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Epidemiological Aspects of visceral leishmaniasis in Belém, Pará state from 2012 to 2022

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Abstract
Visceral leishmaniasis is considered one of the main neglected tropical diseases of zoonotic character caused by protozoa of the genus Leishmania. Reaching more vulnerable populations and presenting a change in their transmission pattern, affecting urban areas, such as the municipality of Belém in the State of Pará**.** This study analyzed epidemiological data of the disease in Belém do Pará from 2012 to 2022, including factors such as incidence, sex, zone and evolution of cases. Epidemiological study conducted through data obtained from the Pará State Department of Health, in the period of 10 years.During the research period, 935 cases were diagnosed, reaching a maximum incidence of 8.8 in 2018. Case fatality rates were below national averages in this period, with the exception of 2016. The male, urban and rural areas being more prevalent throughout the period. The positive findings such as the high percentage of evolution of cure of the disease and the low rate of death. Due to the results presented, epidemiological characteristics of the disease is fundamental for the direction of efficient prevention and control strategies. Underscoring the need for integrated approaches, including individual protection measures, vector control and the search for an effective vaccine.

Keywords: Tropical medicine; Neglected Diseases; Epidemiology; Public health.

Epidemiological aspects of visceral leishmaniasis in Belém, Pará State, from 2012 to 2022

Resumo
A leishmaniose visceral é considerada uma das principais doenças tropicais negligenciadas de caráter zoonótico causada por protozoários do gênero Leishmania. Atingindo populações mais vulneráveis e apresentando mudança no seu padrão de transmissão, acometendo zonas urbanas, como o município de Belém do Estado do Pará. O objetivo desse estudo foi analisar dados epidemiológicos da doença em Belém do Pará no período de 2012 a 2022, incluindo fatores como, incidência, sexo, zona e evolução dos casos. Trata-se de um estudo epidemiológico realizado através de dados obtidos da Secretaria do Estado de Saúde do Pará, no período de 10 anos. No período da pesquisa, 935 casos foram diagnosticados, alcançando incidência máxima de 8,8 em 2018. As taxas de letalidade estiveram abaixo das médias nacionais nesse período, com exceção de 2016. O sexo masculino, zona urbana e rural sendo mais prevalentes durante todo o período. Os achados positivos como alta porcentagem de evolução de cura da doença e pelo baixo índice de óbito. Devido aos resultados apresentados, características epidemiológicas da doença é fundamental para o direcionamento de estratégias eficientes de prevenção e controle. Ressaltando a necessidade de abordagens integradas, incluindo medidas de proteção individual, controle de vetores e a busca por uma vacina eficaz.

Palavras-chave: Medicina tropical; Doenças Negligenciadas; Epidemiologia; Saúde pública.

Introduction

Visceral leishmaniasis (VL) is a zoonotic disease caused by protozoa. Its etiological agent is of the *genus Leishmania* and is transmitted by the female sandfly vector *Lutzomyia longipalpis* (DE LIMA, 2021). VL is present on almost all terrestrial continents. In Latin America, 1,799 cases were reported in 2021, 93.6% of them in Brazil. In Brazil, the species present are classified into species: L. *infantum* and L. *Donovani*. (BRAZIL, 2016; DE LA SALUD, 2023). It has great importance in the world according to the World Health

Organization (WHO), and being a systemic and chronic disease, when left untreated, leads to the patient's death. (WHO, 2015; BATISTA, 2021).

According to data from the Notifiable Diseases Information System (SINAN), from 2015 to 2022, 24,380 cases of VL were registered in Brazil, of which 4,167 were registered in the North Region during this period and the first state with the most reported cases was Pará with 2,722 and the second Tocantins with 1,438 (SINAN, 2023). According to the study by Santos Silva (2020), 202 cases of human cutaneous leishmaniasis and 252 cases of human visceral leishmaniasis were registered in Marabá from 2010 to 2016 and 454 cases of human leishmaniasis were confirmed between 2016 and 2019. According to the Oswaldo Cruz Foundation, the North and Northeast regions are the most affected by VL. Among most of the municipalities in the mesoregions that make up the State of Pará, basic sanitation is evaluated as precarious, below the national percentage.

