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Retrospective study of triatomines in an endemic region for Chagas disease in the state of Bahia, Brazil

Estudo retrospectivo de triatomíneos em região endêmica para a doença de Chagas no estado da Bahia, Brasil

Jéssica Samile Sousa Santos[1]*, Alini Dias de Pauda[1], Joane Maíra Cavalcante Braga Novais[1], Jairo Torres Magalhães Junior[1], Ianei de Oliveira Carneiro[2], Flavia dos Santos[1]

ABSTRACT: Chagas disease is caused by *Trypanosoma cruzi*, which has several forms of transmission. Among them, the vector route requires the constant action of the Health Surveillance in the control of triatomines. Our objective is to describe the diversity of triatomines and the rate of natural infection by *T. cruzi* in these insects, as well as to analyse entomological indicators, through secondary data generated by the Health Surveillance of the municipality of Barra, in the period from 2009 to 2019. The secondary data were subjected to descriptive analysis and the entomological indicators calculated. Williams' G test and Fisher's exact test were used to analyse the categorical data. A total of 10,913 triatomines of the genera *Rhodnius sp*., *Panstrongylus sp*., *Eratyrus sp.* and *Triatoma sp*. were captured, represented by 12 species. *Triatoma sordida* was the most prevalent 98.66% (10,767/10,913), reflected in the overall infestation index 7.61% (2,555/33,544) and triatomine density 0.24 (8,247/33,544). While the overall infection rate was 0.81% (41/5,048) and remained low during all years. There was significant association for *T. sordida* in relation to "*T. cruzi* infection index" and "Developmental stage" and "Capture site". It is concluded that the municipality of Barra has a high occurrence of triatomines of various species, with *T. sordida* being the most prevalent species and responsible for the rates of infestation and infection by *T. cruzi*. The presence of these insects in households is a risk for the domestic cycle of the parasite, and thus can transmit *T. cruzi* to various domestic animals, including humans.

KEYWORDS: Vector control; entomological indicators; *Triatoma sordida*; *Trypanosoma cruzi*.

RESUMO: A doença de Chagas é causada pelo *Trypanosoma cruzi,* que possui diversas formas de transmissão. Dentre elas, a via vetorial, requer a atuação constante da Vigilância em Saúde no controle dos triatomíneos. Nosso objetivo é descrever a diversidade de triatomíneos e o índice de infecção natural por *T. cruzi* nestes insetos, bem como analisar os indicadores entomológicos, por meio de dados secundários gerados pela Vigilância em Saúde do município de Barra, no período de 2009 a 2019. Os dados secundários foram submetidos a análise descritiva e os indicadores entomológicos calculados. Os testes G de Williams e exato de Fisher foram utilizados para a análise dos dados categóricos. Foram capturados 10.913 triatomíneos, dos gêneros *Rhodnius* sp., *Panstrongylus* sp., *Eratyrus* sp. e *Triatoma* sp., representados por 12 espécies. *Triatoma sordida* foi a mais prevalente 98,66% (10.767/10.913), refletindo no índice de infestação geral 7,61% (2.555/33.544) e densidade triatomínea 0,24 (8.247/33.544). Enquanto que o índice de infecção geral foi de 0,81% (41/5.048) e manteve-se baixo durante todos os anos. Houve associação significativa para *T. sordida* em relação ao "Índice de infecção por *T. cruzi*" e "Estágio de desenvolvimento" e "Local de captura". Conclui-se que o município de Barra apresenta uma alta ocorrência de triatomíneos de diversas espécies, sendo *T. sordida* a espécie mais prevalente e responsável pelos índices de infestação e infecção por *T. cruzi*. A presença desses insetos nos domicílios é um risco para o ciclo doméstico do parasito, podendo assim transmitir o *T. cruzi* para diversos animais domésticos, inclusive humanos.

PALAVRAS-CHAVE: Controle vetorial; indicadores entomológicos; *Triatoma sordida*; *Trypanosoma cruzi*.

