a number of 241 cases in the age group 20 to 39 years representing 22.03% of the total cases, representing a young age group and fewer cases of elderly above 80 years. Thus totaling 1071 cases notified between 2015 to 2019 of VL (25).

In Gurupi, a city in southern Tocantins, the number of cases from 2013 to 2020 according to data consulted in the SINAN database were found 59 notified cases. An emblematic situation, as it denotes an endemic region in the state of Tocantins.

Some questionnaires were disregarded from the total of SINAN cases in the years 2013 to 2020 as a result of not being found in the household and presenting outdated contacts were not located, others changed city or address of record in the SINAN notification form.

The years with the highest number of notifications were 2014, 2015 and 2017. In 2017, 37.28% (n = 22) of the cases in the period analyzed were reported. However, in the subsequent year no notification was recorded for Sinan and together with the year 2015 are the two years with the lowest notifications (Figure 01).
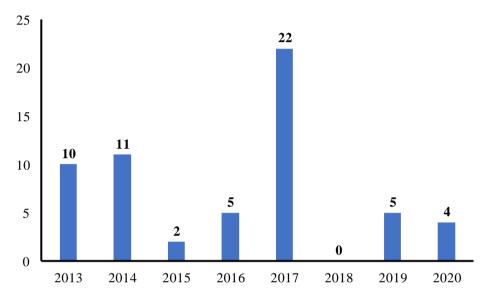

Figure 1- VL notifications from 2013 to 2020. Sources Sinan data, 2021.

The sector with the highest incidence in the city was Jardim dos Buritis with 9 cases (15.25% of the total), followed by the Central sector with 7 cases (11.86%), Nova Fronteira with 5 cases (8.47%) and Vila Iris with 4 cases (6.78%) (Figure 2). The locality with the highest incidence presents worrying traces because most of the community is of low income, with low level of instruction about the forms of transmission and with rural habits such as raising animals in urban environments.

The diversity of factors that involve the transmission of VL in the city of Gurupi is an aggravating factor, as well as the lack of awareness of the community about the forms of prevention make the problem even worse.

Figure 2 - Visualization of the city of Gurupi-To and the regions referring to the cases studied. Source: Google maps adapted (2021).

Another worrisome situation is the climatic factors that propitiate the spread of the vector, because the prevalence of contamination is related to changes in temperature, favorable situations in the ecosystem favor the proliferation of the vector, however, the importance of preventive methods and the animal reservoir cannot be underestimated (4).

Corroborating these findings studies describe that VL expands among nearby municipalities, which has a higher incidence, serving as a focus for the expansion of the disease to other localities that had not yet had reported cases (26).

Among the questionnaires applied on the investigation of the disease, most of them, 17 patients, were not assisted and supervised by the local zoonosis center, nor were they informed about the forms of vector transmission. This leaves them susceptible to further contamination, as they continue to be exposed to vector transmission with practices that increase its proliferation and consequent prevalence of the disease.

It is known that most people affected by VL are unaware of important concepts about the disease, with respect to transmission, treatment, and prevention. Therefore, it is necessary to adopt public policies and measures to encourage health education, whether individual or collective, which can contribute to improving the quality of life and health of the population (27).

Among the guidelines received 50% responded that they were guided by professionals at the time of diagnosis and treatment with superficial guidelines that do not expand the disease cycle and forms of transmission and another 50% did not receive any information and both groups are not accompanied by basic health units during treatment and discharge, since the medication is made in a hospital environment, thus demonstrating a public strategy aimed at weak disease and low resolution. Thus, it is reaffirmed that

the routines for diagnosis, treatment, and monitoring of patients need to be implemented and/or mandatorily implemented in all areas with transmission or at risk of transmission of the disease (28) (Figure 3).
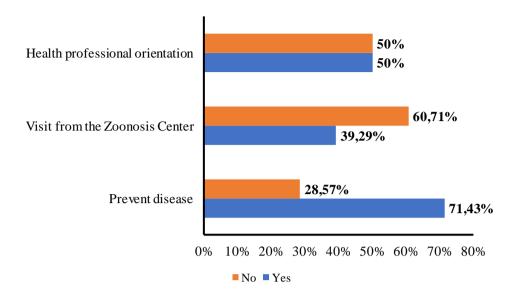

Figure 3 - Percentage on: health professional orientation, Zoonosis Center visit, and Prevent Disease. Source, Sinan, 2021.

