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## Risk of domiciliation of *Triatoma williami* Galvão, Souza e Lima, 1965 in a municipality of Brazilian Legal Amazon region

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### ABSTRACT

**Objective:** To notify the positivity and presence of vectors in natural and artificial ecotopes and analyze the basic knowledge of the Chagas disease vectors among population of amazon legal municipality. **Methods:** The molecular confirmation of the parasite species was by PCR using species-specific markers. Data collection was conducted using semi-structured interviews. **Results:** All of 34 specimens collected were classified to be a single species, *Triatoma williami*. The natural infection rate of vectors in the specimens by *T. cruzi* was 30%. Most interviewees recognized adult triatomines. For 24.43% of respondents who had found the vector inside the house the main practice reported was killing the insects by crushing. **Conclusions:** Despite the knowledge shown by the residents, educational measures are needed to improve entomological surveillance of Chagas disease into enzootic amazon area.

## 1. Introduction

Chagas disease is resulted from etiologic agent *Trypanosoma cruzi* (*T. cruzi*), the protozoan flagellate described by Carlos Chagas in 1909. This disease is widespread mainly in the Americas, from Mexico to Southern Argentina. In addition, there are approximately 100 million people living in these regions, increasing the risk of acquiring the disease<sup>[1]</sup>.

According to recent data it is estimated that there are 8 to 10 million infected individuals in Americas<sup>[2,3]</sup>. The symptoms of infection are large and can cause illness from acute or chronic benign lesions to disease in heart or digestive tract which can lead an individual to death<sup>[4]</sup>.

Despite the possibility of human infection during procedures such as blood transfusion, transplantes<sup>[5]</sup>, or by accidental ingestion of food contaminated with parasite<sup>[6]</sup>, the main mode of transmission of *T. cruzi* is vectors<sup>[7]</sup>.

The parasitic flagellate *T. cruzi* is transmitted into the body of the vertebrate host when it instinctively rubs the feces of the insect bite site, mucous membranes, or any injury on the skin, after the blood meal and defecation of vector<sup>[3]</sup>.

The vectors of Chagas disease are popularly known as “kissing bugs” and have wide distribution in the Americas. These insects belong to the order Hemiptera, family and Reduviidae Triatominae with 138 species described<sup>[8]</sup>. The bugs are hemimetobolics, the egg hatches, the nymph, which gives rise to five nymphal stages and finally to the adult insect. All are obligatory hematophagous, males, females, nymphs and adults<sup>[9]</sup>. However, it is important to note that only adults are winged, and therefore has great epidemiological importance<sup>[10]</sup>.

Another factor limiting the vectorial capacity of triatomines is its food source. Species with tropism for birds, refractory to the parasite *T. cruzi*, are not important vector, eg. *Triatoma sordida* (*T. sordida*)<sup>[11–13]</sup>. Consequently, only species of triatomines that have wild mammals as a food source such as bats, marsupials, rodents, dogs and primates, which are competent hosts of *T. cruzi*, become infected during blood feeding and can transmit the parasite to other hosts<sup>[14–16]</sup>. Thus, among the 138 described species of triatomines, few are effective vectors of Chagas

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disease, due mainly to adapt to domestic environments and their anthropophilic behavior. Among these species, are: *Rhodnius prolixus*, *Triatoma infestans* (*T. infestans*), *Triatoma dimidiata*, *Triatoma brasiliensis* and *Panstrongylus megistus* (*P. megistus*) as the main vector of *T. cruzi* in Latin America[12].

Interestingly, these insects in the natural environment are related to their food source, so it is possible to relate triatomine species with their natural ecotopes that serve as shelter and food. For example, *T. sordida* shows marked bird watching and of course is present in the nests of birds, dry wood. However, when food supply is depleted in these habitats, these vectors seek artificial ecotopes, like chicken and even invade and colonize human houses[12].

Species like *P. megistus*[17,18], and *Rhodnius stali* are naturally found in palm[19]. However, despite the need to keep these insects shelter and a stable food source for their development, some wild species are attracted to and adapted to the artificial environment human[20].

Usually the artificial biotope triatomines live in the cracks of homes in rural or urban. Seek shelter during the day, and nocturnal, feeding on human blood, pets, or rodents synanthropic[3]. Consequently, the triatomines species with higher capacity to adapt to anthropized environment are the main vector responsible for transmitting the parasite that causes disease Chagas[21].

Thus, the success of campaigns to control the vector transmission of Chagas disease based on the identification and elimination of synanthropic species[22]. Previously, we reported the presence of *Triatoma williami* naturally infected with *T. cruzi* parasites in the urban community area (BNH) and into military area (CINDACTA–I) located into Serra Azul Park at Barra do Garças city, Amazon region, Brazil (15 ° 53'24" S, 52 ° 15'24" W)[23].