The reservoir animals of VL in the urban area are dogs and in the wild are foxes and marsupials (MEDEIROS et al, 2022). The symptoms in these animals may present clinical forms, depending on the type of immune response of the infected animal, and may or may not present symptoms. In humans, the disease presents in a chronic and systemic way, and may present symptoms such as long-lasting fever, weight loss, paleness of the mucous membranes, and for immunosuppressed patients, they may present more severe forms of the disease (FARIAS et al, 2019; REIS et al, 2019; LEMOS et al, 2019).

According to Maria Meirelles 2022, with data from PAHO and MoH at the beginning, Visceral Leishmaniasis was seen in rural areas and small urban localities, however, we can find cases growing in large urban centers. In our state, the disease is endemic and frequent outbreaks are being recorded. In addition, it is noted that the disease appears after climatic aspects such as deforestation, fires, and others (MAGALHÃES et al, 2019).

Faced with this scenario, Brazilian agencies developed the Visceral Leishmaniasis Control Program (PCLV) to combat the disease, with the objective of reducing the high number of cases and proposing early diagnosis and treatment. In addition, strategies were established to reduce the transmission of the parasite in order to control the action of vectors and reservoirs. It is essential to identify people infected by the disease and thus carry out an early and effective treatment to reduce lethality through the institution of timely prophylactic and therapeutic measures (RODRIGUES ACM, et al., 2017).

In view of the large scenario of VL caused in the context of public health in the municipality of Belém in the State of Pará, the present study aimed to describe the epidemiological profile of reported cases of Visceral Leishmaniasis (VL) over a 10-year period.

Material and Methods

eported to the Ministry of Health (MH) from 2012 to 2022. All confirmed cases notified to the Pará State Department of Health (SESPA) were included in the study. Patients who had the disease reported in Belém in the State of Pará, the period determined was to evaluate the data in the last 10 years. These secondary data were requested from the SESPA database, and the variables studied were classified by: incidence and lethality, number of cases per year, sex, zone and evolution of cases.

Data were collected from spreadsheets generated by the database and exported to the Microsoft Excel 2019 program, which allowed the descriptive statistical analysis of the study. The population estimates used to calculate the incidence coefficient were based on the number of VL cases reported to SESPA, divided by the resident population in the area and by 100,000 inhabitants. The results were organized in tables and graphs using the Microsoft Excel 2019 software and the Graph prism program. The information obtained from a database did not have personal data of the patients, therefore, according to item III of Resolution No. 510/2016, it was not necessary to submit the project to the Research Ethics Committee.

Results and Discussion

From 2012 to 2022, 935 cases of visceral leishmaniasis (VL) were confirmed in the municipality of Belém, in the state of Pará. The incidence calculated with the number of VL cases reported to SESPA, which was divided by the resident population in the place and year, multiplied by 100 thousand inhabitants, as shown in graph 1, in 2020 had the lowest index that was equal to 3.0 and the highest in 2018 with 8.8. However, the lethality rates in the municipality of Belém in the State of Pará in these years were below the national rates, with the lowest and highest rates being, respectively, 2.3 and 5.7. These results may be related to several factors, according to Aldeízo da Silva 2020, individuals tend to be victims of the disease due to the lack of instructions on knowledge in quality health education. The reason for the high rates is due to the influence of the Amazonian winter in Pará, which provides a warm environment with high humidity to the insect vectors, providing a favorable climate for them to proliferate and thus feed on human and domestic animal blood at night, and this act will cause the transmission of the parasite (VARGAS et al, 2019).

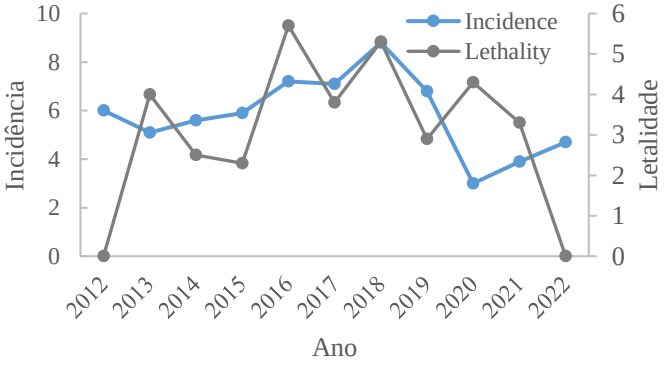

Figure 1. Analysis of the temporal trend of the incidence and lethality rates of visceral leishmaniasis. Belém, Pará, Brazil,

2012 to 2022. Prepared by the authors (2023)/SESPA, 2023.

