ARTIGO ORIGINAL

Comparison of Knowledge, Attitude and Practice (KAP) on visceral leishmaniasis in Rio Grande do Sul

Comparação de Conhecimento, Atitude e Prática (CAP) sobre leishmaniose visceral no Rio Grande do Sul

Comparación de Conocimiento, Actitud y Práctica (CAP) sobre la leishmaniasis visceral en Rio Grande do Sul

Sabrina Braga Knorr[1] ORCID 009-006-2268-533x
Francine Raimundo da Silva[1] ORCID 0009-0009-5293-8280
Camila dos Santos Lagranha[2] ORCID 0009-0005-1068-2775
Manoel Roberto Poitevin da Silva Filho[2] ORCID 0009-0005-9043-798X
Franklin Gerônimo Bispo Santos[3] ORCID 0000-0001-7007-4644
Débora da Cruz Payão Pellegrini[2] ORCID 0000-0002-4285-5643
Rovaina Laureano Doyle[1] ORCID 0000-0002-8282-6564

[1]Centro de Pesquisa em Saúde Animal, Instituto de Pesquisas Veterinárias Desidério Finamor (IPVDF), Estrada do Conde, 6000. Eldorado do Sul, RS, Brasil, CEP 92990-00.
[2]Universidade Federal do Pampa (UNIPAMPA), Uruguaiana, RS, Brasil.
[3]Universidade Federal de Alagoas (UFAL), Arapiraca, AL, Brasil.

Endereço: R. L. Doyle Centro de Pesquisa em Saúde Animal, Instituto de Pesquisas Veterinárias Desidério Finamor (IPVDF), Estrada do Conde, 6000. Eldorado do Sul, RS, Brasil, CEP 92990-00.
E-mail: rovainadoyle@gmail.com

ABSTRACT

Background and Objectives: visceral leishmaniasis (VL) is a zoonosis with a major impact on public health, affecting neglected populations, with a high fatality rate, and its control is highly dependent on human actions. This study aimed to describe and compare the level of Knowledge, Attitude, and Practice (KAP) regarding VL in the populations of three municipalities in Rio Grande do Sul (endemic and non-endemic areas). **Methods:** 334 tests were applied, in KAP format, classified as adequate and inadequate. Variable "A" (Attitude) was assessed before and after a brief explanation of the topic. **Results:** among the total number of interviewees, 43.63% in the city with an urban area of endemic focus (UAEF) obtained an adequate score in "K" (Knowledge) about VL, 16.66% with an adequate assessment in "P" (Practice), and 61.40% with an adequate level of "A". In the rural area of endemic focus (RAEF), the scores obtained were 14.54%, 10% and 56.40%, respectively, and in the non-endemic area (NEA), 10.9%, 11.81% and 30.90%, respectively. Respondents with the highest level of "K" in RAEF and UAEF opted for euthanasia for positive dogs and did not change their opinion after the explanation about the disease. In NEA, respondents with the highest "K" score opted for treatment without changing their choice, whereas respondents with

the highest "P" score opted for euthanasia and maintained it. **Conclusion:** the results obtained in this study indicate that knowledge of the disease interferes with decision-making regarding it, which can be decisive in VL control and prevention.

Keywords: *Zoonosis. Neglected. Endemic. Score.*

RESUMO

Justificativa e Objetivos: a leishmaniose visceral (LV) é uma zoonose com grande impacto na saúde pública, acometendo populações negligenciadas, com alta taxa de letalidade, sendo seu controle altamente dependente das ações humanas. Este estudo objetivou descrever e comparar o nível de Conhecimento, Atitude e Prática (CAP) em relação à LV nas populações de três municípios do Rio Grande do Sul (zonas de foco endêmico e não endêmico). **Métodos:** foram aplicados 334 questionários, no formato CAP, com resultados classificados em adequado e inadequado. A variável "A" (Atitude) foi avaliada antes e após uma breve explanação sobre o tema. **Resultados:** do total de entrevistados, 43,63% da cidade com zona urbana de foco endêmico (ZUFE) obtiveram escore adequado em "C" (Conhecimento) sobre LV, 16,66%, com avaliação adequada em "P" (Prática), e 61,40%, com nível de "A" adequado. Na zona rural de foco endêmico (ZRFE), os escores obtidos foram 14,54%, 10% e 56,40%, respectivamente, e em zona não endêmica (ZNE), 10,9%, 11,81% e 30,90%, respectivamente. Os respondentes com maior nível de "C" em ZRFE e ZUFE optaram pela eutanásia dos cães positivos e não mudaram de opinião após a explanação sobre a doença. Já em ZNE, os respondentes com maior nível de "C" optaram pelo tratamento sem mudar a escolha, ao passo que os entrevistados com maior escore "P" optaram pela eutanásia e assim a mantiveram. **Conclusão:** os resultados obtidos neste estudo indicam que o conhecimento da doença interfere na tomada de decisão diante da mesma, o que pode ser determinante no controle e prevenção da LV.