[1]Multidisciplinary Center of the Campus de Barra (CMB) of the Federal University of West Bahia – UFOB, 23 de Agosto, s/n, Barra, Bahia, Brazil, 47100-000.
[2]Salvador University-UNIFACS, Av. Luiz Viana Filho, 3146, Salvador, Bahia, Brazil, 41720-200; Postgraduate Program in Collective Health, Collective Health Institute (ISC), Federal University of Bahia-UFBA, Basílio da Gama, s/n, Salvador, Bahia, Brazil, 40110-040.
*Corresponding author: djessikassssgg@gmail.com
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INTRODUCTION

Chagas disease (CD) is caused by *Trypanosoma cruzi*, a flagellated protozoan belonging to the class Kinetoplastea, family Trypanosomatidae (SCHOCH et al., 2020). This disease is also known as American trypanosomiasis is considered as one of the main endemic diseases in Latin America, consequently, object of several discussions in public health in Brazil, since it is widespread in the country (DIAS et al., 2016). The disease is a zoonosis impacted by anthropic actions, such as degradation and occupation of natural space, whose triatomine vector benefits from the narrowing resulting from these changes by expanding its dispersion, its shelter sites, approaching households and diversifying the food source for domestic animals (dogs and cats), synanthropic animals (rodents and marsupials) and even humans (MEIS; CASTRO, 2017). Considered as one of the main neglected parasitic diseases, CD is closely associated with a population with socioeconomic vulnerability, low education, concentrated in rural areas, or even in poorly developed places, in which actions or health services are scarce or non-existent, causing the disease to go unnoticed (OLIVEIRA, 2018).

Humans in the acute phase of infection may be asymptomatic, however, when symptomatic, it is common to present fever, subcutaneous oedema, inappetence, and asthenia (DIAS et al., 2016). While in the chronic phase, the carrier can present cardiac or digestive symptoms, and in more severe cases present both symptoms (SCHMIDT et al., 2016; SOUZA; POVOA, 2016). The symptomatology manifestation is complex and depends on the immune system of the individual, the parasite load in the body, the route of transmission, and the strain of the parasite (DIAS et al., 2016). Currently the main route of infection reported in Brazil is the oral route, followed by the vector-borne route, congenital route, blood transfusion, and organ transplantation (BRASIL, 2019). The vector route occurs after hematophagy of infected triatomines, when they release in the faeces infective forms of *T. cruzi* on the surface of the scarified skin and mucous membranes of their vertebrate hosts (MEIS; CASTRO, 2017), thus presenting great epidemiological importance in the CD cycle, mainly due to the difficulty of combating triatomines (SILVEIRA; DIAS, 2011).

About 153 species of triatomines are distributed around the world, of these, 68 are present in Brazil (GALVÃO, 2014), and 26 species are recorded in the state of Bahia. These are grouped in the genera *Triatoma* sp., *Rhodnius* sp. and *Panstrongylus* sp., all of epidemiological importance in the chain of transmission of *T. cruzi* (SOUSA et al., 2020), highlighting the species *Triatoma sordida*, with occurrence throughout the state (RIBEIRO et al., 2019).

The control of vector infection in humans is structured by the National Program for the Control of Chagas disease (PCDCh), developed by the Health Surveillance and/or Entomological Surveillance bodies. The program uses active and passive search, chemical control, and health education activities (DIAS et al., 2016). The active search is the investigation of triatomines inside the home, or also called intradomicile, and outside the home, or peri-domicile. While the passive search would be the reflection of health education, in which the conscious population takes the triatomine to the local surveillance service. As for the chemical control, also carried out by the surveillance service, it relies on the spraying of insecticides with high residual power in peri and intra-domicile areas with detection of triatomines (SOUSA et al., 2020).

Since 2006 the Western Bahia region has been classified as high risk for vector transmission of *T. cruzi* (FIGUEIREDO et al., 2018). The municipalities in this region have similar characteristics that place them at risk for most neglected diseases, such as high levels of adult illiteracy, poor basic sanitation, low household income *per capita*, high concentration of income, a large rural population, as well as being municipalities with large tracts of land and with areas of difficult access (BRASIL, 2016).

Given this, the aim of this study was to describe the diversity of triatomines and the rate of natural infection by *T. cruzi* in these insects, as well as to analyse the entomological indicators generated by the Health Surveillance of the municipality of Barra, Bahia, Brazil, in the period between 2009 and 2019.

MATERIALS AND METHODS

Study design: This is a descriptive, cross-sectional, retrospective study, carried out through the analysis of the annual technical epidemiological reports on vectors, secondary data, from the Health Surveillance of the municipality of Barra, of triatomines captured in the period from 2009 to 2019, according to what is established by the National Program for the Control of Chagas disease (PCDCh).

Study area: The municipality of Barra is located in Western Bahia, and is characterized as one of the largest in the state, with an area of 11,414 km² (Figure 1). It has a population of 53,910 inhabitants, with more than half living in rural areas and practicing subsistence farming, representing one of the lowest human development indexes in the state. The predominant vegetation is *Caatinga*, and the climate is semi-arid and hot (IBGE, 2021).