In the municipality of Belém, the total number of cases of Visceral Leishmaniasis reported from 2012 to 2022 was 935, with the lowest number of cases in 2020, and 2018 with the highest number, respectively, 46 (4.9%) and 132 (14.11%) notifications, which are shown in graph 2. According to Camila da Cunha 2020, factors related to disorderly expansion with large numbers of houses in neighborhoods with a small proportion of low vulnerability, with the presence of garbage and without basic sanitation, in addition to climate change leads to the appearance of vectors and reservoir animals of the disease, which consequently will transmit the disease to humans. According to data from the National Institute for Space Research (INPE) in Ariana da Silva's 2022 study, it points out that deforestation is a factor that contributes to the increase in the number of cases, and through these environmental changes, rural emptying and growing urbanization occur.

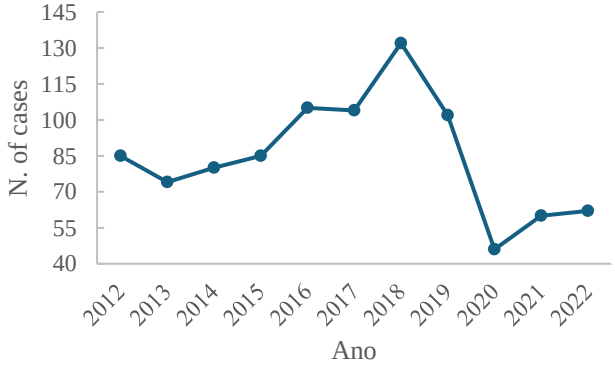

Figure 2. Confirmed cases of visceral leishmaniasis reported to SESPA in the municipality of Belém in the State of Pará, classified by year. Period 2012-2022. Source: Prepared by the authors (2023)/SESPA, 2023.

The results obtained in Graph 3 reveal a higher prevalence among males. Throughout this period, the total number of notifications was 935, of which 538 (57.5%) corresponded to notifications of male cases and 397 (42.4%) to female cases. This difference is observed in all the years analyzed. Some studies such as Jucilene Reis, 2019 and Logrado Junior, 2022 suggest that men would be more exposed to the vector, certainly due to performing occupational and behavioral activities closer to the source of infection, resulting in greater chances of being affected by the disease. According to Ariana da Silva, 2022 points out important aspects such as some hormonal factor that is linked to the man that occurs the increase in the involvement of the disease, which may be related to body exposure and also the lack of preventive means putting yourself at risk and not seeking basic health units for possible diagnosis and early treatment. Therefore, it is necessary to maintain continuous vigilance and investment in preventive measures in order to prevent a resurgence of the disease and ensure the protection of the affected population.

It was observed in graph 4 in the municipality of Belém, in the period of the research results were presented with 54.1% in the urban area and rural with 40.4% in relation to the total sample of notifications, and the cases in rural areas had a result close to the urban area.

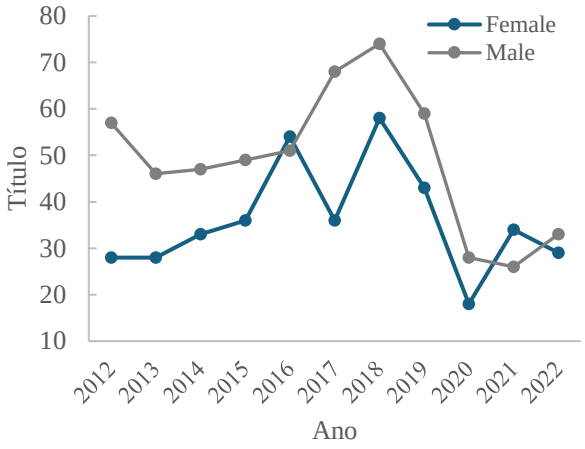

Figure 3. Confirmed cases of visceral leishmaniasis reported to SESPA in the municipality of Belém in the State of Pará, classified by sex. Period 2012-2022. Source: Prepared by the authors (2023)/SESPA, 2023.