Descritores: *Zoonoses. Negligenciadas. Endêmicas. Escore.*

RESUMEN

Justificación y Objetivos: la leishmaniasis visceral (LV) es una zoonosis de gran impacto en la salud pública, provocando trastornos olvidados, con una alta letalidad, y su control depende altamente de la acción humana. Este estudio tuvo como objetivo describir y comparar el nivel de Conocimiento, Actitud y Práctica (CAP) en relación a la LV en las poblaciones de tres municipios de Rio Grande do Sul (áreas endémicas y no endémicas). **Métodos:** se aplicaron 334 cuestionarios, en formato CAP, clasificándose los resultados como adecuados e inadecuados. La variable "A" fue evaluada antes y después de una breve explicación sobre el tema. **Resultados:** del total de entrevistados, el 43.63% de la ciudad con zona urbana de foco endémico (ZUFE) obtuvo una puntuación adecuada en "C" (Conocimiento) sobre VL, el 16.66%, con una evaluación adecuada en "P" (Práctica), y el 61,40%, con un nivel adecuado "A". En la zona rural de foco endémico (ZRFE), los puntajes obtenidos fueron 14,54%, 10% y 56,40%, respectivamente, y en la zona no endémica (ZNE), 10,9%, 11,81% y 30,90% respectivamente. Los encuestados con el nivel más alto de "C" en ZRFE y ZUFE optaron por la eutanasia de los perros positivos y no cambiaron de opinión tras la explicación sobre la enfermedad. En ZNE, los encuestados con la puntuación "C" más alta optaron por el tratamiento sin cambiar su elección, mientras que los encuestados con la puntuación "P" más alta optaron por la eutanasia y la mantuvieron. **Conclusión:**

los resultados obtenidos en este estudio indican que el conocimiento de la enfermedad interfiere en la toma de decisiones sobre la misma, lo que puede ser decisivo en el control y prevención de la LV.

Palabras Clave: *Zoonosis. Desatendida. Endémica. Puntuación*.

INTRODUCTION

Leishmaniasis is a zoonosis with a major impact on public health and represents a complex of diseases with a broad clinical spectrum and epidemiological diversity. According to the World Health Organization (WHO), leishmaniasis is among the six most important infectious diseases affecting neglected populations, due to the high incidence of infection, the high lethality of the visceral form when left untreated, the difficult treatment and the capacity to produce deformities. It is estimated that 350 million people are at risk of contracting the infection, with approximately two million new cases of the different clinical forms recorded each year. In Brazil, the country responsible for the majority of cases recorded in Latin America, visceral leishmaniasis (VL) is an emerging disease with an increasing lethality rate.[1-4]

Due to the multifactorial nature of human visceral leishmaniasis (HVL) and canine visceral leishmaniasis (CVL), exposed populations play a decisive role in disease prevention. Therefore, for the health system to perform better, it is essential to identify how the exposed population perceives and behaves when faced with issues related to the disease. In this regard, the use of epidemiological tools, such as questionnaires that aim to characterize Knowledge, Attitude and Practice (KAP), can provide information that helps prevent and control the spread of the disease. Therefore, this study aimed to compare the KAP of populations from three municipalities in Rio Grande do Sul with different epidemiological characteristics.[5-7]

