

# Visceral leishmaniosis: a proposal for measuring the perception of health professionals in Uruguaiiana (Rio Grande do Sul)

## Leishmaniose visceral: uma proposta para a mensuração da percepção dos profissionais de saúde em Uruguaiiana (Rio Grande do Sul)

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### ABSTRACT

**Introduction:** Visceral leishmaniasis (VL) is considered one of the most relevant zoonoses in the Americas due to its high magnitude, wide geographic distribution, and high fatality rate. **Objective:** Evaluate the perception of health professionals regarding the occurrence of VL in Uruguaiiana (RS). **Method:** A cross-sectional observational study was carried out using a self-administered questionnaire from December 2016 to January 2017. **Results:** One hundred eighty-three health professionals participated in the study (one hundred thirty-six members of the Family Health Strategy, twenty endemic control agents and twenty-seven veterinarians). Health professionals' perception deficiencies were identified regarding the epidemiology and symptomatology of the disease. **Conclusions:** This study showed weaknesses in the knowledge of health professionals about the epidemiology and symptoms of VL, which may impact the early detection of cases and, consequently, their favorable resolution. It is necessary to invest in training strategies on VL, aiming to correct gaps in knowledge and foster discussion on the subject.

**KEYWORDS:** Leishmaniasis; One Health; Public Health Policies; Health Education

### RESUMO

**Introdução:** A leishmaniose visceral (LV) é considerada uma das zoonoses mais relevantes das Américas devido à acentuada magnitude, à ampla distribuição geográfica e à alta taxa de letalidade. **Objetivo:** Avaliar a percepção dos profissionais de saúde quanto à ocorrência da LV em Uruguaiiana (Rio Grande do Sul). **Método:** Estudo observacional transversal empregando um questionário autoaplicável durante o período de dezembro de 2016 a janeiro de 2017. **Resultados:** Participaram 183 profissionais de saúde, sendo 136 integrantes da Estratégia Saúde da Família, 20 agentes de controle de endemias e 27 veterinários. Identificaram-se deficiências de percepção dos profissionais de saúde a respeito da epidemiologia e da sintomatologia da doença. **Conclusões:** Fragilidades na percepção dos profissionais de saúde quanto à epidemiologia e à sintomatologia da LV ficaram evidenciadas, o que poderá impactar na detecção precoce de casos da doença e, consequentemente, na execução das ações preconizadas para o controle e prevenção da doença. É necessário investir em estratégias de capacitação sobre a LV, visando corrigir lacunas no conhecimento e fomentar discussões que englobem a complexidade do tema.

**PALAVRAS-CHAVE:** Leishmaniose; Saúde Única; Políticas Públicas em Saúde; Educação para a Saúde

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## INTRODUCTION

Visceral leishmaniasis (VL) is considered one of the most important zoonoses in the Americas due to its magnitude, wide geographical distribution and high lethality rate. A reduction in the severe forms of the disease can be achieved by early diagnosis, adequate treatment of cases and a reduction in human-vector contact. In the Americas, case fatality in 2019 reached 7.7%, with a slight drop compared to 2018 (8.0%). Brazil accounts for 97.0% of VL cases on the American continent<sup>1</sup>.

The state of Rio Grande do Sul (RS) was considered free of VL until 2008, when the state's first autochthonous case of canine visceral leishmaniasis (CVL) occurred in the municipality of São Borja<sup>2</sup>, where the presence of *Lutzomyia longipalpis*, the vector of the disease, was also recorded<sup>3</sup>. In January 2009, the RS State Health Department (SES) notified the first confirmed autochthonous case of human visceral leishmaniasis (HVL) in the same municipality<sup>4</sup>. In the period from 2009 to September 2021 (Epidemiological Week 38/2021), 43 cases were confirmed in RS, distributed in the municipalities of São Borja, Uruguaiana, Itaqui, Porto Alegre, Viamão and Santa Maria. Of these, 36 cases progressed to cure and seven to death<sup>5</sup>. Uruguaiana is classified as a transmission area for VL, as it has records of the presence of the vector, human cases and autochthonous canine cases of the disease<sup>6</sup>. Between 2009, when the first case of CVL occurred in the municipality, and December 2019, the Environmental Health Surveillance of Uruguaiana confirmed, 1,478 cases of CVL through spontaneous notification by the population (passive surveillance system). In the canine serological surveys carried out to investigate canine and human cases, the prevalence of CVL found was 1.0% (2009), 8.0% (2010), 25.0% (2011), 48.0% (2016) and 29.0% (2017). About human cases, the municipality recorded three autochthonous cases of VL in 2011, 2016 and 2017<sup>7</sup>.

