

Survey of Leishmaniasis Vectors in the City of Cuiabá

Levantamento dos Vetores de Leishmanioses no Município de Cuiabá

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Abstract

Leishmaniasis is transmitted naturally in urban and suburban areas, due to the emergence and reemergence of their vectors in these areas. In order to deepen the knowledge about ecological aspects that affect the occurrence of vectors in areas of transmission of leishmaniasis areas in Cuiabá, state of Mato Grosso (MT), Brazil, a survey was carried out of the Zoonosis Control Center database – ZCC serologically positive dogs from Cuiabá municipality within the period 2005-2011. Nine species of the genus *Lutzomyia* and one of *Brumptomyia* were identified. The most abundant species were *Lutzomyia whitmani* (33.2%), followed by *L. cruzi* (16.8%) *longipalpis* (13.9%) *Brumptomyia brumpti* (9.9%), *L. saulensis* (4.0%) and *L. flaviscutellata* (3.5%). There was an increase in the number of Leishmaniasis vectors in the municipality of Cuiabá during the years 2005-2011. The presence of infected dogs, the increase in vector's density and the rate of susceptibility *and surveillance interruption* may increase the risk of leishmaniasis transmission to humans in the municipality of Cuiabá.

Keyword: Dogs. Center for Zoonosis Control. Protozoa.

Resumo

A leishmaniose é transmitida naturalmente em áreas urbanas e periurbanas, devido à emergência e reemergência de seus vetores nessas áreas. Com o objetivo de aprofundar o conhecimento sobre aspectos ecológicos que afetam a ocorrência de vetores em áreas de transmissão de leishmaniose no município de Cuiabá, estado de Mato Grosso (MT), Brasil, foi realizado um levantamento do banco de dados do Centro de controle de Zoonoses - CCZ de Cuiabá de cães sorologicamente positivos do período de 2005 a 2011. Nove espécies de gênero *Lutzomyia* e uma dos *Brumptomyia* foram identificadas. As espécies mais abundantes foram *Lutzomyia whitmani* (33,2%), seguido por *L. cruzi* (16,8%), *L. longipalpis* (13,9%), *Brumptomyia brumpti* (9,9%), *L. saulensis* (4,0%) e *L. flaviscutellata* (3,5%). **Observou-se um aumento no número de vetores** de Leishmanioses no município de Cuiabá durante os anos de 2005 a 2011. A presença de cães infectados, o aumento da densidade do vetor, a taxa de susceptibilidade e a interrupção de vigilância epidemiológica pode aumentar o risco de transmissão de leishmaniose para o homem no município de Cuiabá.

Palavras-chave: Cães. Centro de Controle de Zoonoses. Protozoários.

1 Introduction

Leishmaniasis are diseases caused by intracellular protozoa of the genus *Leishmania*, transmitted by the insect vectors' bite, called sandflies (LAINSON; SHAW, 1987; REY, 2008), which can be presented in two main clinical forms: cutaneous leishmaniasis (CL) and visceral leishmaniasis (VL) or kala-azar.

The cutaneous leishmaniasis is the sylvatic zoonosis that affects mainly farm workers and individuals that settle near the forest remnants (LAINSON; SHAW, 1987). This disorder can be manifested in the simple or disseminated cutaneous form, with the presence of multiple painless ulcers, or unique; disseminated form in which nodular lesions occur; and the mucocutaneous form, considered serious, once it reaches Nasopharyngeal regions, affecting the respiratory system (GOTO; LINDOSO, 2010; MARZOCHI; MARZOCHI, 1994; REITHINGER *et al.*, 2007).

Visceral leishmaniasis is a severe form, whose incubation

period ranges from 10 days to 24 months, on average, from two to four months. This zoonotic disease is characterized as being of long duration weight loss, hepatosplenomegaly, weakness, malaise, cough, anorexia, cachexia and the skin and mucous membranes' pallor. Hair loss, lower limb edema, gum epistaxis, and petechiae bruising may also occur. Among the laboratory findings are pancytopenia, anemia, leukopenia, thrombocytopenia, hyperglobulinemia and hypoalbuminemia (CRUZ *et al.*, 2006; GRIMALDI JUNIOR; TESH, 1993).

