PHLEBOTOMINE SANDFLIES IN RURAL LOCATIONS IN THE STATE OF PARANÁ, SOUTHERN BRAZIL

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SUMMARY

This study reports the fauna and frequency of sandflies in domestic animal shelters, residences and other ecotopes in rural areas of the municipality of Bandeirantes, Paraná State. Sandflies were collected twice in eight rural villages by using Falcon traps from 8pm to 6am in 2008. In these localities, 4,790 sandflies were collected, which were represented by ten sandfly species, prevailing of Nyssomyia neivai and Nyssomyia whitmani species. It was observed that animal shelters are the domestic ecotopes where there is the greatest frequency of these insects. The localities where the collections were made had the environmental characteristics that allow the persistence of transmission of parasites from the American tegumentary leishmaniasis. Although the fauna and the behavior of sandflies species are similar in different localities, the method of controlling these insects should be adjusted to the environmental characteristics of each one of the most diverse endemic areas of American tegumentary leishmaniasis in the municipalities of Paraná State.

KEYWORDS: Sandflies; American Tegumentary Leishmaniasis; Leishmania; Animal’s shelter; Fauna; Control.

INTRODUCTION

The leishmaniasis condition is sited among the top five diseases that have a major impact on public health worldwide\(^4\). In Latin America, the cutaneous leishmaniasis (CL) has a strong impact on public health, especially in Brazil, where it occurs in every State\(^5\). In the State of Paraná, CL is an endemic disease and it has been registered in more than 300 of the 399 municipalities\(^6\) including the municipality of Bandeirantes.

In Bandeirantes municipality, 232 autochthonous cases of TL were noted, with yearly occurrences from 1990 to 2009. As a result, this research on phlebotomine fauna and frequency in domiciliary, peri-domiciliary and rural localities was conducted in order to provide detailed knowledge on the areas where the *leishmania* transmissions have happened that could be helpful when choosing the most effective method to control the vectors.

MATERIAL AND METHODS

**Municipality description:** The municipality of Bandeirantes is located in the North Pioneer mesoregion of Paraná and according to the Demographic Census conducted in 2010, has a population of 32,182 inhabitants, of which 28,382 are living in urban and 3,800 in rural areas. The vegetation type of the municipality is of semi-deciduous forest and the soil is a composite type (Red Podzol, Red Latosol and Red Nitosol). The climate is subtropical humid reaching in the coldest month averaged temperatures lower than 18 °C and in the warmest month averaging higher than 22 °C. The municipality has an area of 44,527.9 hectares (ha), where only 872.9 ha are native forest. Nowadays, 80% of the municipality’s territory is occupied by grain crops (soya and maize), alfalfa and sugar cane. According to Figure 1, the rural zone of Bandeirantes is divided into 17 districts, of which eight of them (Água da Jacutinga, Água das Perobas, São Paulo, Cábiúna, Água do Cateto, Agua do Caixão, Água Vermelha and Água da Boa Pastora) were selected for collection of sandflies. In these districts in Água do Caixão and Água da Boa Pastora there were no reported cases of CL.

**Rural neighborhoods where the phlebotomines were collected:**

1. Água da Jacutinga (23° 05’S/50° 25’W). Two farms were selected from which to collect the samples: (3 irmãos Farm and Silva Farm). In the first one, the traps were installed in the woods 984.25m from a house (E1); in a chicken coop (E2); 9.84m from a house (E3), and in a pigsty 6.56m from this same house (E4). In the second farm, the traps were installed in a pigsty 64.04m from a house (E5); in the woods, 984.25m from the same house (E6); in a house made of wood which is used as chicken coop and is 6.56m from another house (E7); and in a banana plantation (E8). In both farms there are soybean and sugar cane plantations.

2. Água das Perobas (23° 14’S/50° 18’W). Samples were collected in Peroba Farm. The traps were installed in sites (E1, E2 and E4) which were located behind the houses (E3, E5, E6, E9) where traps were also installed; in chicken coops (E7, E8) 6.56m from these houses, and in the woods, 984.25m from the same houses.
in Cateto Nomura Farm in houses (E1, E2, E5, E8 and E9); in chicken coops close to these houses (E3, E4 and E7); in a pigsty (E6) near these same houses, and in a corral (E10). Considering all the localities where the work was done, this one has the largest residual area, which is located approximately 656.17m from the residences.

6. Água Vermelha (23°09'S/50°26'W). The collect was done in Boa Vista Farm in houses (E1, E2, E6 and E8); chicken coops (E3 and E9); in a pigsty (E4) 196.85m from the woods (E5), in a hangar (E7), and in a dam shore (E10) 6.56m from the woods.

7. Água do Cateto (23°06'S/50°20'W). The collections were done in Tanaka Farm, in two houses (E1, E6); in a chicken Coop (E2); in a corral linked to a pigsty (E3); in a duck barn (E4); in canebraes (E5, E8); in a pigsty (E7) and in hangars (E9, E10). The house (E1) was 6.56m from the chicken coop (E2) and the corral linked to the pigsty (E3). The pigsty was located 6.56m from E6.