The Ministry of Health's (MoH) Visceral Leishmaniasis Surveillance and Control Manual presents standards and recommendations for the surveillance and control of the disease, with the main objective of structuring and implementing actions by municipalities aimed at reducing the morbidity and mortality of VL in our country. The recommended measures focus on the diagnosis and early treatment of human cases, the reduction of the phlebotomine population, the elimination or treatment of reservoirs and health education activities<sup>8</sup>. In the municipality of Uruguaiana (RS), the Environmental Health Surveillance sector of the Municipal Health Department (SMS) carries out the screening diagnosis of CVL using the Bio-manguinhos Dual Path Platform (TR-DPP) rapid test. Confirmation of the diagnosis, using the Enzyme-Linked Immunosorbent Assay (ELISA) technique, is carried out at the RS Central Public Health Laboratory (LACEN) in Porto Alegre. Once the case of CVL has been confirmed, the recommendation is to opt for treatment or euthanasia. Euthanasia used to be carried out as a municipal public control policy after the diagnosis was confirmed in sick animals belonging to owners who could not afford it. As of

2017, this public policy has been discontinued by the municipal administration. When a human case is confirmed, the municipality carries out a canine survey and spraying to control the vector. Communication and health education actions are continuously carried out through various vehicles (social networks, the official city hall website and visits by community health and endemic disease control agents).

Health education is an important strategy for controlling VL and mitigating its effects, aiming to develop concepts of the cycle and symptoms of zoonoses based on the habits and attitudes of the local population<sup>9</sup>. The severity of the problem demands innovative surveillance strategies to assess the effectiveness of control measures in the urban context.

Uruguaiana's current situation as a municipality with a low risk of transmission<sup>10</sup> requires preventive and control measures to be adopted by both health professionals and the community. The effectiveness of these actions is strongly influenced by the lack of knowledge and coordination between the main players responsible for the success of the recommended interventions. Identifying the perceptions of health professionals is essential for building a participatory and dialogical approach between the different players in the human and animal health scenarios, together with the assisted population. This is an essential stage in the development of a VL surveillance system from a One Health perspective.

This study was a proposal to measure the perception of health professionals working in public health (doctors, nurses, community health agents, endemic disease control agents and veterinarians) regarding VL in the municipality of Uruguaiana.

## METHOD

The research project was authorized by the Uruguaiana SMS and approved by the Research Ethics Committee of the Federal University of Pampa (Unipampa), under protocol number CAAE 58534316.9.0000.5323.

### Study area and population

The municipality of Uruguaiana is in the far west of the state of RS, at 29° 46' 55" South latitude and 57° 02' 18" West longitude, on the border with Argentina. The climate is subtropical, with a coxilha topography, grassland vegetation and average annual rainfall of 1,650 mm. It has an altitude of 74 meters and an average maximum temperature of 25.8°C and a minimum of 9.7°C<sup>11</sup>. Uruguaiana has 125,435 inhabitants, with the rural population accounting for 7% of the municipality's total population<sup>12</sup>. A 2.4 km bridge over the river Uruguay connects the city to Paso de Los Libres, in Argentina, which is why the city is considered the main gateway for tourists to RS, registering more than 100,000 tourists from the River Plate Basin, Chile, Paraguay and other countries.<sup>11</sup>



## Study design

A cross-sectional observational study was conducted to assess the perception of health professionals working in the Family Health Strategy Program (FHS) - doctors, nurses, community health agents (CHAs), endemic disease control agents (EDCs) and veterinarians - regarding VL and CVL, considering the main aspects related to epidemiology, clinical signs, control and prevention measures specified in the technical standards<sup>8,13</sup>. The decision was made to evaluate professionals directly involved in VL notification and investigation, covering all the neighborhoods in the municipality of Uruguaiana.