Capture, taxonomy and parasitology of triatomine faeces: The captures of triatomines were performed as established by the PCDCh in localities with a previous history of triatomine infestation and were part of the regular activity of the endemic agents, who are technicians from the municipality's Health Surveillance. Insect captures were also made in households where residents spontaneously delivered triatomines to the surveillance service.

The insects were captured in the houses with the help of metallic tweezers and flashlights, and the places that would serve as possible shelter for the triatomines were investigated, always from left to right, considering the door of the house

room as the starting point. In the intra-domicile, cracks in floors, holes in walls, behind furniture or paintings were checked. In the peri-domicile, piles of tiles, wood and stones, and outbuildings for raising domestic animals were inspected. Figure 2 shows the peri-domicile of a residence located in the urban area of Barra. Each specimen found was placed in a previously identified and aerated jar (OBARA; WANDERLEY; SILVA, 2014).

The identification of triatomines was performed by stereomicroscopy in an electronic magnifier (Olympus, model SZ2-ILST) evaluating the morphology of the head, thorax and abdomen, according to the identification keys of Lent; Wygdzinsky (1979) and Galvão (2014). After the determination of the species, all the triatomines were submitted to parasitological examination, done from the abdominal compression of the insect, for diagnosis of infection by trypanosomatids similar to *T. cruzi*. The faeces obtained were placed on a slide with a drop of 0.9% saline solution and observed under an optical microscope with a 40x objective. In the interpretation of the results were considered positive

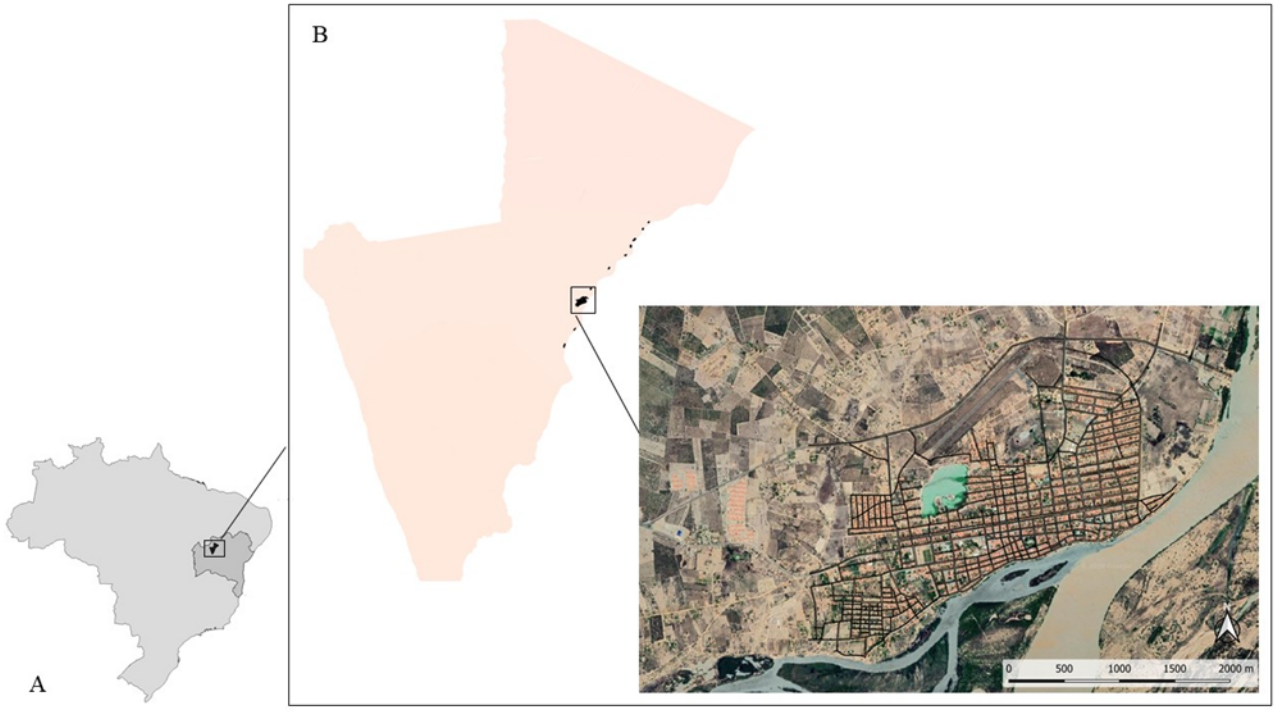

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Figure 1. A: Map of Brazil and Bahia, showing the municipality of Barra. B: Map of the municipality of Barra, showing its territorial extension (in pink), emphasizing the urban area of the municipality (in black). The image in the lower right corner shows its headquarters.