In dogs, the major clinical changes in VL are dermatitis, alopecia, skin ulcers, lymphadenopathy, conjunctivitis, onychogryphosis, progressive weight loss, listlessness, muscle atrophy and hepatosplenomegaly (ALMEIDA; MENDONÇA; SOUSA, 2010).

Leishmaniasis may receive other denominations such as dum-dum fever, assam fever, caquexial fever, splenomegaly and tropical Indian black fever (REY, 2008). Visceral leishmaniasis - VL is a zoonotic disease that can be fatal, especially in children, elderly and immuno-compromised

people or when not treated early individuals. Primarily a disease of marsupials and wild canids, due to the ecosystem changes and migration of rural populations to urban centers, there was a transfer of the role of the main reservoir to the domestic dog (*Canis familiaris*), with the Canine Visceral Leishmaniasis form - CVL. Other domestic animals, especially chickens, can also serve as vectors' power source, luring these insects into house.

Dogs are considered important reservoirs in several VL foci in both rural and urban and peri-urban areas (MARZOCHI; MARZOCHI, 1994, SILVA *et al.*, 2001). Several reports have correlated the human VL in the presence of high canine prevalence (DEANE; DEANE, 1955; LAINSON; SHAW, 1987; OLIVEIRA *et al.*, 2001). And, moreover, the occurrence of disease has been associated with the huge abundance of vectors (VIEIRA; COELHO, 1998).

Thus, the present study aimed to deepen the knowledge about the temporal vectors fluctuation vectors in an area of transmission of leishmaniasis in the city of Cuiabá, MT.

2 Material and Methods

A study was conducted on the documentary prevalence of documentary prevalence type descriptive quantitative method through the presence of serologically positive dogs and bloodsucking insects (vectors) of leishmaniasis. Data were sought from the period 2005 to 2011, in the database

of the Municipal Health-SMS/Center for Zoonosis Control - CZC, Cuiabá – MT. The Center for Zoonosis Control (CZC) is a public health unit whose primary assignment is prevent and control zoonosis (eg. rabies and leishmaniasis, beyond dengue and Chagas disease), developing sanitary and epidemiological surveillance systems. The CCZ Cuiabá is located at Boulevard Palmas Mario, no/number, Ribeirão do Lipa – Cuiabá/MT. This study was approved by the ethics committee of animal research at the Federal University of Mato Grosso on Protocol No. 23108.065233/13-9.

In possession of the information data normality analysis was performed using the Kilmogorov-Smirnov test and subsequently analyzed by the frequency histogram, in addition to performing regression analysis associated with the graphic "boxplot" to analyze the vectors' temporal variation of leishmaniasis in the city of Cuiabá.

3 Results and Discussion

Ten species of the genus *Lutzomyia* France (1924) and one of *Brumptomyia* France and Parrot (1921) were identified in the urban area of Cuiabá (Table 1), where the most abundant species (Table 2) were *Lutzomyia whitmanie* (30.0%), followed by *Lutzomyia cruzi* (18.6%), *Lutzomyia longipalpis* (12.9%). = The presence of visceral leishmaniasis vectors are highlighted (*L. cruzi* and *L. longipalpis*) and cutaneous leishmaniasis (*L. whitmanie* and *L. flaviscutellata*).

Table 1 - Species of Leishmaniasis vectors in the city of Cuiabá

2005	2006	2007	2008	2009	2010	2011
Northern Region						
1, 2, 3, 4	2, 3, 4	3		2, 3, 4, 7, 8	2, 3, 8, 10	3
Southern Region						
			4	3, 7, 9	3, 7, 8, 9	1, 3, 7, 8
Eastern Region						
1, 3, 5	3, 4	3, 4		3, 4, 6	1, 2, 3, 4, 5, 10, 11	2, 3, 4, 5, 10, 11
West region						
2, 3, 4		3, 4	1, 2, 3, 4	2, 3	1, 2, 3, 4, 10	3, 4

1 *Lutzomyia flaviscutellata*, 2 *Lutzomyia longipalpis*, 3 *Lutzomyia whitmanie*, 4 *Lutzomyia cruzi*, 5 *Lutzomyia lenti*, 6 *Lutzomyia tzomyia*, 7 *Lutzomyia saulensis*, 8 *Lutzomyia evandroi*, 9 *Lutzomyia dreisbachi*, 10 *Brumptomyia brumpti*, 12 *Lutzomyia termitophila*.