Data collection was carried out in December 2016 and January 2017 in 21 FHS teams, with 21 nurses, 21 doctors and 150 CHAs registered as working, corresponding to 61.45% coverage of the population<sup>14</sup>. Twenty-eight EDCs were part of the municipal Environmental Health Surveillance. As for veterinarians, we chose to list only those who were registered with the municipality's Health Surveillance, totaling 28 self-employed professionals. Veterinarians working in the public sector were not interviewed because they were involved in the study (two working in Environmental Health Surveillance and one in municipal Health Surveillance). The exclusion criterion was the absence of professionals from the workplace due to vacation, sick leave, maternity leave or termination of contract.

A standardized, semi-structured, self-administered questionnaire was used. The main biological, social and environmental determinants recognized in the literature for their importance in the spread and perpetuation of VL were considered<sup>8,13</sup>. The questionnaire also sought to assess the actions of veterinarians in relation to CVL. For validation purposes, the questionnaire was applied to five individuals (doctor, nurse, veterinarian and CHA) working at the Municipal Polyclinic and the Municipal Health Surveillance. The questionnaire was completed after reading and signing the Informed Consent Form.

When the information was compiled, the sum of the alternatives correctly marked received a final value of one point. In order to identify the strengths and weaknesses of the Visceral Leishmaniasis Surveillance and Control Manual<sup>8</sup>, the questions were grouped according to the four axes of action highlighted in the related guidelines: 1 - human beings (nine questions; nine points), 2 - the canine reservoir (five questions; five points), 3 - the vector (two questions; two points) and 4 - prevention and control actions (two questions; two points).

Coding to form a structured database and exploratory data analysis were carried out using Microsoft Excel 2010 program. The comparison between health professionals was carried out using the non-parametric Kruskal-Wallis test in the R statistical package version 4.0.1 (R Core Team, 2020), assuming a 5% significance level.

## RESULTS

Of the 248 professionals scheduled to be interviewed in this study, 183 (73.79%) answered the questionnaire, 65 (26.21%) met the exclusion criteria because they were on vacation, on sick leave or because their contract had ended and one (0.40%) refused to answer the survey. The CHAs (56), EDCs (eight) and a veterinary doctor (one) were excluded. The greater number of CHAs who were not working at the time the questionnaire was administered was because the period of application coincided with the end of their contract, which was carried out via a public selection process for a limited time. Thus, of the 183 participants, 94 were CHAs, 21 nurses, 21 doctors, 20 EDCs and 27 veterinarians.

Most interviewees (79.03%) were female, aged between 31 and 40 (41.71%), with a university degree (52.69%). Income varied according to the professional categories assessed. Doctors and nurses had the highest average income, above three minimum wages (81.00%). CHAs and EDCs had the lowest average incomes, with 74.00% and 81.80% reporting average incomes of between one and two minimum wages, respectively.

According to the axes of action in the Visceral Leishmaniasis Surveillance and Control Manual, the EDCs performed best in the questions related to human beings and the vector (first place). Doctors performed very well on questions related to humans (second place) and disease control and prevention (first place). Veterinarians, on the other hand, did better on questions relating to canine reservoirs (first place) and those referring to control and prevention strategies (second place). The other professionals interviewed did not stand out in any of the areas (Chart).

When considering the nine questions that make up the "human" axis, doctors obtained the second highest score due to the high scores obtained on the questions relating to forms of presentation, transmission and treatment of VL. However, when the scores obtained on two questions relevant to the early diagnosis of VL cases are analyzed (occurrence of cases and form of presentation in Uruguaiana), the performance of this professional category showed deficiencies in the perception of VL, since, of the 21 doctors, nine (42.86%) did not know about the occurrence of cases in the municipality and 15 (71.43%) did not point to the visceral form as the incident. CHAs and nurses also had lower scores on these two questions, with 47 CHAs (50.00%) and 11 nurses (52.38%) not knowing about human cases of VL in the municipality and 59 (62.76%) CHAs and 16 (76.19%) nurses not correctly identifying the form of the disease that occurs in Uruguaiana. The CHAs (100.00%) and veterinary doctors (92.59%) had the best level of information about the occurrence of cases of HVL in Uruguaiana. Considering all the professionals interviewed, 58.70% said they were aware of the occurrence of cases of HVL in the municipality.