The first autochthonous case of HVL in the state of Rio Grande do Sul occurred in 2009, in the municipality of São Borja. Between 2011 and 2022, Rio Grande do Sul registered 398 notifications of suspected cases of HVL, of which 53 were confirmed (43 cases are autochthonous) and seven evolved to death.[5-8]

Porto Alegre is the capital of the state of Rio Grande do Sul, with an area of 495,390 km², density of 2,689,94 inhabitants/km² and a population of 1,332,570 inhabitants. The city has a peculiar epidemiological situation, since the urban cycle vector was not found in the studies carried out to date, but rather the sylvatic cycle vectors, which justifies a more detailed study, mainly in relation to health education around the communities that are in an endemic area, since they belong to areas of social

vulnerability. In this study, Porto Alegre is treated as a rural area of endemic focus (RAEF).[9]

At the same time, on the western border of RS, the municipality of Uruguaiana recorded the first autochthonous case of CVL in 2009 and, in 2011, the first case of HVL. Uruguaiana is located in the extreme west of the state, 632 km from the capital, with a population of 117,210 inhabitants, a population density of 20.56 inhabitants/km² and an area of 5,702,098 km². In this city, there is a presence of urban-cycle sandflies. and the disease is present in the city's neighborhoods, being used in this study as an urban area of endemic focus (UAEF).[10-12]

The municipality of Eldorado do Sul, in turn, is 15 km from the capital, and has a population of 39,559 inhabitants distributed in an area of 509,614 km² and a population density of 77.63 inhabitants/km². To date, there are no records of the presence of the vector nor data regarding positive dogs and the presence of the disease in humans in Eldorado do Sul. In this study, the municipality will be treated as a non-endemic area (NEA).[13]

METHODS

A total of 334 questionnaires were administered in 110 interviews in Porto Alegre, 110 in Eldorado do Sul and 114 in Uruguaiana, during May and July 2019. The database was obtained by convenience from individual interviews with residents in the aforementioned municipalities, after signing the Informed Consent Form, completed in two copies, with one remaining with the interviewee. As a selection criterion, the interviewees were people over 18 years of age, resident in the chosen regions and who agreed to answer the questionnaire.

The area selected for application of the questionnaires in Porto Alegre (RAEF) was the Protásio Alves neighborhood, where deaths from HVL were reported.[8] The selected locations in Uruguaiana (UAEF) were the neighborhoods of Centro and Mascarenhas de Moraes. In these locations, there were reports of dogs serologically positive for CVL and HVL.[12] The Sans Souci and Progresso neighborhoods were the areas selected for the study in Eldorado do Sul (NEA) and the municipality did not report cases of CVL and HVL until this study was carried out.

Prior to application, the questionnaire was adapted with 30 interviewees, which corresponded to approximately 10% of the total number (n=334).

The questionnaire was divided into three parts, with the aim of identifying the population's KAP. The variables "K" and "P" were assessed through a score, in which the answer considered "correct" received the maximum score (three), and the "incorrect", the minimum score (zero). Nine questions were asked to assess "K", all with open-ended answers, and thirteen questions to characterize "P".

The variable "A", in turn, was assessed through the single question "What do you think should be done with a dog diagnosed positive for leishmaniasis?", with a score of three being given for the answer euthanasia, a score of two for treatment and a score of one for those who did not know how to answer.

In this study, the responses were classified as adequate or inadequate using the sum of the scores obtained in each question of each of the parts. Respondents who obtained from half of the score to the maximum score were classified as adequate (> 32 for "K"; and > 20 for "P"), and those who did not reach these values were classified as inadequate in relation to "K" and "P". In the variable "A", the respondent who opted for euthanasia of the dogs, according to the guidelines contained in the Brazilian Ministry of Health manual of surveillance and control of VL, was considered adequate.[14]

After completing the questionnaires, explanatory information about CVL/HVL was provided and a brief explanation was given on the topic. Then, the single question regarding "Attitude" was asked again to assess whether interviewees, after reading the information, would change their opinion.

For statistical analyses, the responses' qualitative/quantitative variables were associated with each other: location (endemic or non-endemic area) versus KAP and level of Knowledge (K) versus Attitude (A) and Practice (P) of interviewees.