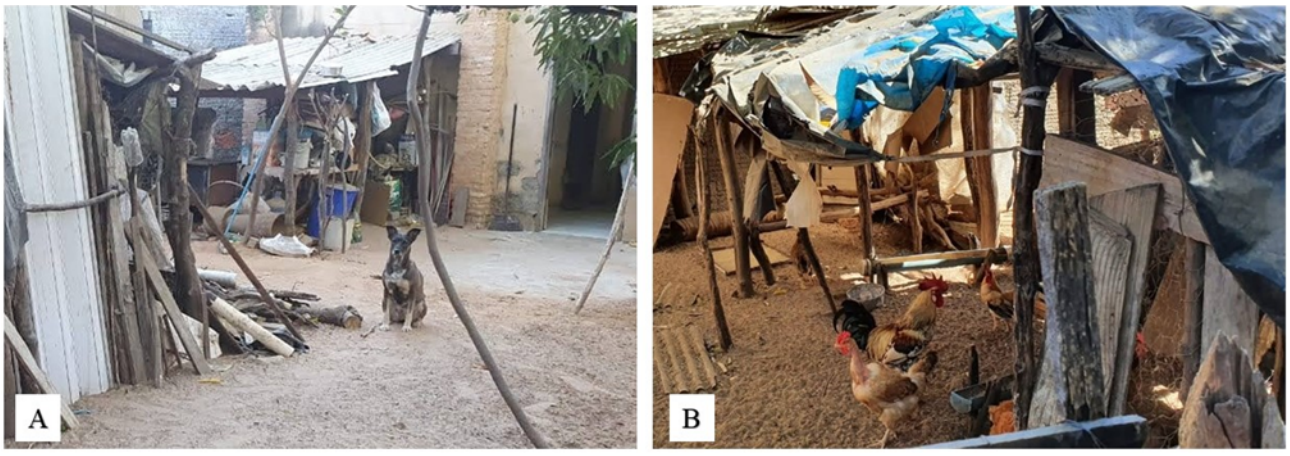

Figure 2. Household peri-domicile of a residence in the urban area of Barra, Bahia, Brazil, characterizing a propitious environment for colonization by triatomines. A: arrangement and organization of the peridomicile space with a dog belonging to the environment. B: outbuilding for raising chickens.

for *T. cruzi* those slides showing flagellated trypanosomatids (VASCONCELOS et al., 2013).

Entomological indicators: Based on the secondary data of triatomines captured in the period from 2009 to 2019, generated by the Health Surveillance of the municipality of Barra within the PCDCh it was possible to analyse the following entomological indicators: i) the natural infection index, which is the percentage of triatomines infected by *T. cruzi* in relation to those examined x 100; ii) the number of triatomines captured according to their developmental stage (adults and nymphs); iii) number of triatomines captured in the peri- and intra-domicile; iv) general infestation index, number of households positive for triatomines in relation to the number of residences surveyed x 100; v) general triatomine density, number of triatomines captured in relation to the number of residences surveyed. The data generated were arranged and accounted in spreadsheets in Excel - Office 2013 Copyright© Microsoft Corporation software and subjected to descriptive evaluation, being shown in tables in the form of absolute frequency and percentage.

A statistical association was analysed between the dependent variable: "Result of parasitological examination of triatomine stool by vector species (positive or negative for *T. cruzi*)" and the independent variables: "Place of capture of triatomines (intra-domicile or peri-domicile)" and "Developmental stage of the triatomine (adult or nymph)." For these analyses the following statistical tests were used: Williams adjusted G-test and Fisher's exact test (BioEstat 5.3 program), with a significance level of 5%. Data were presented based on the statistical test value, p-value, Odds Ratio (OR) and Confidence Interval (95% CI).

RESULTS

The Health Surveillance of the municipality of Barra captured a total of 10,913 triatomines between 2009 and 2019. The annual average of insects captured during this period was 1,091 specimens, with the quantitative of triatomines obtained annually exceeding this average in the years 2009, 2014, 2015, 2018, 2019 (Table 1).