All this emblematic is described and elucidated in the questionnaires, where the most probable sources of contamination for the interviewees are their homes, where nearby there was a chicken farm or in their own homes, followed by 10 (36%) who believe they acquired the disease in a place near their homes that stores organic garbage, and 9 (32%) who affirm that they had dogs with characteristic symptoms of the disease nearby (Figure 4).
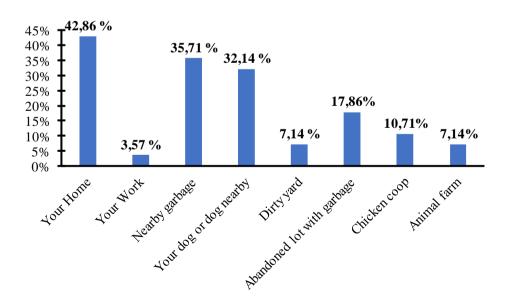

Figure 4- Suspected site(s) of your infection. Source: Sinan, 2021.

The control of this pathology in the Americas involves early diagnosis and treatment, which are fundamental for a good prognosis, but with little relevance in relation to the transmission and control of the vector and the animal reservoir in the epidemiological theme raising reflections on the measures of

prevention of the disease, since it has increased the number of cases in Brazil in urban areas before limited the vast majority to rural areas. (26).

Among the notified patients who participated in the survey and had some domestic animal, 9 (39.13%) were positive for the disease (Figure 5) and 6 (26.08%) had to be sacrificed and had not been tested before the onset of the disease by a householder (Figure 6).
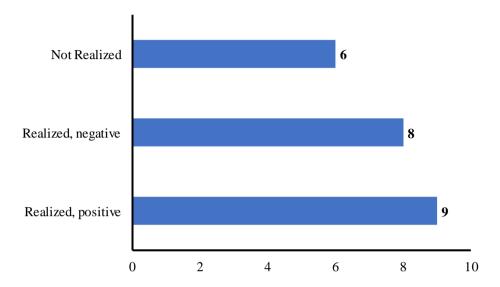

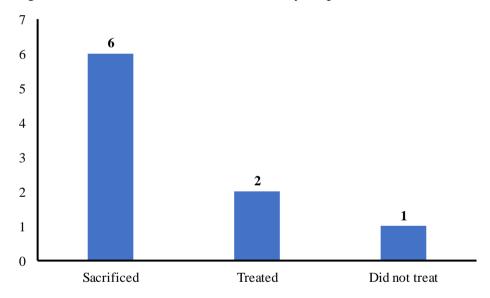Figure 5 -Realization of theexamination on your pet. Source: Sinan, 2021.

Figure 6 - Conduct after a positive test result.   Source: Sinan, 2021.

The most efficient forms of disease prevention and control highlighted by the Ministry of Health is the mass use of collars impregnated with insecticides that are very effective in combating canine Leishmaniasis and very efficient in reducing cases in humans (29). A complicated situation since all these actions require financial expenses and the most affected neighborhood in most of the community cannot afford prophylactic measures for visceral leishmaniasis in their domestic animals, thus requiring intervention by the municipal health department to reduce the cases in the municipality. In addition, visceral leishmaniasis is among the neglected diseases, because it affects about 80% of the low-income population and is not a priority in investments in research for treatment and control (30).

Corroborating these findings other studies further demonstrate that the use of collars in reducing circulating vectors and their spread. (31; 29).

We also observed a higher prevalence rate in children, corresponding to 47.46% of all cases (28 patients), because they are more susceptible due to immaturity of the immune system (Figure 7). Although VL affects all age groups, the prevalence stands out between 5 to 9 years (residual = 5.90).
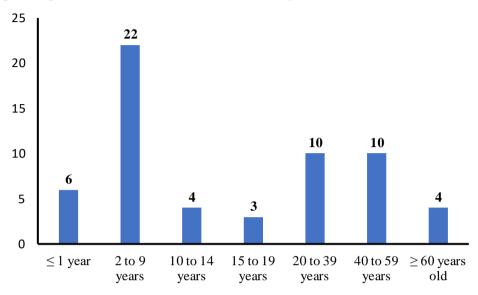

Figure 7 - Age of the patients. Source: Sinan, 2021.

