LEPTOSPIROSIS IN THE HALITI-PARESÍ COMMUNITY FROM THE PERSPECTIVES OF SURVEILLANCE AND HEALTH PROMOTION

ABSTRACT
This is a quantitative study aimed to verify the seroprevalence of *Leptospira* sp. and risk factors of leptospirosis in the Haliti-Paresí indigenous community, north of Mato Grosso. For this was collected 73 paired samples of serum from indigenous participants in the cohorts conducted in 2014 and 2015 in Haliti-Paresí villages, municipality of Campo Novo do Parecis, State of Mato Grosso, Brazil. In this scenario analysis, female Indians (65.75%) was predominant, aged 20 to 39 years (39.73%), with incomplete elementary education (42.47%). The prevalent occupational activity was taking care of the home, family, collection in the cerrado and cultural activities (35.61%). Rodents were seen by 46.58% and of these, 55.88% said they were in the vicinity/interior of the house. There was no seroreactivity for leptospirosis among Haliti-Paresí in the biennium analyzed and no reports of symptomatology compatible with this zoonosis. Although, in their daily lives, they have proximity to the wild environment and their animals, environmental changes caused by agriculture and other risk factors, health surveillance actions are crucial and determinant for the absence of prevalence. Surveillance actions when planned and articulated become effective preventive measures, capable of promoting health and guaranteeing quality of life.
Keywords: Leptospirosis, Vulnerable Populations, Health Promotion, Population Surveillance.

LEPTOSPIROSE NA COMUNIDADE DE HALITI-PARESÍ NAS PERSPECTIVAS DA VIGILÂNCIA E PROMOÇÃO DA SAÚDE

RESUMO
Trata-se de um estudo quantitativo que objetivou verificar a soroprevalência de *Leptospira* sp. e fatores de risco para leptospirose na comunidade indígena Haliti-Paresí, norte de Mato Grosso. Para isso, foram coletadas 73 amostras pareadas de soro de indígenas participantes das coortes realizadas em 2014 e 2015 nas aldeias Haliti-Paresí, município de Campo Novo do Parecis, Estado de Mato Grosso, Brasil. Nessa análise de cenário, predominou o sexo feminino (65,75%), com idade entre 20 e 39 anos (39,73%) e ensino fundamental incompleto (42,47%). A atividade ocupacional prevalente foi cuidar do lar, família, coleta no cerrado e atividades culturais (35,61%). Os roedores foram vistos por 46,58% e destes, 55,88% afirmaram estar nas proximidades / interior da casa. Não houve sororreatividade para leptospirose entre Haliti-Paresí no biênio analisado e nenhum relato de sintomatologia compatível com esta zoonose. Embora, em seu dia a dia, tenham proximidade com o meio silvestre e seus animais, mudanças ambientais causadas pela agricultura e outros fatores de risco, as ações de vigilância sanitária são cruciais e determinantes para a ausência de prevalência. As ações de vigilância quando planejadas e articuladas tornam-se medidas preventivas eficazes, capazes de promover a saúde e garantir a qualidade de vida.
Palavras-chave: Leptospirose, Populações Vulneráveis, Promoção da Saúde, Vigilância Populacional.

LEPTOSPIROSIS EN LA COMUNIDAD HALITI-PARESÍ DESDE LAS PERSPECTIVAS DE VIGILANCIA Y PROMOCIÓN DE LA SALUD

RESUMEN
Se trata de un estudio cuantitativo destinado a verificar la seroprevalencia de *Leptospira* sp. y factores de riesgo de leptospirosis en la comunidad indígena Haliti-Paresí, al norte de Mato Grosso. Para ello se recolectaron 73 muestras pareadas de suero de participantes indígenas en las cohortes realizadas en 2014 y 2015 en las aldeas Haliti-Paresí, municipio de Campo Novo do Parecis, Estado de Mato Grosso, Brasil. En este análisis de escenarios, predominaron las mujeres indígenas (65,75%), de 20 a 39 años (39,73%), con educación primaria incompleta (42,47%). La actividad ocupacional predominante fue el cuidado del hogar, la familia, la recolección en el cerrado y las actividades culturales (35,61%). Los roedores fueron vistos por el 46.58% y de estos, el 55.88% dijo que se encontraban en las cercanías / interior de la casa. No hubo serorreactividad para leptospirosis entre Haliti-Paresí en el bienio analizado y no hubo reportes de sintomatología compatible con esta zoonosis. Si bien, en su vida diaria, tienen proximidad al medio silvestre y sus animales, cambios ambientales provocados por la agricultura y otros factores de riesgo, las acciones de vigilancia de la salud son cruciales y determinantes para la ausencia de prevalencia. Las acciones de vigilancia planificadas y articuladas se convierten en medidas preventivas eficaces, capaces de promover la salud y garantizar la calidad de vida.
Palabras clave: Leptospirosis, Poblaciones Vulnerables, Promoción de la Salud, Vigilancia de la Población.