The triatomine infestation and density indices were evaluated considering the domiciles surveyed in rural and urban areas. From the year 2011 to 2019, 33,544 residences were visited, of these 2,555 had an occurrence of triatomines. Thus, generating an overall infestation index of 7.61% (2,555/33,544)

Table 1. Entomological indicators of triatomines captured by the Health Surveillance of the Municipality of Barra, Bahia, in the period from 2009 to 2019.

Year	Quantity				General density	Positive for *T. cruzi*				N.I.I %
	Intra		Peri			Intra		Peri		
	A	N	A	N		A	N	A	N	
2009	27	14	847	881	-	1	0	11	4	1.11 (16/1,442)
2010	14	7	430	446	-	2	1	2	0	1.75 (5/285)
2011	5	4	386	283	0.275 (678/2,464)	0	0	3	4	1.63 (7/429)
2012	10	3	671	364	0.236 (1,048/4,438)	0	0	0	0	0 (0/261)
2013	6	0	181	183	0.155 (370/2,384)	0	0	0	0	0 (0/156)
2014	15	8	670	468	0.254 (1,161/4,567)	0	0	0	0	0 (0/500)
2015	16	5	701	481	0.196 (1,203/6,134)	0	0	2	0	0.50 (2/396)
2016	7	2	551	384	0.179 (944/5,260)	0	0	2	2	0.64 (4/623)
2018	22	17	1.013	496	0.244 (1,548/6,335)	0	0	3	0	0.84 (3/354)
2019	20	8	671	596	0.660 (1,295/1,962)	1	0	2	1	0.66 (4/602)
Total	142	68	6.121	4.582	0.24 (8,247/33,544)	4	1	25	11	0.81 (41/5,048)

Intra: intra-domicile; Peri: peri-domicile; A: adults; N: nymphs; N.I.I.: Natural Infection Index by *T. cruzi*.

and overall triatomine density of 0.24 (8,247/33,544) (Table 1). The years 2009 and 2010 were not accounted for, because the Health Surveillance did not have the data for these years.

Twelve species of triatomines were found in the period from 2009 to 2019, (Figure 3). Among them the most commonly found was *T. sordida*, followed by the species *T. pseudomaculata*. Both species contributed to the highest rate of *T. cruzi* infection (Table 2). There was a statistically significant association for *T. sordida* species in relation to "Result of triatomine parasitological stool testing " and the "Capture site" [Williams' G = 7.39; p= 0.007; OR= 8.71 (95% CI = 3.00-25.27)] and "Developmental stage" [Williams' G = 8.52; p= 0.004; OR= 2.67 (95% CI = 1.34-5.31)]. While for the species *T. pseudomaculata* there was no statistically significant association (p>0.05) when analysing the same variables, "Capture site" [Fischer's exact; p= 0.2195; OR= not calculated)] and "Developmental stage" [Fischer's exact = 8.52; p=0.5302; OR= not calculated)]. The same statistical analyses were not performed for the other species of triatomines, because the number of specimens captured was insufficient to perform the tests.

DISCUSSION

In the period from 2009 to 2019 a high number of triatomines (10,913) were captured in the municipality of Barra. Considering that more than half of the studied population lives in rural areas, this was the origin of higher prevalence for the insect vectors, however, the data provided by the Health Surveillance did not discriminate this information (rural or urban origin). In addition, the occurrence of triatomines was higher in the peri-domicile of the residences (98%), where it is common to have a greater availability of food due to the habit of raising domestic animals in outbuildings such as, pigsties, corrals and chicken coops (ABAD-FRANCH et al., 2014). However, there was also an occurrence of triatomines in the intra-domicile (2%), which offers a risk of transmission of *T. cruzi* to humans and domestic animals (NOIREAU; DUJARDIN, 2010).

The annual average of triatomines (n=1,091) found in the municipality of Barra is higher than that detected by Melo et al. (2018) in the state of Sergipe, where 838 triatomines were captured in six years of study (average=140). The survey of these insects conducted in the municipality of Aurora, state of Ceará, showed that 1,176 triatomines were captured in four years (average=294) (PINTO et al., 2017). While Barreto et al. (2019) accounted 5,370 triatomines in nine municipalities located in the state of Rio Grande do Norte in the period of five years (average=1,074). These studies were conducted in regions of the Northeast in different periods and methodological conditions from Barra. Therefore, the differences in the annual averages of triatomines captured in these studies are due to several factors, such as: territorial extension of the regions studied; number of endemic disease agents available for vector control in each area; differences in the engagement of the population in the reporting of triatomines; structural and environmental characteristics of both the external environment and domiciles; environmental degradation, altering vegetation and reducing wild animals; and variation in the density of triatomines in each region. Such studies show the