In the city of Gurupi, 22 (37.29%) patients are in this age group being this fact also observed in other localities - for this pathology, for which children under 10 years old prevail (16). This characteristic occurs due to the greater susceptibility in childhood, because the immune response in this age group is immature, in addition to immunodepression triggered by malnutrition, a common situation in low-income populations most affected by this disease (32; 33). In this study, the most affected gender was male with 39 records (66.10%, residual = 3.0) and the most affected age group was between 2 and 9 years with 37 records (37.29%). A similar fact occurred in Mato Grosso do Sul that the percentage of 75% and most of the number of cases were male (20).

The data show a high prevalence of the disease in the city of Gurupi and throughout the state, in which the research data are not favorable to the combat and prevention of visceral leishmaniasis, demonstrating high morbidity and mortality and an unfavorable epidemiological framework for a disease often neglected by public health policies with intense actions aimed at combating the vector, prevention in dogs and consequent prophylaxis of humans aiming at a reduction in reported cases.

CONCLUSION

Given the exposed results, the prevalence of VL in the municipality of Gurupi is evident, being considered an endemic area and difficult to control the number of cases. Still in this scenario, we observed the predominance of affected children, a factor that aggravates the situation due to the early risks that they are exposed and the need for intensive monitoring. This is a disease that should not be underestimated, as it poses imminent risks to the population and can worsen.

It is worth mentioning that this epidemiological surveillance helps to visualize the main affected areas, age group, and social group. Thus, it is possible to guide prophylactic and control measures for each profile.

The VL problem is very neglected and must be solved through public policies to raise awareness about the ways to prevent the disease, since the population lacks information about the severity of the disease and the social-sanitary responsibility to control this endemic.

In general, prevention should be guided through lectures promoted in Basic Health Units of the municipality, lectures in schools and universities, home visits warning about the disease and the partnership with the zoonosis center for mass testing of dogs and monitoring of patients. Prevention is based on combating the vector through the cleaning of organic matter (rotting fruit and leaves), not breeding birds in urban and peri-urban areas, the use of repellent collars on dogs and cats that inhabit endemic areas, mass testing of dogs and cats, adherence to animal vaccination campaigns and the use of insecticides to combat the vector.

Through epidemiological clipping there is, therefore, the targeted adoption of public policies to combat the disease and planning of specific treatment regimens for each population in order to reduce the number of cases and, consequently, morbidity and mortality. This type of action prevents the disease and informs the population about the possible severities. In this way, the number of sick people is reduced and health promotion is reinforced. Moreover, it is worth noting that public spending on prevention policies is lower than that used to treat the sick. Thus, prevention is effective in reducing the number of cases and reducing public spending.

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ANNEX 1

UNIVERSIDADE DE GURUPI

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: INVESTIGAÇÃO EPIDEMIOLÓGICA DAS CAUSAS DE LEISHMANIOSE VISCERAL EM GURUPI-TO

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Área Temática:

Versão: 2

CAAE: 29795320.7.0000.5518

Instituição Proponente: Fundação UNIRG/ Faculdade UNIRG

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 3.993.748

Apresentação do Projeto:

Essa pesquisa pretende-se identificar os bairros com maior número de notificações de LVA no município de Gurupi-TO, a fim de traçar os fatores de risco daquela região e caracterizar epidemiologicamente a doença. Fundamentado nos dados coletados, será determinada as regiões de Gurupi- TO com maior prevalência e indicar os fatores de risco daquela região por meio de um questionário investigativo aplicado no domicílio das pessoas que foram infectadas pela LVA. A pesquisa tratará de um estudo transversal, epidemiológico, descritivo e de campo dos casos registrados no período de 2013 a 2020 na cidade de Gurupi – TO.

Problema: Quais as causas do aumento de casos de leishmaniose Visceral em Gurupi-TO?

Hipótese: Os prováveis fatores para o aumento da Leishmaniose Visceral em Gurupi são aspectos econômicos e sociais da comunidade, visto que os indivíduos mais acometidos por essa patologia são pessoas com baixo grau de escolaridade e poder aquisitivo.

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