INTRODUCTION

Leptospirosis is a neglected disease of worldwide distribution caused by spirochetes of the genus *Leptospira* sp.[1], with greater incidence in subtropical regions and vulnerable populations in developing countries[2]. The risk of infection is directly or indirectly associated with contact with the transmitting animals, whether in urban or rural environments[3,4].

In rural or wild areas in Brazil, populations at risk of illness from leptospirosis usually have contact with the bacteria eliminated in the urine of cattle, pigs, dogs, goats, capybaras, skunks and small mice (*Akodon azarae* e *Akodon montensis, Oligoryzomys nigripes, Oxymycterus judex*)[5–7]. Thus, after contagion, usually related to abrasions on the skin and mucous membranes that had contact with the water/soil contaminated with the urine of these infected animals[4], individuals may present a wide spectrum of symptoms, ranging from acute febrile illness to severe illness and potentially fatal, with multiple organ dysfunction[8].

Due to the immunological susceptibility, the close contact with the environment and the way of life, indigenous communities have an additional vulnerability to zoonotic infections, especially to leptospirosis. Mato Grosso stands out internationally for being the Brazilian state with the greatest diversity of indigenous peoples and added to that it still has the three main biomes, Amazon, Pantanal and Cerrado, which allows interaction between biological and ethnic diversity, favorable to the occurrence of emerging and reemerging zoonoses[9,10].

Among the indigenous peoples of Mato Grosso, the Haliti-Paresí constitute the main ethnic group of the Cerrado, as they inhabit the Paresí territory, with 56 villages in nine indigenous lands[11]. In addition, they are also a reference in terms of ethnodevelopment and good relationships with non-Indians, which can be a model of socio-cultural and economic adaptation to be followed by other indigenous peoples[12].

Thereby Haliti-Paresí sought, over time, ways of adapting to the current challenges of cultural and economic interaction, developing strategies beyond traditional activities such as handicrafts, hunting, fishing and collecting in the cerrado. As a result of this process, the actions of ethnotourism, mechanized agricultural production in large territorial extensions, investment in the education and professional

training of young people, political insertion in associations and indigenous agencies as well as the toll collection on the MT 235[13,14].

In this context, it is worth considering that in Mato Grosso there are no studies reporting the seroprevalence of leptospirosis in this indigenous population and, above all, understanding how the factors underlying the transmission of such zoonosis in the epidemiological-environmental scope increase the understanding of the transmission dynamics, enabling the planning and developing preventive and emergency control measures.

As leptospirosis is traditionally associated with rural areas and individuals who carry out risky work activities, it is assumed that the cultural and occupational habits of this indigenous community are favorable to contact with vectors of this disease. Furthermore, they live in a natural environment surrounded by grain culture, a fact that attracts rodents in the surroundings, as in the evidence of infection by hortohantavirus reported by Terças[15], even understanding that the reservoir of diseases are distinct, it is essential to investigate the possibility of co-circulation of these zoonoses. Given these factors, this study aimed to verify the seroprevalence of *Leptospira* sp. and the risk of leptospirosis infection in the Haliti-Paresí indigenous community, in the north of Mato Grosso.

METHODS

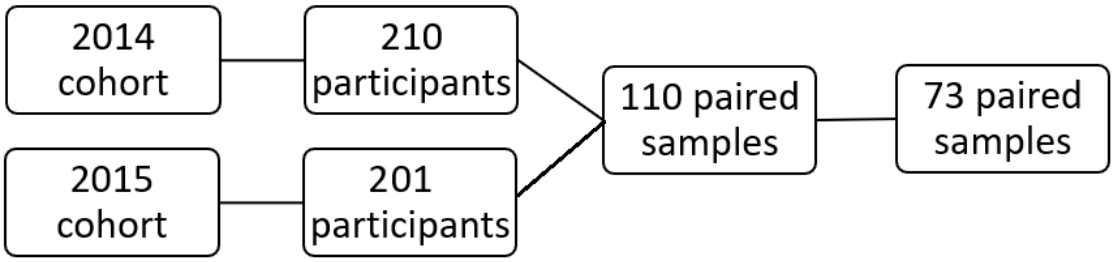
This is a cohort study carried out in the following Haliti-Paresí villages Seringal/Cabeça do Seringal, Chapada, 4 Cachoeiras, Bacaval, Wazare, Morrim, Utiariti, Sacre 2 and Bacaiuval, belonging to the municipality of Campo Novo do Parecis, in the State of Mato Grosso, Brazil. The Paresí indigenous area is located in the western region of this municipality up to the border with the municipality of Sapezal.