Within the vector axis, 122 (66.66%) interviewees had a score equal to or less than 0.5 on the question that addressed their



Chart. Performance of the professionals interviewed according to the axes of action of the Visceral Leishmaniasis Surveillance and Control Manual.

Professionals	N	Axes of action of the Visceral Leishmaniasis Surveillance and Control Manual							
		Human*	Clas.	Reservoir*	Clas.	Vector*	Clas.	Control*	Clas.
EDC	20	138,88	1°	93,10	2°	150,75	1°	72,90	5°
CHA	94	69,90	5°	81,70	4°	84,80	3°	87,02	3°
Nurse	21	91,60	4°	90,93	3°	78,90	4°	81,98	4°
Medical	21	137,10	2°	68,83	5°	71,57	5°	132,50	1°
Veterinarian	27	99,46	3°	145,89	1°	99,61	2°	99,78	2°

Source: Prepared by the authors, 2021.

\*There was a significant difference at the 5% level between the categories.

EDC: endemic disease control agents; CHA: community health agents; Clas.: classification.

perception of the vector's characteristics, such as its size, the place where the immature forms are multiplied and the time of the insect's activity.

When evaluating the answers to the questions addressed only to veterinarians, the survey revealed that 17 (62.96%) thought that treatment for CVL was appropriate, even though 24 (88.89%) interviewees said that treatment would not lead to a cure. Six veterinarians (22.22%) considered euthanasia as a control measure for VL and nine (33.33%) pointed to treatment. Still on this question, seven (25.92%) veterinarians marked only measures aimed at the vector or at people and five (18.52%) veterinarians chose not to answer the question.

In the questions about preventive attitudes towards dogs, all the veterinarians said they recommended a repellent collar to prevent CVL. About vaccination, 17 professionals (62.96%) vaccinated dogs in their veterinary establishments. Other measures were also marked as: *spot-on* product (66.66%); use of repellent (85.18%) and cleaning the yard (92.59%).

It was found that veterinarians used various methods to diagnose CVL. In all cases, serological diagnosis was used and could be carried out: in the practice itself (51.85%), in a veterinary laboratory (33.33%), in a human laboratory (33.33%) and in an official laboratory (29.63%). Of the 27 veterinarians evaluated, nine (33.33%) carried out parasitological diagnosis associated with some serological diagnostic technique.

## DISCUSSION

Selection bias was one of the potential errors in this study, since the individuals who took part were likely to differ from those who met the exclusion criteria. To reduce losses, several visits were made to basic health units to access professionals who had not taken part in the meetings in which the questionnaires were administered.

The lack of knowledge of 41.30% of the interviewees about the occurrence of human cases in Uruguaiana can be explained by the low number of human cases reported up to the date of this study, with only two confirmed cases of VL in the municipality (in 2011 and 2016). However, as the second case was notified to the municipal epidemiological surveillance only two

months before the questionnaire was administered, it was expected that health professionals would be better informed about its occurrence.

The hypothesis of underreporting of human cases in the population should be considered. The results found in the questions that obtained a low rate of correct answers reflect a lack of perception the form of leishmaniasis and suggestive symptoms, which justifies this possibility. The underreporting of the disease is worrying, as preventive and control measures depend on the epidemiological classification of the area, which is established by a composite index used by the Ministry of Health's Visceral Leishmaniasis Surveillance and Control Program (PVC-LV), which contains the average number of cases and incidence of VL over the last three years<sup>10</sup>. As this is a municipality with confirmed cases, epidemiological surveillance services should look for alternatives to improve the investigation of suspected cases, considering under-reporting as a potential problem to be investigated, since the symptoms of VL are non-specific<sup>15</sup>.