Source: Authors.

Table 2 - Percentage of vectors by region

	Northern	Southern	Eastern	Western	Total
<i>Lutzomyia flaviscutellata</i>	17	17	33	33	8.6
<i>Lutzomyia longipalpis</i> *	44	0	22	33	12.9
<i>Lutzomyia whitmani</i>	29	14	29	29	30
<i>Lutzomyia cruzi</i> **	15	8	38	38	18.6
<i>Lutzomyia lenti</i>	0	0	100	0	4.3
<i>Lutzomyia tzomyia</i>	0	0	100	0	1.4
<i>Lutzomyia saulensis</i>	25	75	0	0	5.7
<i>Lutzomyia evandroi</i>	33	67	0	0	4.3
<i>Lutzomyia dreisbachi</i>	0	100	0	0	2.9
<i>Brumptomyia brupti</i>	25	0	50	25	5.7
<i>Lutzomyia termitophila</i>	25	0	50	25	5.7
Total	24.3	17.1	32.9	25.7	100

* vector responsible for cutaneous leishmaniasis

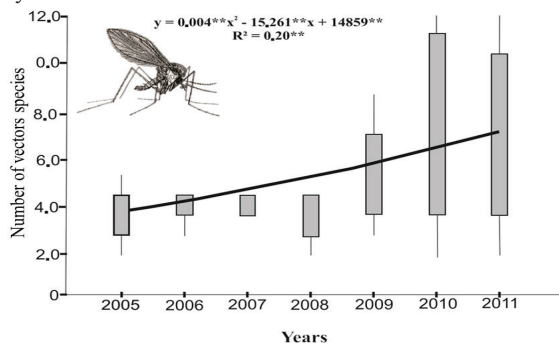
** vector responsible for visceral leishmaniasis

Source: Authors.

The southern region was less affected by the presence of *L. cruzi* and *L. longipalpis* vectors. However, the northern region was the most affected by the presence of *L. longipalpis* (44%), and *L. cruzi* prevails in the eastern and western region (38%).

An increase was observed in the number of Leishmaniasis vectors in the city of Cuiabá during the years 2005 to 2011 (Figure 1). Missawa and Lima (2006) indicated the presence of vectors *L. cruzi* and *L. longipalpis* in metropolitan region Varzea Grande, near the city of Cuiabá between the years 1996-2004.

Figure 1: Number of species of Leishmaniasis vectors in the city of Cuiabá



Source: The authors.

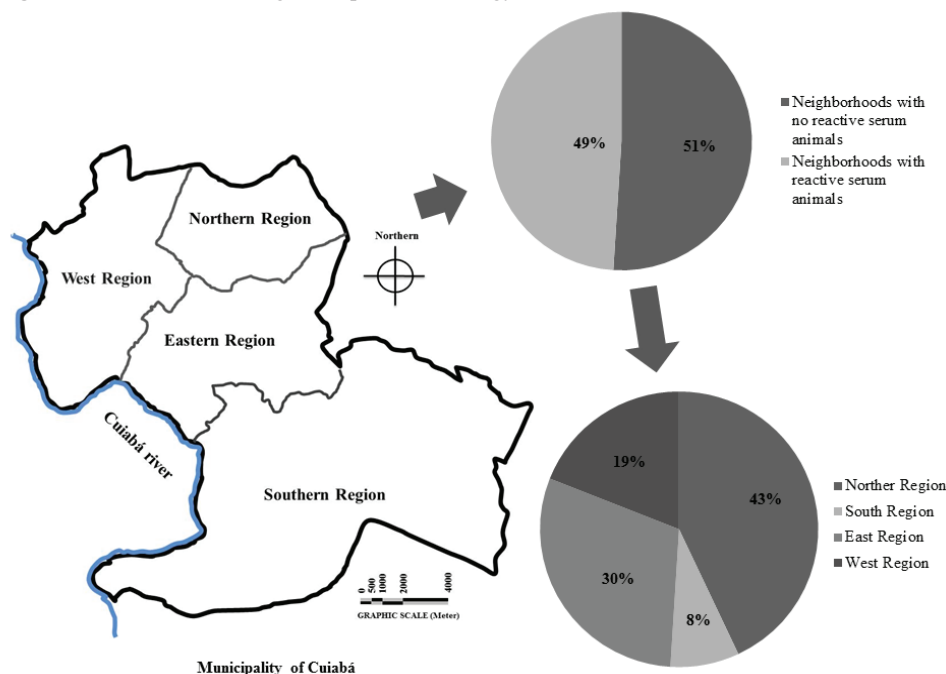
It was found that the best mathematical regression model that fitted to the data model of second order quadratic, it was noted that the value of R² (0.20) was weak, but being possible to notice a trend in the increasing of the number of species over the years. This increase could be related to disorderly expansion performed next to forest areas, causing