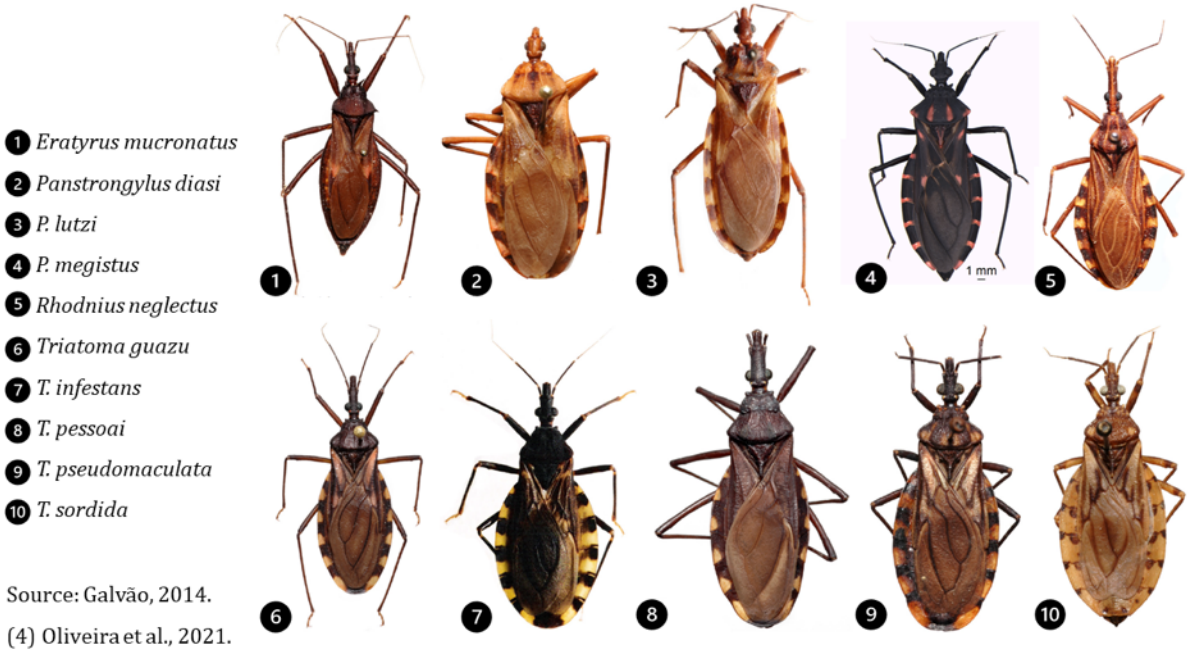

Figure 3. Triatomine species captured in domiciles by the Health Surveillance of the municipality of Barra, Bahia, in the period from 2009 to 2019.

high frequency of triatomines captured in the Northeast of Brazil, demonstrating the gravity of the situation and alerting to the importance of maintaining entomological surveillance activities (BARRETO et al., 2019; MELO et al., 2018; PINTO et al., 2017).

Despite the high number of captured specimens, only 46.2% were examined, reflecting the lower detection of *T. cruzi* and consequently the low overall natural infection rate (0.81%). This may have occurred due to the decentralization of financial resources and endemic disease agents assigned to other public health emergency programs, such as arboviruses, which present diseases with acute clinical picture and with greater repercussion in the media (PRIOTTO et al., 2014). In addition, the low rate of infection by *T. cruzi* in *T. sordida* contributed to the low overall natural infection rate, since it was the species with the most specimens examined and has the characteristic of feeding on birds, which are refractory to the parasite (JASEN; ROQUE; XAVIER, 2017). In addition, the parasitological test for *T. cruzi* detection has low sensitivity (PIZZARO; LUCERO; STEVES, 2007), and the insect may be infected and not be detected in the diagnostic test.

Considering that 57% of the triatomines present in the peri-domicile were adults, it is believed that this environment provides adequate shelter and food for the development and permanence of these insects. These conditions are usually found in the peri-domicile of residences in the municipality of Barra, and it is common the presence of outbuildings for animal rearing built with stakes of wood and palm leaves found in the region, providing shelter for the triatomines near possible food sources, such as chickens and dogs (Figure 2) (NOIREAU; DUJARDIN, 2010). In addition to these factors, the following factors also contribute to the colonization of the peri-domicile by triatomines: the low residual content of insecticides in this environment, when compared to the intra-household; the greater amount of hiding places and ecotopes (PESSOA et al., 2015), added to the precarious cleaning and organization by the residents (MENDES et al., 2013).