Data analysis was performed based on the frequencies of the questionnaire responses (chi-square) and the score obtained in the KAP (Kruskal-Wallis), using the Statistical Package for the Social Sciences (SPSS) 20 program and a significance level of 5%. In this study, KAP were classified as adequate and inadequate, according to the Brazilian Ministry of Health manual of surveillance and control of VL.[14]

This study was conducted in accordance with the ethical standards required by Resolutions 466/2012, 510/2016 and 580/2018 of the Ministry of Health, being submitted to the *Plataforma Brasil* and approved by the Research Ethics Committees of *Hospital Moinhos de Vento* (HMV), Opinion 3.280.282, on 04/24/2019.

RESULTS

In the first part of the questionnaire, the target populations were characterized. Table 1 summarizes the results of respondents' descriptive analysis.

Table 1. General characteristics of the population interviewed in the sampled municipalities

VARIABLE	ENDEMIC AREAS		NON-ENDEMIC AREA
	RURAL	**URBAN**	
	Porto Alegre	**Uruguaiana**	**Eldorado do Sul**
Sex	**N (%) 110**	**N (%)114**	**N (%)110**
Male	33 (30%)	72 (63.2%)	44 (40%)
Female	77 (70%)	42 (36.8%)	66 (60%)
Education	**N (%)**	**N (%)**	**N (%)**
Illiterate	4 (3.6%)	0 (0%)	2 (1.8%)
Elementary school	68 (61.8%)	40 (35.1%)	27 (24.6%)
High school	31 (28.2%)	53 (46.5%)	58 (52.7%)
Higher education	7 (6.4%)	21 (18.4%)	23 (20.9%)
Family income	**N (%)**	**N (%)**	**N (%)**
Up to 1 minimum wage	61 (55.5%)	50 (43.9%)	15 (13.6%)
2-3 minimum wages	23 (20.9%)	28 (24.6%)	27 (24.5%)
Above 3 minimum wages	3 (2.7%)	7 (6.1%)	24 (21.8%)
Total respondents	87 (79.1%)	85 (74.6%)	66 (59.9%)
Branch of labor activity	**N (%)**	**N (%)**	**N (%)**
Does not work	14 (12.7%)	20 (17.5%)	15 (13.6%)
Formal work	59 (53.6%)	56 (49.1%)	83 (75.5%)
Informal work	37 (33.6%)	38 (33.3%)	12 (10.9%)

This study indicates that most respondents in the city of Porto Alegre had completed elementary school (61.8%) and, in the cities of Eldorado do Sul and Uruguaiana, high school (46.5% and 52.7%). In Porto Alegre and Uruguaiana, most respondents reported an income of up to 1 minimum wage (55.5% and 43.9%) and, in Eldorado do Sul, the majority chose not to report their monthly income (59.9%). In the three cities studied here, most respondents reported being in the formal labor market (Table 1).

Concerning "Knowledge", in UAEF, Uruguaiana, 88.6% (n=101) declared to know about VL (Table 2). However, in RAEF, in Porto Alegre, the percentage of interviewees who responded to knowing about the disease reached 42.7% (n=47), similar to that observed in Eldorado do Sul (NEA), with 45.5% (n=50) (Table 2).

When assessing the way knowledge about VL was acquired, in Uruguaiana, 41.2% (n=47) reported it through informal conversation, while 17.5% (n=20) reported it through lectures by community workers and 24.6% (n=28) reported it through other means of communication (TV, internet radio). Porto Alegre and Eldorado do Sul presented similar frequencies in this question, with the majority reporting acquiring

knowledge through other means of communication, with 23.6% and 25.5%, respectively (Table 2).

Regarding knowledge about the severity of the disease for the canine population, the highest frequency was observed in Uruguaiana (n=99, 86.8%), followed by Eldorado do Sul (n=40, 36.4%) and Porto Alegre (n=33, 30%). At the same time, as for the importance of VL for human health, 78.1% (n=89) of interviewees stated that they knew about the severity of the disease, however, in Porto Alegre and Eldorado do Sul, the majority of individuals did not answer this question (Table 2).