The finding of transmitting vectors of Chagas disease in animal sheds Barra do Garças, motivated the development of scientific research on the endemic incidence of these vectors, mainly due to favorable environmental characteristics of the region for the establishment of the vector potential and possible transmission parasite *T. cruzi* positive case.

So we begun the implementation of this survey triatominic to carry out exploratory research among the residents, to identify the basic knowledge of trypanosomiasis and its vectors in the fields of ecology and health, mainly due to the location of the neighborhood, the slope of Serra Azul Park.

## 2. Materials and methods

Obtaining the vectors are given by capturing indirect, which were obtained in all 34 specimens, from donations made by residents of the neighborhood and BNH effective CINDACTA–I. For containment of specimens provided to the population involved in the research, collecting universal Farmax sealed with screens in the upper portions to assist in the maintenance of the vectors, increasing the chances of confirmation of the parasite. The species of triatomine was identified by morphological aspects[24]. Triatomines feces, were collected for fresh examination and specific detection of *T. cruzi* DNA by polymerase chain reaction was carried out with oligonucleotides complementary to the kDNA minicircle sequence; a 330 bp fragment containing the variable regions of the parasite[23].

The strategy of data collection in 376 households were georeferenced through a questionnaire composed of eight questions categorized in order to obtain their perception of respondents on the variables chosen to assess the quality of information and analytical environment[25]. All interviews were conducted after acceptance of informed consent.

For the analysis of the data contained in the questionnaire, we used Microsoft Office Access 2007, while the global positioning data were measured with GPS Garmin 60 CSx.

## 3. Results

The 34 specimens which were acquired by collecting indirect, in the course of the investigation from April 2009 to August 2010 were classified as belonging to a single species, *T. williami*. The natural infection rate of vectors in the specimens by *T. cruzi* was 30%. The taxonomy was confirmed in this work, by PCR, generating a molecular profile of 330 bp, corresponding to species-specific band.

As seen in Table 1, most interviewees recognized adult triatomines. The 24.43% of residents claimed to have found the vector inside the home as it can contribute to a possible inference of the vector clearance in artificial biotope investigated. The data also showed high frequencies in the elimination of the vector by crushing practice, in all age groups categorized.

**Table 1.**

Frequencies of answers to questions related to the vector given by respondents in three age groups of the sample.

Questions about the vector	Age Groups (year)						IC	95%
	07–15		16–50		51–85			
	N°	%	N°	%	N°	%		
You know the barber?								
no	2	40	58	28	11	1	-51.03	98.36
yes	3	60	149	72	74	87	-106.03	256.69
Have you seen a barber?								
no	3	60	107	52	24	28	-91.94	181.27
yes	2	40	100	48	61	72	-68.23	176.89
Where did you see the barber?								
At home	1	20	45	22	30	35	-30.23	80.89
woods near	1	20	4	2	3	4	-1.12	6.46
Another place	3	60	154	74	20	24	-146.46	264.46
chicken	0	0	0	0	0	0	0.00	0.00
What made the barber?								
killed with insecticide	0	0	3	1	1	1	-246	5.12
killed crushed	1	20	31	15	27	32	-20.79	60.13
tossed in the trash	0	0	2	1	1	1	-1.48	3.48

IC 95%: confidence interval 95%

## 4. Discussion

Chagas disease represents the leading cause of cardiac lesions in young, economically productive adults in endemic countries in Latin America[4]. Even with important gains in control of vectorial transmission of Chagas disease by *T. infestans*, the main vector of *T. cruzi* in Brazil, several factors also promote the maintenance of the life cycle of the parasite *T. cruzi* thus enabling the recrudescence of the disease[11,14]. Among them the high diversity of species

and the synanthropic triatomines and low knowledge of the population living in zoonotic area[25,26].

An important fact to be considered was the entomological survey was conducted between 2000 and 2003, had been shown *T. williami* resident infected with *T. cruzi* in Goiás, a neighboring state of Mato Grosso and the environmental conditions favorable to the spread and development of vectors with shelter and food available[13]. The analysis allows us to draw the general profile of the residents of the study area, which have good education, but have not mastered the basic factors for the prevention of Chagas disease.

The practice of using insecticides, such as chemical control of vectors, will hardly reach satisfactory results, as well as decimating species of triatomine, will require an annual application and accurate understanding of the complex temporal pattern of migration of the insects. Moreover, the use of mosquito nets may contribute to the containment process of potential disease vectors supplied by the insects[7]. Thus, the use of mosquito nets may offer a viable and environmentally friendly alternative to neighborhood BNH residents and military CINDACTA I.

### Conflict of interest statement

We declare that we have no conflict of interest.

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