Despite the shorter stay of triatomines in the intra-domicile due to the lack of animals available for feeding (NOIREAU; DUJARDIM, 2010) and the absence of hiding places in physically well-structured houses (SILVEIRA; DIAS, 2011), its presence should not be disregarded, because besides the risk of vectorial transmission, there is the possibility of the faeces of these insects contaminating water and food, triggering CD in humans orally, as reported by Dias et al., (2008) in the municipality of Macaúbas, in the interior of Bahia, which led

Table 2. Triatomine species captured by the Health Surveillance of the municipality of Barra, Bahia, in the period from 2009 to 2019, distributed by capture site, developmental stage, and natural infection index by *T. cruzi*.

Species	Captured in the intra-domicile		Captured in the peri-domicile		Total/ environment		Total/ general (%)	Examined for *T. cruzi*	Positive/ environment		Positive/ general (%)
	A (%)	N (%)	A (%)	N (%)	Intra (%)	Peri (%)			PI	PP	
T. sordida	122 (65)	67 (35)	6,013 (57)	4,565 (43)	189 (2)	10,578 (98)	10,767 (98.66)	4,995	4	34	38 (0.8)
T. pseudomaculata	15 (94)	1 (6)	95 (86)	16 (14)	16 (13)	111 (87)	127 (1.16)	49	1	1	2 (4)
R. neglectus	1 (100)	0	3 (100)	0	1 (25)	3 (75)	4 (0.03)	1	0	0	0
P. lutzi	3 (100)	0	0	0	3 (100)	0	3 (0.02)	1	0	0	0
E. mucronatus	0	0	3 (100)	0	0	3 (100)	3 (0.02)	1	0	1	1 (100)
T. infestans	0	0	1 (50)	1 (50)	0	2 (100)	2 (0.01)	0	0	0	0
P. diasi	0	0	2 (100)	0	0	2 (100)	2 (0.01)	1	0	0	0
* Others	1 (100)	0	4 (100)	0	1 (20)	4 (80)	5 (0.04)	0	0	0	0
Total	142 (68)	68 (32)	6,121 (57)	4,582 (43)	210 (2)	10,703 (98)	10,913 (100)	5,048	5 (12)	36 (88)	41 (0.81)

A: adults; N: nymphs; Intra: intra-domicile; Peri: peri-domicile; PI: triatomine positive for *T. cruzi* in the intra; PP: triatomine positive for *T. cruzi* in the peri; *: In the intra-domicile 1 adult specimen of *T. pessoai* (0.009%), and in the peri-domicile 1 adult specimen of *P. lingnarius* (0.009%), *P. megistus* (0.009%), *T. guazu* (0.009%), *T. brasiliense* (0.009%).

to the illness of seven people from the same family, with two fatalities from *T. cruzi* infection. Another aggravating factor are the nymphs present in the intra-domicile (32%), which indicate colonization of the residences, which increases the possibility of blood repast, since nymphs feed more often than adults, thus possibly having greater human exposure, especially in households that do not have domestic animals such as dogs (JASEN; ROQUE; XAVIER, 2017).

Four genera of triatomines were found in the municipality, *Rhodnius* sp., *Panstrongylus* sp., *Eratyrus* sp. and *Triatoma* sp. The genera Rhodnius sp. and Panstrongylus sp. were observed less frequently, represented by five species, appearing randomly in seven of the ten years studied. All were negative for *T. cruzi*, denoting less epidemiological importance for the disease in this region.

The genus *Eratyrus* sp. described in countries situated in northern South America, and in states located in northern Brazil, for having a predilection for the humid tropical climate (OBARA et al., 2013), had its occurrence recorded in the municipality of Barra for three years, 2013, 2014 and 2018. In this last year of occurrence, the specimen found was infected for *T. cruzi*. Sousa et al., (2020) and Ribeiro et al., (2019) recently conducted a survey of triatomines in Bahia and did not depict the occurrence of this species in the state. *E. mucronatus* is described in the states of Amazonas, Mato Grosso, Pará and Tocantins, and has been reported in Maranhão (GALVÃO, 2014), and its appearance is considered a finding in Bahia, which is not yet described in the literature. The proximity between the studied location and the state of Tocantins may explain the presence of *E. mucronatus* specimens in the region (GALVÃO, 2014). This shows that the dispersal area of this species may be larger than reported, alerting to the importance of future studies in Barra to elucidate this finding. Added to this, one should consider the possibility of triatomine dispersal by anthropic actions (JESUS et al., 2021), already documented for *Triatoma pseudomaculata* and *Rhodnius nasutus* in the Northeast of the country (FREITAS et al., 2004; LIMA et al., 2012).