The prevalence of CVL found in serological surveys and tests requested spontaneously by dog owners reveal the high occurrence and wide distribution of the canine disease in the urban area of Uruguaiana<sup>7</sup>. Many studies have shown that canine cases of VL precede the occurrence of human cases in each area<sup>16,17,18</sup>. In this context, training health professionals to identify suspected cases of VL can significantly contribute to the sensitivity of health services in detecting new cases and measuring the intensity of VL transmission in the municipality. In addition, early diagnosis is essential for successful control of the disease and is considered one of the main factors associated with a reduction in the lethality of VL<sup>8</sup>.

When analyzing the responses of health professionals regarding treatment for VL, it was observed that one in five was unaware of the treatment available. It is very important for professionals to be informed and up to date on the possibility of treatment for VL, since early treatment is one of the fundamental control measures for reducing lethality<sup>20</sup>. Knowledge about the efficacy of CVL treatment is also important, since treated dogs are not cured and continue to be reservoirs of the disease and, therefore, vector repellency measures must be maintained continuously in sick dogs<sup>19</sup>.



Another issue that deserves emphasis in training is the characteristics of the vector. It is essential that health professionals know the habits of *Lu. longipalpis* so that they can correctly recommend preventive measures related to repelling the insect to the population, without confusing them with the measures already recommended for controlling *Aedes aegypti*<sup>8</sup>.

About preventive and control measures for CVL, the results of the survey showed that 100.00% of veterinarians recommended the use of repellent collars and 62.96% of veterinarians vaccinated against CVL. In Cuiabá, Igarashi et al.<sup>21</sup> found different results, with vaccination being the most widely used measure (71.64%), followed by the recommendation of repellent collars (58.20%). In the province of Lleida, Spain, Ballart et al.<sup>22</sup> also found that 100.00% of the veterinarians interviewed recommended repellent collars. Le Rutte et al.<sup>23</sup>, in a survey of 459 veterinarians in Spain and northern France, found that 88.00% of professionals recommended the use of repellent collars on dogs and 45.00% recommended vaccination against CVL. Collars impregnated with deltamethrin have a powerful repellent and insecticidal effect against *Lu. longipalpis* and can reduce the risk of infection<sup>24</sup>. However, the impact of this strategy on the community depends on distribution coverage and the low rate of collar loss<sup>25</sup>. In addition, this practice is not common among dog owners due to the high financial cost. In this sense, the Ministry of Health has incorporated the distribution of collars impregnated with insecticide (4% deltamethrin) for the control of VL in priority municipalities<sup>26</sup>. However, Uruguaiana is considered a low-risk area for VL transmission<sup>10</sup> and is not included in this MoH project for the supply of repellent collars.

There was disagreement among the veterinarians interviewed as to the control measures for the dog, with appointments for both euthanasia and treatment of the animals. Several studies have questioned the efficacy of euthanasia in reducing the incidence of VL<sup>27,28</sup>. Ethical and economic issues also hinder the adoption of euthanasia as a method of VL control<sup>29</sup>. However, euthanasia still appears as a disease control measure recommended in the technical standards of the Ministry of Health, as well as in the guide of the Federal Council of Veterinary Medicine<sup>8,30</sup>. When CVL treatment was specifically discussed with veterinarians, 62.96% considered this measure to be appropriate. In Cuiabá, a smaller number of veterinarians (38.80%) did not consider treatment to be prohibited<sup>21</sup>. The lower percentage of veterinarians who recommended treatment in Cuiabá may be due to the date of the survey, since in 2014 there was still no drug approved for the treatment of dogs. Therapy with leishmanicidal drugs can lead to a clinical cure and not a parasitological cure, i.e. the dogs remain infectious for the vector<sup>31</sup>. The Brazilian Ministry of Health has authorized treatment with miltefosine (milteforan), registered with the Ministry of Agriculture, Livestock and Food Supply<sup>19</sup> but stressed that this is not a public health measure because it is an individual initiative and does not guarantee a parasitological cure.