In Uruguaiana (UAEF), approximately 60% of respondents reported knowing the transmitter of VL, of which 56.5% stated that the vector was the phlebotomine or its popular names in Brazil, such as *mosquito-palha*, *anjinho*, *cangalhinha* (open response). Most populations of Porto Alegre (RAEF) and Eldorado do Sul (NEA) (56.4% and 78.2%, respectively) did not know who transmitted the disease, and more than half of respondents did not know who the transmitter of VL was, with 14.5% and 16.4%, respectively (Table 2).

Table 2. Frequency of responses obtained regarding Knowledge (K) of visceral leishmaniasis in the municipalities studied

QUESTION	ENDEMIC AREAS		NON-ENDEMIC AREA
	RURAL	URBAN	
	Porto Alegre	Uruguaiana	Eldorado do Sul
Have you ever heard of leishmaniasis?	N (%)	N (%)	N (%)
Yes	47 (42.7%)	101 (88.6%)	50 (45.5%)
No	62 (56.4%)	11 (9.6%)	59 (53.6%)
Not sure	1 (0.9%)	2 (1.8%)	1 (0.9%)
Do you think leishmaniasis is an important disease?			
1	3 (2.7%)	4 (3.5%)	3 (2.7%)
2	0 (0%)	0 (0%)	0 (0%)
3	6 (5.5%)	9 (7.9%)	3 (2.7%)
4	6 (5.5%)	13 (11.4%)	10 (9.1%)
5	33 (30%)	77 (67.5%)	35 (31.8%)
I do not know	62 (56.4%)	11 (9.6%)	59 (53.6%)
How did you acquire this knowledge?			
Informal conversation	12 (10.9%)	47 (41.2%)	16 (14.5%)
Health workers	21 (19.1%)	18 (15.8%)	8 (7.3%)
Lectures by community workers	2 (1.8%)	20 (17.5%)	7 (6.4%)
Other means of communication (TV, newspaper, internet)	26 (23.6%)	28 (24.6%)	28 (25.6%)
Not acquired	1 (0.9%)	1 (0.9%)	1 (0.9%)
I prefer not to answer	48 (43.6%)	0 (0%)	50 (45.5%)

Did you know that leishmaniasis is severe for dogs?			
Yes	33 (30%)	99 (86.8%)	40 (36.4%)
No	76 (69.1%)	12 (9.7%)	69 (62.6%)
Not sure	1 (0.9%)	3 (2.6%)	1 (0.9%)
Did you know that leishmaniasis is severe for humans?			
Yes	36 (32.7%)	89 (77.4%)	38 (34.5%)
No	63 (66.4%)	25 (21.7%)	71 (64.6%)
Not sure	1 (0.9%)	0 (0%)	1 (0.9%)
Do you know anyone who has had the disease?			
Yes	15 (13.6%)	7 (6.3%)	15 (13.0%)
No	95 (86.4%)	100 (87.0%)	95 (86.4%)
I prefer not to answer	0 (0%)	7 (6.1%)	0 (0%)
Do you know who transmits this disease?			
Yes	43.6%	60.9%	21.8%
No	56.4%	39.1%	78.2%
Who? Answer: phlebotomine sandfly or its popular names	14.5%	56.5%	16.4%

Note: through the Kruskal-Wallis test, with a p value>0.001.

In the second part of the questionnaire, the population's "Practice" in relation to leishmaniasis were assessed (Table 3). Regarding disease prevention, the three populations studied, for the most part, did not use repellent collars on their dogs, with 62.7% of respondents being from Porto Alegre, 59.6% from Uruguaiana and 60.9% from Eldorado do Sul.

Concerning veterinary care, (n=54) 49.1% of respondents from Porto Alegre reported that their dogs did not receive care. In Uruguaiana and Eldorado do Sul, respondents stated that their dogs received care, with 55.3% and 53.6%, respectively (Table 3).

Regarding mosquito control, most of interviewees in our study reported carrying out some form of home or peridomestic monitoring. The main strategy employed was the use of insecticides. Furthermore, most of respondents stated that they did not raise chickens, pigs or wild animals (Table 3).