T. sordida, the most captured species in this analysis (98.66%), and with the highest rate of *T. cruzi* infection (0.8%) is commonly associated with chicken coops made of wooden stakes and artificial ecotopes, such as tiles and bricks scattered in the peri-domicile, which sometimes tend to have a greater disposition of animal food source, such as rodents (ROSSI; DUARTE; GONÇALVES, 2015). On the other hand, *T. pseudomaculata* which was the second most captured species (1.16%) and with the infection rate of 0.03%, is considered an arboreal species, associated with environments with little anthropic action (PARENTE et al., 2017), which is easily found in the territorial extension of the municipality. Both species, which are widely distributed in the Northeast of Brazil (BARRETO et al., 2019; MELO et al., 2018; PINTO et al., 2017; RIBEIRO et al., 2019), were the only ones found in all years of this study. The high density of triatomines of the species *T. sordida* and *T. pseudomaculata* in the peri-domicile, verified in this study, is justifiable due to the destruction and food shortage in the wild environment (PARENTE et al., 2017). Thus, enabling long-term home invasions by these triatomines, which are attracted by artificial light from the interior of the homes (NOIREAU; DUJARDIN, 2010). And even though the feeding habit of *T. sordida* is ornithophilic, its occurrence in domiciles shows a high risk for the domestic cycle of *T. cruzi.*

Despite the vector control of *T. infestans* in the last decade, Bahia still has residual foci of this species (ARAUJO et al., 2014; RIBEIRO et al 2019; SILVEIRA et al., 2016). In 2013, the municipality of Barra recorded the occurrence of two adult specimens in the peri-domicile, the only ones during the study period, confirming the effective control of this triatomine in Brazil (SILVEIRA; DIAS, 2011). The *T. brasiliensis*, common in some states of the northeast (BARRETO et al., 2019; FARIAS et al., 2019; MELO et al., 2018; PINTO et al., 2017), and in other municipalities in Bahia (RIBEIRO et al., 2019; SOUSA et al., 2020) only recorded occurrence of one specimen in the peri-domicile, in the year 2013, having little relevance for the studied region.

The occurrence of *T. cruzi* positive triatomines in the last 10 years in Barra demonstrates the vulnerability of this population to vector-borne infection. However, data from the municipality registered in the National Disease Notification System (SINAN) reveals no records of CD cases in the last decade, reporting only one hospitalization, in 2012, and four deaths, distributed in the years 2011, 2012, 2013 and 2017 (SESAB, 2020). In addition, Miranda et al., (2019) when evaluating 816,346 blood samples from blood donors residing in the State of Bahia between 2008 and 2018, did not detect positive cases in samples from individuals residing in the municipality of Barra. It is believed, therefore, that since there is no specific location for blood donation in the city, the representation of the individuals from Barra in this research was low, and most of those who have contact with the triatomines reside in rural areas, which would have greater difficulty in accessing the locations for blood donation. However, there has been a recent case report of acute natural infection by *T. cruzi* in a dog from this region (SILVA et al., 2020). Dogs are a link in the chain of transmission of this protozoan from the wild to the domestic environment, because they are more exposed to triatomines, especially when they stay overnight in the peri-domicile of residences, a place of higher occurrence of these insects (RIBEIRO et al., 2019). This reinforces the need for health education activities to make the population aware of the importance of notifying health surveillance and/or entomological surveillance of the occurrence of triatomines in their homes. Thus, making it possible to generate data that can promote effective control

of vector transmission in endemic areas and prevent the re-emergence of Chagas disease in humans.

CONCLUSION

During the period from 2009 to 2019, the municipality of Barra, Bahia, Brazil presented 12 species of triatomines, belonging to four genera described in the literature. Among the species found, *T. sordida* prevails in the rates of infestation and infection by *T. cruzi*. In households the preferred location for triatomines is the peridomicile and the majority of the insects captured are adults. The presence of these infected insects in homes is a risk factor for the domestic cycle of the parasite, which can transmit *T. cruzi* to various domestic animals, including humans.

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