According to a study developed by Silva et al, 2021, it contributes to the understanding of occurrences in urbanized areas, such phenomenon is linked to risk factors for VL transmission, such research carried out in the state of Mato Grosso, describes the close relationship with domestic animals, activities such as fishing or in direct contact with risk areas (forest reserves, rural areas, presence of infected domestic animals and presence of vectors in the household or peridomicile). Fernando da Silva, 2019 noted that although VL is present in rural areas, the disease has been expanding to medium and large urban areas. This accelerated expansion is proving to be an important public health and deforestation problem.

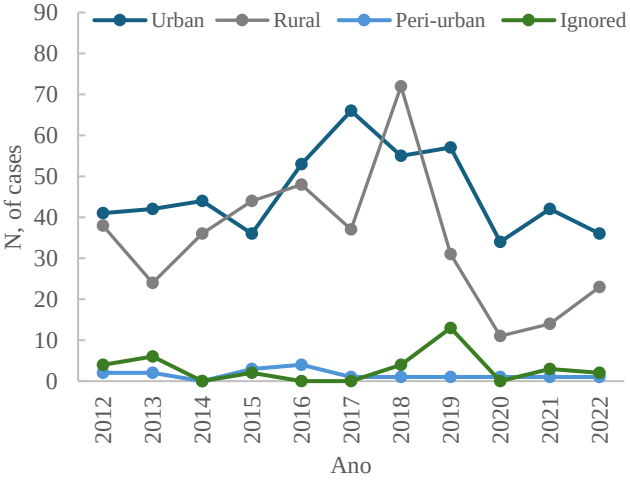

Figure 4. Confirmed cases of visceral leishmaniasis reported to SESPA in Belém in the State of Pará, classified by zone. Period 2012-2022. Source: Prepared by the authors (2023)/SESPA, 2023.

As a result of the evolution, 47.16% were cured, 3.4% died from VL, 7.2% from other causes, 16.4% were transferred, and 25.4% had empty records (Table 1). These numbers demonstrate a positive outcome for the vast majority of patients diagnosed with VL, reflecting the efficacy of the available treatments and the effort of health teams in managing cases. However, it is still necessary to worry about the empty forms that did not even have information on the evolution of the patients, which results in the relevance of improvements in the records and data collection for a more accurate and mandatory epidemiological analysis to assist in the planning of VL control actions. These results of the study reinforce the importance of the disease and the need for a careful look at all cases, from the mildest to the most severe, ensuring early diagnosis and treatment (DE OLIVEIRA REGO et al, 2023).

Table 1. Confirmed cases of visceral leishmaniasis reported to SESPA in Belém in the State of Pará, classified by evolution of cases. Period 2012-2022.

Year	Healing	Abandonment	Death from VL	Death from other causes	Transfer	Empty	Total
2012	20	-	-	7	55	3	85
2013	30	-	3	8	24	9	74
2014	26	-	2	4	47	1	80
2015	73	-	2	4	1	5	85
2016	68	-	6	11	8	12	105
2017	50	2	4	5	2	41	104
2018	42	-	7	6	6	70	132
2019	51	-	3	10	6	32	102
2020	16	-	2	2	1	25	46
2021	29	-	2	5	1	23	60
2022	36	-	-	6	3	17	62
Total	441	2	32	68	154	238	935

Source: Prepared by the authors (2023)/SESPA, 2023.

Conclusion

In view of the results presented in the present study, it is possible to observe that the variation in the cases registered over the years analyzed considered that before 2020 the cases of VL were high, and since the pandemic these data have been reduced. Therefore, it can be understood that there has been no improvement in public health policies for neglected and tropical diseases capable of significantly reducing the potential for transmission. Through the results of this study, it will contribute to the creation of vector and canine control measures and strategies aimed at the disease with early diagnosis, timely and effective treatment, in addition to the control of VL in the municipality.

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