Table 3. Frequency of responses obtained on "Practice" (P) for controlling and preventing visceral leishmaniasis

QUESTION	ENDEMIC AREAS		NON-ENDEMIC AREA
	RURAL	URBAN	
	Porto Alegre	Uruguaiana	Eldorado do Sul
	N (%)	N (%)	N (%)
Did they use repellent collars on their dogs?			
Yes	11 (10%)	21 (18.4%)	12 (10.9%)
No	69 (62.7%)	68 (59.6%)	67 (60.9%)
No dog	30 (27.3%)	25 (21.9%)	31 (28.2%)
How often did they replace it?			

Up to 8 months	2 (1.8%)	17 (14.9%)	9 (8.2%)
More than 8 months	7 (6.4%)	5 (4.4%)	5 (4.5%)
Do not use	101 (91.8%)	92 (80.7%)	96 (87.3%)
Do dogs have veterinary care?			
Yes	26 (23.6%)	63 (55.3%)	59 (53.6%)
No	54 (49.1%)	27 (23.7%)	19 (17.3%)
No dog	30 (27.3%)	24 (21.1%)	32 (29.1%)
Do you carry out any mosquito control at home or in the yard?			
Yes	55 (50%)	89 (78.1%)	63 (57.3%)
Do you use repellent on people?			
Yes	32 (29.1%)	54 (47.4%)	52 (47.3%)
Do you use insecticides to control mosquitoes at home?			
Yes	61 (55.5%)	79 (69.3%)	85 (77.3%)
Raise of:			
Chickens	20 (18.2%)	5 (4.4%)	4 (3.6%)
Pigs	1 (0.9%)	1 (0.9%)	2 (1.8%)
Horses	0 (0%)	6 (5.26%)	5 (4.54%)
Wild animals	5 (4.5%)	2 (1.8%)	9 (8.2%)

About the assessment of attitudes toward the disease, each interviewee was asked about the stance they would take if a dog was diagnosed with CVL (Table 4). This question was asked before and after a technical explanation by the interviewer about the disease. In Porto Alegre, before the explanation about VL, the majority, 58.2% (n=64), stated that they were unaware of any contingency protocol in case the disease was confirmed in the animal, but when the question was asked again after the explanation, the majority of respondents, 56.4% (n=62), opted for euthanasia of the animal. In Uruguaiana, the majority, 57% (n=65), initially reported opting for treatment, but after the educational intervention, they decided to euthanize the animal, 61.4% (n=70).

In Eldorado do Sul, there was no change in the main response even after the interviewer's explanation about VL, with the majority responding that they would opt for treatment, both before (47.3%, n=52) and after (68.2%, n=75) the explanation (p<0.001) (Table 4).

Table 4. Characterization of the "Attitude" (A) of respondents if their dog was diagnosed positive for visceral leishmaniasis, before and after the explanation about the disease

	ENDEMIC AREAS		NON-ENDEMIC AREA
OPTIONS	RURAL	URBAN	
	Porto Alegre N (%)	Uruguaiana N (%)	Eldorado do Sul N (%)
BEFORE the explanation			

Treatment	26 (23.6%)	65 (57%)	52 (47.3%)
Euthanasia	20 (18.2%)	34 (29.8%)	15 (13.6%)
Unknown	64 (58.2%)	15 (13.2%)	43 (39.1%)
AFTER the explanation			
Treatment	28 (25.5%)	41 (36%)	75 (68.2%)
Euthanasia	62 (56.4%)	70 (61.4%)	34 (30.9%)
Unknown	20 (18.2%)	3 (2.6%)	1 (0.9%)

Note: through the Kruskal-Wallis test, with a p value =0.007.

In the assessment of the level of KAP, most respondents presented "Knowledge" (K) considered inadequate in the three municipalities. "Attitude" (A) was categorized as adequate in Uruguaiana, whereas, in Porto Alegre and Eldorado do Sul, it was classified as inadequate, even after the explanation (Table 5).