The samples used in this study come from the Biobank, which has samples from the entire population of the abovementioned villages in the years 2014 and 2015. In order for the indigenous people to integrate the study, the suitability for inclusion factors was verified, as well as the term signature informed consent form (ICF). Subsequently, they were submitted to individual interviews to collect sociodemographic, clinical and peripheral blood data. This in turn was centrifuged, cryopreserved and transported to the Laboratory of Hantaviroses and Rickettsioses of

the Oswaldo Cruz Institute (LHR), to constitute the biobank of this indigenous community.

The entire population resident in the nine villages was included in the study, which constituted two cohorts. The first was composed of 210 indigenous people and the second, held in 2015, 201 indigenous people were included. However, it was decided to conduct the investigation in the 110 indigenous people who presented paired samples from the years 2014 and 2015. From the 110 paired samples from the 2014 and 2015 cohorts, it was observed those with enough blood serum to perform the microscopic agglutination test (MAT), totaling 73 paired samples at the end (FIG. 1).

FIG. 1 - Scheme for the constitution of the 2014 and 2015 cohorts in the Haliti-Paresí community, Campo Novo do Parecis-MT.



Vivi-Oliveira, 2020

The MAT of these 146 serum samples was performed according to the standard technique at the National Reference Laboratory for Leptospirosis of the Oswaldo Cruz Institute, Manguinhos, Rio de Janeiro[16].

The material generated from the interviews and laboratory results were doubly typed using a form built in the EpiInfo 7 software. Subsequently, the double typing inconsistencies with the Excel program were verified, constituting the final database for analysis. For data processing, the MiniTab 17 statistical software was used, performing descriptive statistical techniques in the form of proportions and tables with 95% confidence intervals.

The study respected all ethical aspects in research with human beings according to resolution 466/2012, being evaluated by the Ethics Committee in Research with Human Beings of Hospital Júlio Muller and has a presentation certificate for ethical appraisal nº 04647412.0.1001.5541, and approval by the National Research Ethics Commission (CONEP), under protocol 819.939/2014.

RESULTS

There was a predominance of female Indians (65.75%), aged between 1 and 94 years, with 20 to 39 years old being the most prevalent and with incomplete elementary education (42.47%). Regarding the occupational situation developed by the indigenous people, activities related to home, family, collection in the cerrado and cultural activities (35.61%) and student (16.43%) prevailed (TAB. 1).

TAB. 1 - Sociodemographic variables of the indigenous people. 2014-2015. Campo Novo dos Parecis - MT, Brazil. (n = 73)

Variable and category	n (%)
Gender	
Male	25 (34,25)
Female	48 (65,75)
Age	
≤ 19 years	20 (27,40)
20 - 39 years	29 (39,73)
40 - 59 years	15 (20,55)
≥ 60 years	9 (12,33)
Education	
No year of study	9 (12,33)
Not of school age	2 (2,74)
Pre school	2 (2,74)
Complete primary education	2 (2,74)
Incomplete elementary school	31(42,47)
Complete high school	11 (15,07)
Incomplete high school	10 (13,70)
Complete higher education	2 (2,74)
Incomplete higher education	4 (5,48)
Site of residence	
Village 4 Cachoeiras	7 (9,59)
Village Bacaiuval	8 (10,96)
Village Bacaval	21 (28,77)
Village Cabeceira do Seringal	4 (5,48)
Village Chapada Azul	6 (8,22)
Village Sacre 2	1 (1,37)
Village Seringal	6 (8,22)
Village Utiariti	11 (15,07)
Village Wazare	9 (12,33)
Number of resident/house	
1 - 3	24 (32,88)
4 - 6	41(56,16)
≥ 7	8 (10,96)
Type of residence	

