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Mini Review

Canine Leishmaniasis in Brazil

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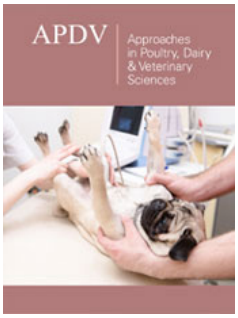

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Abstract

Canine leishmaniasis is a vector-borne disease caused by Leishmania infantum and is transmitted by phlebotomine sand flies primarily between animals and secondarily to humans. In Brazil, approximately 3,500 cases of LV have been reported annually since 2002 affecting humans, with an average incidence of two cases per 100,000 inhabitants and a lethality rate of 5.5% in the last 12 years. The control of canine visceral leishmaniasis is based on the detection of infected animals, followed by their euthanasia and in the control of the transmitting vector. Such control, however, is a difficult task due to the great variety of reservoirs of the parasite in nature.

Keywords: zoonosis; protozoa; flebuotominae; Lutzomyia longipalpis; Lutzomyia cruzi

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Leishmaniasis is a group of diseases that can infect humans when they come into contact with the parasite's transmission cycle. It is considered an anthropozoonosis. Currently, it is among the six most important endemic diseases in the world [1]. This disease is caused by protozoa of the order *Kinetoplastida*, family *Tripanossomatidae*, genus *Leishmania*, species *Leishmania infantum,* that infect man and different species of wild and domestic mammals of the tropical and subtropical regions of the world [2].

The lethality rate of this disease can reach up to 100% when untreated [3]. Visceral leishmaniasis (LV) affects around 500,000 new individuals each year, according to official data from the World Health Organization [4]. In Brazil, approximately 3,500 cases of LV have been reported annually since 2002, with an average incidence of two cases per 100,000 inhabitants and a lethality rate of 5.5% in the last 12 years [4].

The etiological agents of LV are trypanosomatid protozoa of the genus Leishmania, an obligate intracellular parasite of the cells of the mononuclear phagocytic system with a flagellate or promastigote form found in the digestive tract of the insect vector and another form or amastigote in the tissues of the vertebrate hosts [5]. The amastigote form is ovoid or spherical in shape, measuring approximately 3-6.5 µm by 1.3-3 µm. It presents nucleus, kinetoplast and rudimentary flagellum.

Vertebrate hosts may include a wide variety of animals, such as rodents, edentates, marsupials, canids and primates, including humans [5]. In urban areas, dogs (*Canis familiaris*) can be considered the main source of infection and responsible for maintaining the zoonotic cycle of this disease. Canine enzootia has preceded the occurrence of human cases and infection in dogs has been more prevalent than in humans [6]. In the wild, the reservoirs are foxes (*Dusicyon vetulus* and *Cerdocyon thous*) and marsupials (*Didelphis albiventris*).

The vectors of LV are flebuotominae, popularly known as straw mosquito or birigui [7]. In Brazil, especially two species are related to the transmission of the disease: *Lutzomyia longipalpis* and *Lutzomyia cruzi* [8]. The first species is considered the main transmitting source of L. (L.) chagasi in Brazil, and recently *L. cruzi* was considered a vector in the State of Mato Grosso do Sul. In Brazil, the geographical distribution of *L. longipalpis* is broad and seems to be in great expansion [7].

The urbanization of LV in several Latin American cities has occurred due to rural exodus and the formation of consequent pockets of urban poverty [9]. In Brazil, LV occurs endemically in almost all of the territory, and is showing expansion and urbanization, but many studies are still necessary for the knowledge of epidemiology in this new scenario [10,6]. After infection, the promastigote forms of Leishmania are phagocytosed by macrophages and multiply as amastigotes within phagolysosomes. This proliferation in phagolysosomes protects the microorganisms of the cellular defense of the dogs. After proliferation, macrophages rupture and release the amastigote forms, which penetrate into other host cells, especially to the hemolymphatic organs, such as lymph nodes, spleen, bone marrow and liver, as well as to the dermis [11]. Generally, the disease in the dog is systemic and chronic, however the acute and severe evolution can lead the animal to death in a few weeks. Immunosuppression caused by leishmania can lead to opportunistic infections that make diagnosis difficult [12]. In Brazil, the asymptomatic form of the disease is found with varied indices, representing 40 to 60% of a seropositive population.

The appearance of clinical signs will depend on the immunocompetence of the animal. Commonly observed clinical signs are: lymphadenomegaly, onychogrifose, emaciation, hair loss, ulcerative lesions, pruritus, opaque hairs, foot edema, hyperkeratosis, diarrhea, keratoconjunctivitis, splenomegaly, among others. In advanced stages, it is also observed paresis of the hind limbs, cachexia, starvation evolving to death [13].

Based on the clinical suspicion, confirmation of the diagnosis can be based on parasitological, serological and molecular methods [14]. The initial diagnosis of leishmaniasis is made by the evaluation of clinical and epidemiological parameters, but for a definitive diagnosis, there is a need for tests that prove the presence of the parasite [15,16,17]. Diagnostic confirmation can be done through parasitological techniques (direct visualization of the parasite) or by serological and molecular methods [18,1]. The specificity of the direct parasitological method is 100% and the sensitivity may exceed 80% when the material harvested from hematolymphoid organs. In asymptomatic animals, in which few amastigote forms are present, false negative results may occur [7].

The control of canine visceral leishmaniasis is based on the detection of infected animals, followed by their euthanasia and in the control of the transmitting vector. Such control, however, is a difficult task due to the great variety of reservoirs of the parasite in nature; in addition, leishmaniasis presents as a zoonotic disease that is maintained, for the most part, in natural cycles involving vectors and wild reservoirs. There is also the ability of the parasite to adapt, even in the absence of its natural reservoir, to survive in other hosts present in its habitat [19].

The focus given to euthanasia of dogs has been shown to be ineffective and costly [21,22,10]. The elimination of seropositive dogs, among the measures of control of leishmaniasis, is the one that presents less technical-scientific support, since there are several conflicting points in this action [22]. Regarding the euthanasia of dogs as reservoir control, we must remember the profound impact that this measure causes, considering the man-dog relationship in society and considering that many dogs have become true "members" of the family, being euthanasia of dogs with positive serology and most often asymptomatic, becomes increasingly unacceptable and difficult to perform for public health authorities [23].

The official canine LV control program recommends that measures be directed to the human and canine population and to the vector; and should include individual protection measures for humans, basic sanitation, population control of stray dogs, vaccination of the canine population and use of impregnated collars based on Deltametrin 4% [7].

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