Table 5. Classification of Knowledge (K), Attitude (A) and Practices (P) of the population sampled in the cities of Porto Alegre, Uruguaiana and Eldorado do Sul in relation to visceral leishmaniasis as adequate and inadequate

KAP	ENDEMIC AREAS		NON-ENDEMIC AREA
	Porto Alegre	**Uruguaiana**	**Eldorado do Sul**
Knowledge (K)	**N (%)**	**N (%)**	**N (%)**
Inadequate (up to 32)	94 (85.45%)	66 (57.89%)	98 (89.1%)
Adequate (33-66)	16 (14.54%)	48 (43.63%)	12 (10.9%)
Practice (P)	**N (%)**	**N (%)**	**N (%)**
Inadequate (up to 20)	99 (90%)	95 (83.33%)	97 (88.18%)
Adequate (21-42)	11 (10%)	19 (16.66%)	13 (11.81%)
Attitude (A) *Before the technical explanation*	**N (%)**	**N (%)**	**N (%)**
Adequate (euthanasia)	20 (18.2%)	34 (29.8%)	15 (13.6%)
Inadequate (treatment/not sure)	90 (81.8%)	80 (70.2%)	95 (86.4%)
Attitude (A) *After the technical explanation*	**N (%)**	**N (%)**	**N (%)**
Adequate (euthanasia)	62 (56.4%)	70 (61.4%)	34 (30.9%)
Inadequate (treatment/not sure)	48 (43.7%)	44 (38.6%)	76 (69.1%)

Through the Kruskal-Wallis test, with a p value>0.001 in K and P in the 3 cities and A with p=0.007.

DISCUSSION

In characterizing the populations studied, we found variations in the level of education of interviewees. In a study carried out in the state of Mato Grosso do Sul, the majority (48%) of interviewees declared having completed elementary school. In Belo Horizonte (MG), 41.5% declared having only elementary school. However, 77% of interviewees in the Metropolitan Region of Belo Horizonte had completed elementary school, similar to the results found in our study in the region of Porto Alegre (RAEF), while the results in Uruguaiana (UAEF) and Eldorado do Sul (NEA) were similar to

those observed in the state of Maranhão, where 48.5% of respondents had completed elementary school.[5,15-17]

As for income, in the municipality of Raposa (MA), 47.6% of respondents reported an income of up to 1 minimum wage, similar to a study conducted in João Pessoa (PB), in which 47.8% of respondents reported an income of 1 minimum wage. On the Island of São Luís (MA), 89% of the population studied reported an income of up to 2 minimum wages, as they receive federal government aid grants, quite different from the results described here, in which respondents who reported receiving between 2 and 3 minimum wages represented between 20.9% and 24.6% of the total.[18-20]

In relation to formal work, studies carried out in the metropolitan region of Belo Horizonte (46%) and in Ethiopia (31.5%) support our results, in which the majority of interviewees were included in the formal labor market.[5,6]

As for knowledge of the disease, most interviewees in Uruguaiana stated that they were aware of it, as in other studies conducted in other cities considered endemic for VL. The majority of the population studied had already heard of the disease, as in a study conducted in the city of Três Lagoas (MS), in which 100% of respondents were aware of it. In an equivalent study in the metropolitan region of Belo Horizonte (RMBH-MG), 84% of interviewees were aware of VL. The presence of the vector and the history of notifications of VL cases widely distributed in the urban area of Uruguaiana suggest that the population of the municipality had prior knowledge of the disease, in contrast to the results obtained in Porto Alegre.[5-21] Radio and television were considered the main sources of information about the disease both in our study and in two others carried out in RMBH-MG.[5-22]

Regarding the population's knowledge about the severity of the disease for dogs, our results in UAEF (9.73%) were similar to those found in Belo Horizonte (MG), where less than 10% of respondents did not know about the relationship with dogs. However, they differed from the results RAEF and NEA, where more than 60% of respondents were unaware of the importance of dogs. Likewise, our respondents living in urban areas had much greater knowledge about the severity for humans than those in rural or non-endemic regions. However, in a study conducted in Paraguay, no respondent stated that they knew about the severity of VL for humans.[7,16]

When asked if they knew anyone who was sick, the majority of our interviewees responded negatively, in contrast to a study conducted in Maranhão, in which 57.8% of interviewees reported having known someone who was sick.[17]