Masonry	15 (20,55)
Wood	37 (50,68)
Traditional indigenous	21 (28,77)
Occupational situation	
Administrative and Political	1(1,37)
Health agent	1(1,37)
Agriculture and farming, hunting and fishing	5 (6,85)
Crafts	1(1,37)
Nursing assistant	1(1,37)
Play	2 (2,74)
Hunting and fishing	4 (5,48)
Hunting and fishing, collecting in the cerrado	2 (2,74)
Hunting and fishing, collecting in the savannah, guidance to the youngest	1(1,37)
Food trade	1(1,37)
Care for the home and family	1(1,37)
Home care, family, savanna collection and cultural activities	26 (35,61)
Student	12 (16.43)
Student and recreation	4 (5,48)
Student and volunteer work	1(1,37)
Higher education student	1(1,37)
Fishing	1(1,37)
Retired teacher, school coordinator	1(1,37)
Teacher)	4 (5,48)
General Services in the Health Unit	1(1,37)
Works on water supply	1(1,37)
Community work, responsible for agricultural activities	1(1,37)

n: sample size per variable.

The three villages with the largest number of participants were Bacaval (28.77%), followed by Utiariti (15.07%) and Wazare (12.33%). The number of residents per household ranged from one to nine residents, with a higher prevalence of four to six residents per household (56.16%). The wooden residence is predominant (50.68%), followed by traditional indigenous housing (28.77%).

When asked about contact with the rodent, 46.58% mentioned having visualized this animal, without being able to distinguish the species. The contact place comprised the surroundings/interior of the house (55.88%), places of conviviality in the village (23.53%), in the activity carried out in the cerrado (11.76%) and in the farms that border with the indigenous lands (8.82%) (TAB. 2).

TAB. 2 - Variables refaired to the rodent relatived to the indigenous peoples. 2014-2015. Campo Novo dos Parecis - MT, Brazil. (n = 73).

Variable	n (%)
Contact with wild rodent	
Yes	34 (46,58)
No	39 (53,42)

Place of contact with wild rodent	
Village	8 (23,53)
House	19 (55,88)
Farm	3 (8,82)
Cerrado	4 (11,76)

n: sample size per variable.

As for the reported symptoms, comprising the 60 days prior to data collection, all participants were asymptomatic for leptospirosis in the two years of analysis.

DISCUSSION

Initially, it is important to note that this is the first seroprevalence study for leptospirosis carried out in an indigenous community in Mato Grosso. There are few studies in Brazil that analyze the epidemiological situation of vulnerable populations such as the indigenous, being even more scarce, those carried out in the midwest region. From a political and media perspective, leptospirosis has little or no visibility, making it marginalized, unknown and neglected[17].

No seroreactivity for leptospirosis was detected among Haliti-Paresí in the biennium analyzed, as well as there were no reports of symptomatology compatible with this zoonosis in the two months preceding data collection. Thus, it is important to point out that diseases (or their absence) when identified, trigger a crucial role in conducting interventions to understand the determinants that are associated with the occurrence of these events, which allows health surveillance strategies to be planned and implemented[18].

In view of the negative results obtained in this study, it is understood that, even this population has in its daily routine the proximity to the wild environment and its animals, the environmental changes caused by agriculture and other risk factors already mentioned, the planning of safety measures, health-environmental surveillance in conjunction with the community is capable of containing this zoonosis. In this context, as pointed out by Echevarría[19], Guimarães[20] and Teixeira da Silva[21], disseminating results of this scientific nature benefits researchers and communities, by assisting in the management of efforts, financial, technical and material investments.

Regarding sociodemographic variables, it is observed that the predominance of the female gender has been common in studies in the Haliti-Paresí community[12,22,23],

which is also evidenced in other ethnicities, such as Tremembé and Baniwa[24,25], despite the gender distribution of the Paresí population showing a slight predominance of males in the last census[26]. In general, leptospirosis has a prevalence in males[27,28] justified by the occupational activities performed and, consequently, greater exposure to the risk of infection[29].

The early onset of reproductive life and socio-cultural factors, such as the appreciation of large families, are evidenced in the present study, mainly by young adults, ranging from 20 to 39 years old. In the systematic review presented by Pelissari[22], the confirmed cases of leptospirosis are in this same age group.

It is observed that schooling, showed a higher concentration in individuals who attended up to incomplete elementary school, a fact also observed by Moura[23], Santos[24] e Zenazokenae[12]. As pointed out by Paes[25], school education has recently emerged within the Paresí communities to the detriment of contact with non-Indians and the need for an articulating space, guaranteeing the belonging and free movement of these subjects in the dynamics of the Westernized world. It is important to highlight that one of the risk factors related to leptospirosis is education, a fact pointed out by Hagan[26]. When drawing the population profile of confirmed cases of leptospirosis in the period 2007-2015, Martins and Spink[17] observed that most of the people who had leptospirosis did not complete the 8th grade.

