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## Letter to the editor

# Serosurvey for canine visceral leishmaniasis in rural and urban areas of the Brazilian Legal Amazon



Dear Editor,

Leishmaniasis is a worldwide zoonotic disease, transmitted by phlebotomine species, causing tegumental and visceral injuries. In Brazil, visceral leishmaniasis (VL) is caused by *Leishmania infantum chagasi* and shows a wide territorial distribution among areas of different geographic, climatic and social aspects.<sup>1</sup> Dogs are considered important reservoirs of the disease and play an important role in human infection. In general, most of them are asymptomatic. However, clinical signs in infected dogs include cachexia, hair loss, dermal wounds, weight loss, lymphadenopathy, and lethargy.<sup>2</sup>

There are very few studies related to canine visceral leishmaniasis (CVL) in the Legal Amazon region, mainly in Tocantins state and epidemiological surveys are the basis for the disease control programs. In 2008 and 2009, the state of Tocantins recorded one of the highest prevalence, with 36.8 and 33 cases per 100,000 inhabitants, respectively. In 2010, 21 municipalities in Tocantins were considered a priority region in efforts of VL surveillance and control.<sup>3</sup> Thus, this study aimed to investigate epidemiological variables associated with canine leishmaniasis assessed by serology in rural and urban area of Araguaína, Tocantins State.

Blood samples were collected from 204 dogs from different places of Araguaína city, selected by non-probability convenience, regardless of gender, breed, or age. A total of 99 dogs were sampled from 10 villages and rural properties (Fazenda Nossa Senhora de Fátima, Fazenda Serra das Palmeiras, Povoado Novo Horizonte, Povoado Jacilândia, Chácara Triângulo, Entroncamento Babaculândia, Fazenda Amazonas, Povoado Floresta, Fazenda Boa Vista, Povoado Araçulândia), and 105 dogs from nine urban areas (Vila Couto Magalhães, Tiúba, Setor Palmas, Teresa Hilário, Senador, Araguaína Sul, São João, Barros). Sample collection was conducted in agreement with the Ethical Principles for Research under institutional watch of the Tropical Medicine Foundation of Tocantins Ethical Committee.

Prior to blood collection, the dog owners signed an informed consent form and answered a standardized questionnaire aiming to identify possible risk factors associated with the disease. Information collected of the dogs included gender, age, breed, major type of environment

(indoor/outdoor), cleaning frequency of animal's area, and location.

Serum samples were submitted to indirect immunofluorescent assay (IFA) with antigens of *Leishmania chagasi*, adopting 40 as the cutoff titer for positivity.<sup>4</sup> Possible statistical association between epidemiological data and the occurrence of *Leishmania* spp. antibodies were analyzed by chi-square ( $\chi^2$ ) or Fischer's exact test, adopting 5% as the level of significance. All the analyses were performed by using BioEstat 5.3 software.

From the 204 samples tested, 67.15% ( $n=137$ ) turned out positive, 57.4% ( $n=58$ ) from rural dogs and 82.9% ( $n=79$ ) from urban dogs ( $p<0.05$ ). Anti-*Leishmania chagasi* antibodies were detected in all rural properties and urban neighborhoods of the study. Seropositivity rate varied from 28.6 to 70% in rural area and from 33 to 90% in urban area. The only variable significantly associated with seropositivity was location of the neighborhood in the urban area ( $p<0.05$ ). Dogs living in Tiúba, Setor Palmas, Teresa Hilário, Senador, Araguaína Sul, and São João had significantly higher chance to be seropositive to *L. chagasi* in relation to dogs living in Vila Couto Magalhães and Barros ( $p<0.05$ ). Dogs living in environments with daily, weekly, or no cleaning was not a risk factor for being seropositive ( $p>0.05$ ). Likewise, the urban animals remaining outdoor most of the day was not a risk factor ( $p>0.05$ ). Outdoor rural dogs had a higher seropositivity rate (60.5%), compared to indoor rural animals (50%), but this difference was not significant ( $p=0.41$ ). Indoor urban dogs had a seropositive rate (78.4%) similar to outdoor urban dogs (73.5%). Age ( $\leq 6$  months;  $>6$  months and  $\leq 2$  years;  $>2$  to  $\leq 5$  years;  $>5$  years), gender, and breed (pure or mongrel) were not associated to positive results.

The high rate of positivity for CVL found in the present study, both in rural (57.4%) and urban area (82.9%), underscores the fact that although the disease maintains its rural characteristics, nowadays its urbanization can be widely noticed. In addition, results suggest that dogs living in urban areas are more exposed to vectors than those living in rural areas and might be associated to eco-environmental conditions. The higher positivity rate found in the neighborhoods of the urban area are probably related to poor maintenance of the houses, low socioeconomic conditions, and presence of trees and other vegetation nearby, as it was regularly observed.

The lack of statistical association of positive results and age, sex, and breed are in accordance with previous reports.<sup>5</sup> Although cleaning frequency was not significant, it is known that accumulation of organic matter as well as domestic waste deserves special attention in order to avoid the proliferation of phlebotomines that need organic matter to complete their life cycle.<sup>5</sup> Similarly, outdoor or indoor breeding did not show statistical association, but nonetheless should be considered once outdoor environment permits higher contact with vector ecological niche.

In Brazil, VL is considered an endemic disease, though outbreaks occur more or less often due to poor immune response of hosts and to an ecoepidemiological scenario that favors the proliferation of infected vector populations.<sup>5</sup> The results of the present study highlight the importance of CVL in both rural and urban areas of Tocantins and indicate the need for effective VL surveillance and control measures in the region.

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### Conflicts of interest

The authors declare no conflicts of interest.

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