The fact that the city of Uruguaiana has been living with the disease in urban areas for a longer period of time is reflected in the knowledge of the majority of the population studied regarding the vector of VL found in our study and previously described by Massia *et al*. in the same city. This is different from the situation observed in Belo Horizonte, an endemic area of VL, where less than 5% of the population studied indicated the correct vector. Regarding VL prevention practices, the use of repellent collars is still not accessible for the populations we studied, in the same way that another study conducted in Uruguaiana indicated that more than 73.66% of the population assessed stated that they were financially insufficiency to purchase insecticide collars.[12,16]

The use of insecticides at home is practiced by the majority of the population we studied. In a similar study in Belo Horizonte, respondents used repellents mainly during feeding times for vectors. In Ethiopia, the majority of respondents used mosquito nets as their main method of insect control.[6,16]

In the three municipalities we studied, most respondents stated that they did not raise chickens, pigs or wild animals, as was the case in Belo Horizonte (MG), where the majority of respondents (80%) also stated that they did not raise these animals. Studies in São José do Ribamar (MA) and Belo Horizonte (MG) indicated that raising chickens can create an environment that is favorable to the multiplication of sand flies, due to the organic waste generated by these animals.[16,23,24]

Concerning the attitude to be taken if a dog was sick, the significant increase in the option for euthanasia after the educational intervention in the two endemic areas of this study suggests that respondents understood the severity of the disease and that dogs are the main domestic reservoir of VL and that it is present in these locations, with canine and human deaths. This supports a study carried out in Birigui (SP), in which 65% of respondents responded that euthanasia would be the best option and, after the intervention, 85% opted for euthanasia. In a study carried out in Paraguay, 63.6% of respondents would euthanize their animal if it were diagnosed positive for the disease.[7,25]

In relation to the categorization of the KAP level, most of our respondents presented "Knowledge" (K) considered inadequate in the three municipalities, similarly to a study carried out in Ribeirão das Neves (MG). However, in a study in Ethiopia, most of interviewees had adequate levels of knowledge and practice in relation to VL. In Minas Gerais, the level of knowledge was adequate in non-endemic areas and

inadequate in endemic areas, suggesting that there is no linear relationship between knowledge and practices.[5,6,22]

Our study indicated an inadequate KAP score in the three cities sampled in the research. The municipality of Uruguaiana presented a better KAP score, and this finding can be attributed to the spread of the disease and the vector in the urban area of the municipality, monitoring of the disease, in addition to constant visits of health workers to clarify information about the disease (informal communication from interviewees), which leads us to believe that this enabled a higher level of KAP in this population.[26,27,28]

In the variable "Attitude" (A), the interviewees from Porto Alegre and Uruguaiana obtained an adequate score, which can be attributed to the fact that in these municipalities in endemic areas there are canine and human cases with deaths, which did not occur in Eldorado do Sul.

Since this is a study in which data collection depends on participant participation, the results may not represent the populations assessed. However, most of the population in the three municipalities studied did not have adequate knowledge and practices, reinforcing the need for public policies aimed at health education and the adoption of prophylactic measures to prevent and control this neglected disease.

Most of the population in the three municipalities studied did not have adequate knowledge and practices, reinforcing the need for public policies aimed at health education and the adoption of prophylactic measures to prevent and control this neglected disease.

The results obtained in this study contribute to better combating this zoonosis in endemic regions and bringing pertinent information closer to non-endemic regions, thus preventing this disease.

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Authors' contributions:

Sabrina Braga Knorr contributed to project execution, literature search, writing of the abstract, introduction, methodology, discussion, interpretation and description of results, conclusions and statistics. **Francine Raimundo da Silva** contributed to writing of the abstract, review and statistics. **Camila dos Santos Lagranha** contributed to writing of the abstract, review and statistics. **Manoel Roberto Poitevin da Silva Filho** contributed to writing of the abstract, review and statistics. **Franklin Gerônimo Bispo Santos** contributed to project administration, literature search, writing of the abstract, introduction, methodology, discussion, interpretation and description of results, conclusions, review and statistics. **Débora da Cruz Payão Pellegrini** contributed to project administration, literature search, writing of the abstract, introduction, methodology, discussion, interpretation and description of results, conclusions, review and statistics. **Rovaina Laureano Doyle** contributed to project administration, literature search, writing of the abstract, introduction, methodology, discussion, interpretation and description of results, conclusions, review and statistics.

All authors have approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.