In view of the homologation of the Paresí indigenous land and in order to facilitate and accelerate this process, new villages such as Utiairiti, Sacre 2 and Wazare were founded and inhabited by families who lived in older and strengthened ones, such as the Rio Verde village[11]. Such fact may be one of the justifications for the villages Bacaval, Utiairiti and Wazare to present a larger number of residents, as verified by Moura[23] and Santos[24].

In view of the result obtained when asked about the occupational situation in the village, it is evident that the current daily life presents a diversity of actions that reflect their rites and customs. Some authors show care for the home[27], family[12,28], and the collection in the cerrado[29] present in this community. The second prominent occupation, as a student, expresses interest in education, especially in the village environment with the creation of schools[30] so that they continue in the city and guarantee their insertion in academic spaces and meet the demands of professional level higher in these communities. Treated as an occupational disease, leptospirosis is associated with those

who work or are more exposed to the risk of contact with the urine or reservoirs of this zoonosis. These include miners, farmers, fishermen, veterinarians, soldiers, slaughterhouses, or occupations that involve direct contact with soil, mud, or water[3,31].

The slight difference in whether or not there is contact with a rodent and the fact that this contact took place around the house can be justified by the specific behavior of each village, with regard to concern for the environment. Those which predominate indigenous habits and culture, preserve cleanliness in an environmental balance, such as Wazare, 4 Cachoeiras, Chapada azul and Bacaval, presenting less probability of attracting/proliferating insects, rodents and venomous animals, in view of those that added behaviors of non-Indians with the most frequent presence of solid waste generated in their surroundings, such as Utiariti, Bacaiúval and Seringal.

The problem of the absence of proper garbage collection is brought up by the data from the 2010 census, where 72.3% of this waste is buried and 27.7% is burned in the vicinity of the homes and confirmed in the works of Zenazokenae[12] and Alves and Rodrigues[32], who mention the frequent disposal of packaging around *hatí*, boxes of washing powder, disposable diapers, electronic products, batteries, milk boxes, pet bottles, among others. Waste disposal is one of the main variables that determine leptospirosis cases, as pointed out by Hagan [26]. According with Baquero and Machado[33], waste management becomes a protective factor for leptospirosis.

Leptospirosis is related to both behavioral and socio-environmental conditions and, even with the presence/contact of rodents in the living areas of the village, the asymptomatic condition and the absence of seroprevalence for leptospirosis presented in the individuals elected in this study, allow considering the success of the actions surveillance in zoonoses and community health education conducted by the health team of the Bacaval base pole as factors promoting the health of the community. Therefore, the health promotion strategy is based on knowledge and understanding of the social determinants of health in the health-disease process, in individual and collective involvement, paying attention to the differences and particularities of the events[34].

It is also worth noting that indigenous health has been re-signified throughout history, being closely related to the environment and the changes established in it because it is its way of subsistence. Therefore, it is important to insert the indigenous in a context to which they are protagonists of their reality through health education actions, as it is a way of articulating movements that integrate traditional indigenous

medicine and western medicine, in order to organize it in favor promoting health and better quality of life, both in the individual and collective context[35].

No less important and active in this process are the indigenous health agent and the integrated work of the indigenous health team because, in view of this context of exposure to the risk of this vulnerable population, the interaction between the individual, programmatic and social dimensions will subsidize the production process health through preventive practices anchored in health surveillance, which in turn will be active in social determinants and in the perception of community risks[36–38].

CONSIDERATIONS

The Haliti-Paresí community has some risk factors for leptospirosis that are closely correlated with the social determinants of their daily lives, which are influenced by the culture and the environment in which they live, such as hunting and gathering in the Cerrado, the disposal of solid waste in the surrounding the houses, in addition to the geographical location, which provides environments that allow the free transit of animals that transmit leptospirosis. In this way, a highly altered landscape is juxtaposed around the indigenous land, due to the plantations of grain commodities and natural vegetation practically conserved in the indigenous territory.

In view of the scarcity of studies in Brazilian indigenous communities relating the demographics, epidemiology and health indicators of these populations, the present study hopes to contribute and demonstrate that health surveillance actions when engaged collectively, redirected to health action, establish a network of commitment among the parties involved, enabling indigenous people to interact autonomously in order to raise proposals, create strategies for coping with health problems as well as the adoption of behaviors that allow the promotion of health and quality of life.

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