8. Água da Boa Pastora (23°08'S/50°22'W). The phlebotomines collection was done in São Luiz Farm, Francisco Marques and Bela Manhã Farms. In the first one, in a chicken coop (E1) and in a house (E2). In Francisco Marques Farm, the collection was done in a goat barn (E3); in a pigsty (E4); in a house (E5) and in a chicken coop (E6). In the last one, in a pigsty (E7); in a chicken coop (E8) and in two houses (E9, E10).

Collection and phlebotomines identification: The phlebotomines were caught in 15 localities distributed between eight rural neighborhoods. During area selection, in order to implement the capture, six disease registers in humans were found in two of these areas and in two of them there was no occurrence. The collection was done with a light trap, from 8pm to 6am, from January to March and September to December of 2008, and it consisted of two collections per locality (20 hours).

The number of traps installed in each locality varied from eight to ten because of each house’s availability and other ecotopes in the peridomiciliary area. The collected specimens were sacrificed in chloroform and then kept in cardboard boxes containing mothballs. Phlebotomines were prepared and identified in the Medical Entomology Laboratory of 19th Health Dept. of Jacarezinho, Parana State. The nomenclature follows GALATI and abbreviation follows MARCONDES.

RESULTS

A total of 4,790 phlebotomines, belonging to 11 species, were collected: Nyssomyia neivai, Nyssomyia whitmani, Pintomyia pessoai, Migonemyia migonei, Pintomyia fischeri, Evandromyia cortezzii, Micropygomyia ferreirana, Expapillata firmatoi, Brumptomyia brumpti, Evandromyia sallesi and Brumptomyia cunhai. The hourly average (HA) of total phlebotomines collected was 239.5 (Table 1).

In the Água do Cateto, Água da Boa Pastora and Água das Perobas neighborhoods 79.6% (HA = 190.20) of its total was collected. The most frequent species collected were Ny. neivai (HA = 104.70), Ny. whitmani (HA = 96.95) and Pi. pessoai (HA = 26.25) (Table 1).

In its total neighborhood set 1,788 (HA = 89.40) phlebotomines were collected in 20 chicken coops, 1,350 (HA = 67.50) in 15 piggeries and 973 (HA = 48.65) in 26 house porches (Table 2).
The eleven species collected in several districts of the municipality of Bandeirantes has already been described in several municipalities of Paraná State and Santa Catarina States. The first four species were already marked with natural infection by Leishmania genus in other regions of Brazil, showing the potential of vector insects in natural and anthropogenic environments demonstrating that these species of phlebotomine sand flies present genetic characteristics that allow them to adapt to anthropogenic environments with distinct levels of changes and due to “a sort of” spatial, olfactory memory and/or to the host fidelity that direct sand flies present genetic characteristics that allow them to adapt to anthropogenic environments with distinct levels of changes and due to “a sort of” spatial, olfactory memory and/or to the host fidelity that direct.
In the majority of the districts where the phlebotomine collections were made in bad hygiene condition homes the presence of humidity and organic matter in the soil (leaves, fruits, domestic animal feces, food and vegetal waste) of domestic animals shelters and residences in the neighborhoods of remaining forests was noticed in the peridomical. These factors are crucial for the formation of phlebotomine breeding sites that invade domiciles, increasing the vulnerability of the inhabitants to the CL.

CONCLUSION

In the neighborhoods where the collections were done, 10 phlebotomines species were found, and, among those, *Ny. neivai* and *Ny. whitmani* were the main ones. Domestic animal shelters are the ecotopes where these insects frequency occurs the most. The localities where the collections were done have environmental characteristics that allow *Leishmania* transmission persistence.

Even though fauna and phlebotomines species behavior are similar in many localities, the control method of these insects has to be adjusted to the environmental characteristics of each CL endemic area in Paraná municipalities.

The detailed knowledge on the localities where there is leishmaniasis transmission chain gives the public health administration the option to choose more efficient methods in order to control the spread of the disease. The municipalities have not maintained their promise when it comes to the endemic control of diseases that involve vectors, and it shows the demand for changes in Ministry of Health policies. The increase of cases of diseases related to these insects shows the need to capacitate community health agents for vector vigilance development activities.

RESUMO

Flebotomíneos em localidades rurais do Estado do Paraná, Sul do Brasil

Relatam-se, neste trabalho, a fauna e frequência de flebotomíneos em abrigos de animais domésticos, residências e outros ecótopos em áreas rurais do município de Bandeirantes, Estado do Paraná. Os flebotomíneos foram coletados em oito bairros rurais, com armadilhas de Falcão, duas vezes em cada bairro, das 20 às 6 horas, em 2008. No conjunto dos bairros coletaram-se 4,790 flebotomíneos, representados por dez espécies, com predomínio de *Nyssomyia neivai* e *Nyssomyia whitmani*. Os abrigos dos animais domésticos são os ecótopos onde há maior frequência desses insetos. As localidades onde as coletas foram realizadas têm características ambientais que permitem a persistência da transmissão de parasitos da leishmaniose tegumentar americana. Apesar da fauna e do comportamento das espécies de flebotomíneos serem semelhantes nas diversas localidades, o método de controle desses insetos deve ser ajustado às características ambientais de cada uma das mais diversas áreas endêmicas de leishmaniose tegumentar americana, nos municípios do Paraná.

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