Veterinarians said they used different methods to diagnose CVL, without proper standardization in confirming the diagnosis.

The use of different serological techniques makes it difficult to compare results, since both the parameters inherent to the test (sensitivity and specificity) and those related to the reservoir (prevalence of canine cases, present or absent symptomatology) can influence the results found<sup>32</sup>. In a study carried out by Ballart et al.<sup>22</sup>, in the province of Lleida, Spain, the 32 veterinarians interviewed also reported different serological diagnosis methods, with 78.1% of the tests being carried out in private laboratories and 65.6% in their own laboratories. The use of various tests that measure different responses and parameters can lead to false perceptions about the real epidemiological situation in the municipality. Standardizing the laboratory criteria for confirming CVL would reduce the risk of errors and consequently increase the accuracy of the diagnosis.

The analysis of the questions answered correctly highlighted the position of the EDCs with the most consistent performance when considering the four axes evaluated. This finding probably indicates the importance of the continuous training carried out in Uruguaiana to update disease control and prevention strategies, since this professional, when visiting homes, acts in conveying information regarding the main relevant problems in the municipality. As for veterinarians, the higher frequency of correct answers on the axis related to the reservoir can be attributed to the high incidence of CVL in veterinary clinics.

The veterinarians said they recommended preventive measures for the disease. However, they showed that they had insufficient knowledge of VL and the characteristics of the vector, as well as differing opinions on control measures and diagnosis of CVL. Actions to tackle and combat VL should consider veterinarians as important allies in controlling the disease and should include them in discussions and planning of measures. The complexity of VL demands a multi-professional, inter and transdisciplinary approach, capable of incorporating all the factors that could in any way compromise the recommended control and prevention strategies.

The preparation of a questionnaire to obtain indicators for the four components of the VL program proved to be an adequate and simple tool for assessing the perception of FHS professionals, both because it highlighted the main aspects to be improved in the prevention and control of the disease and because it provided visibility to the different strengths and weaknesses of each professional category. Alternative situational diagnosis tools are useful for understanding the issue from different perspectives and views, considering the complexity and scope of the problem.

In addition, the importance of the participation of veterinarians in the multidisciplinary teams involved in tackling VL should be emphasized, since there is no adequate control, mitigation and prevention strategy that does not consider the interconnectivity between human, animal and environmental health as a central issue. Considering that the indicator proposed by the Ministry of Health for classifying municipalities as being at risk of VL considers the incidence of human cases as the only parameter, the



method presented in this study could be adopted in places considered to be at low risk because they have few human cases and, for this reason, will remain unassisted by public policies for controlling and preventing the disease.

## CONCLUSIONS

This study revealed weaknesses in the perception of health professionals regarding the epidemiology and symptoms of VL, which may have an impact on the early detection of cases and, consequently, in the favorable resolution of these cases. There was a high level of lack of knowledge about the characteristics of the disease vector, which is likely to hinder the adoption of preventive measures against VL and CVL. It was also observed that professionals have little information on VL

control measures and that there is no consensus on control measures aimed at the canine reservoir.

The results emphasize the urgent need to invest in training strategies on VL to expand knowledge and discussions on the subject, which will provide a better basis for drawing up public policies that incorporate a broad, non-dissociative approach to human, animal and environmental health in programs and plans to control the disease.

It is essential that municipalities create spaces for broad discussion and organization of intersectoral actions to combat VL, capable of incorporating the complexity inherent in the disease into control and prevention strategies. Only with collaborative risk management actions and assertive governance can success be achieved in containing VL.

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#### Authors' Contribution

Massia LI, Pellegrini DCP, Harter J - Conception, planning (study design), acquisition, analysis, data interpretation and writing of the work. Bittencourt DG, Lamadril RDQ - Data acquisition. Marques GD, Celis ELH, Ziani JS - Writing of the work. Tassinari WS - Data analysis and interpretation. All the authors approved the final version of the work.

#### Conflict of Interest

The authors inform that there is no potential conflict of interest with peers and institutions, political or financial, in this study.



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