environmental disturbances which favor the extraforest cycle species' installation, benefiting its peridomiciliar character.

The preference of insects for peridomestic areas has also been observed in several Brazilian states (BARATA *et al.*, 2005; MONTEIRO *et al.*, 2005; RESENDE *et al.*, 2006; SANTOS, 2005; SILVA, 2005; SOUZA *et al.* 2004), which provides evidence of insects' domiciliation influenced by human and socio-ecological changes in the mosquito habitat area and the power of adaptation of insects species (AGUIAR; MEDEIROS, 2003; SOUZA *et al.*, 2004; OLIVEIRA *et al.*, 2003), although Resende *et al.* (2006) observed approximately equal proportions of sand flies, mainly *L. longipalpis*, in both intra and peridomestic areas.

The occurrence of *L. longipalpis* and *L. cruzi* in different regions of Cuiabá confirms the widespread nature of species adapted to diverse habitats (AGUIAR; MEDEIROS, 2003), and this maintenance of *L. longipalpis* in ecotypes, it's probably due to its eclectic food preference, having the vector, the ability to bite the man, the dog, birds and other animals (BRAZIL *et al.*, 2003). There was a wide distribution of dogs with positive serology in Cuiabá, identifying reactive serum of animals in 49% of neighborhoods in the city aforementioned. Out of these, 43% are neighborhoods of the Northern region, 8% in the southern region, 30% in the eastern region and 19% in the western region (Figure 2). These data have a little difference from those found by Almeida, Mendonca and Sousa (2010) that used information collected in the Department of Small-sized animals Veterinary Clinical of the Federal University of Mato Grosso, and observed prevalence of 66% reactive serum of animals identified in the Eastern region, 18% in the North, 12% in the West and 4% in the South.

Figure 2 - Distribution of dogs with positive serology in Cuiabá



Source: The authors.

The regions that are associated with a higher prevalence of seropositive dogs with Leishmaniasis are related to population explosion, together with new housing developments that have occurred in recent years in the city of Cuiabá, forcing the opening of new areas and increasing the spread of this disease vectors. The expansion of human activities, habitat fragmentation and deforestation, have led to an increasing adaptation of parasites and sandflies (MARZOCHI; MARZOCHI, 1994), because the human action, has been influencing the leishmaniasis transmission, becoming increasingly urbanized this disease (BARATA *et al.*, 2005; MONTEIRO *et al.*, 2005).

3 Conclusion

The southern region of Cuiabá is the least affected by the presence of Leishmaniasis vectors. Whereas Northern Cuiabá is the one with the highest number of occurrences of seropositive animals for Leishmaniasis. The presence of infected dogs, the increase in vector density and the susceptibility rate and interruption of surveillance can increase the risk of leishmaniasis transmission to man in the city of Cuiabá. Thus, one can't suggest greater attention on the role of these animals and vectors regarding the transmission of this zoonosis and its consequent urbanization as well as the importance of diagnosis and epidemiological survey of the disease in which such information may contribute to the planning strategies for vector control and the dog as a domestic reservoir.

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