Evaluation of the potential transmission of visceral leishmaniasis in a canine shelter

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SUMMARY

Seventeen dogs from the same shelter in an endemic visceral leishmaniasis region were observed for 24 months. The animals lived in contiguous individual cells. After serological diagnosis through ELISA test, all dogs received a deltamethrin impregnated collar (Scalibor® Protector Band, Intervet) and the positives ones were also subjected to treatment with alopurinol, 10 mg/kg BID. After five months, three dogs exhibited serum conversion and also started to receive the same therapeutic protocol. Nineteen months later, none of the other animals showed positive serology. The results suggest that interruption in the transmission process occurred after the measures had been adopted.

Keywords : dog - canine leishmaniasis - deltamethrin - Leishmania chagasi - sand flies.

RÉSUMÉ

Évaluation de la transmission potentielle de la leishmaniose viscérale dans un chenil. Par V.M. RIBEIRO, R.A. RAJAO, S. de DINIZ et M.S. MARQUES MICHALICK.

Dix-sept chiens, issus du même chenil dans une région endémique de leishmaniose viscérale au Brésil, ont été suivis pendant 24 mois. Les animaux ont été maintenus dans des cages individuelles contiguës. Après un diagnostic sérologique par la méthode ELISA, tous les chiens ont reçu un collier à base de deltaméthrine (Scalibor® Protector Band, Intervet) et les chiens positifs ont été traités avec de l’alopurinol, (10 mg/kg BID). Après cinq mois, la séro-conversion a été observée chez trois chiens qui ont été soumis au même protocole thérapeutique. Dix-neuf mois plus tard, aucun des autres animaux n’a montré de séro-conversion. Les résultats suggèrent que la transmission de la maladie a été prévenue grâce aux mesures adoptées.


Introduction

American canine visceral leishmaniasis is a severe systemic disease of slow and chronic course. Its diagnosis as well as its cure are difficult. It is a zoonosis that affects, in general, healthy and well-nurtured dogs. The disease has Leishmania chagasi (= Leishmania infantum) as the etiologic agent in South American continent [14, 19]. Transmission between susceptible animals and between animals and humans occurs specially through the bite of infected females of the sand flies Lutzomyia longipalpis [23].

From the epidemiological point of view, the canine disease is considered more important than the human one : besides being more prevalent, dogs show high level of cutaneous parasitism, so they are the main source of infection for insect vectors [2, 7].

The control measures aim the removal of the disease to human beings, the interruption of the transmission cycle through euthanasia of infected dog and combat to the insect vector [16]. In face of the presence of the disease in urban areas, where the dog occupies an important role in the family environment, euthanasia is frequently contested.

Control of the vector centered in the dog can be achieved through systematic application of deltamethrin in baths [22] or impregnation in daily use collars [5, 11, 13]. These measures can reduce the prevalence of canine and human disease. Canine treatment has been suggested by several authors as an important measure for the disease control prevalence reduction of the canine disease as well as the decrease of infective status of the dog’s skin during therapeutics [1, 3, 8, 9, 12, 15, 17, 20].

Thus, this work had as the objective to evaluate, through dog-centred vector control, the potential of deltamethrin (Scalibor® Protector Band, Intervet) impregnated collars with and of the continuous use of alopurinol (10 mg/kg BID) in interrupting canine visceral leishmaniasis transmission in dogs confined in a shelter.

Materials and methods

AREA

This study was performed in the Santa Efigênia province. This region has 33639 inhabitants and approximately 4464 dogs. Canine and human visceral leishmaniasis have occurred there and the prevalence of the canine disease is approximately 5.4 %, evaluated by means of serologic tests - Enzyme Linked Immunosorbent Assay (ELISA) and Indirect Fluorescence Assay (IFA). The dogs tested and found to be seropositive for visceral leishmaniasis in this province were euthanatized.

ANIMALS

Seventeen dogs (three males and fourteen females) were observed throughout the study. Most of them were mongrel dogs, only one was a Teckel. The ages varied from six to fourteen years (mean 9.07 ± 3.06) and they had an mean...
weight of 17 kilograms. All the animals had been living in this shelter for more than five years.

Before this study, all the dogs in this shelter were being tested for leishmaniasis every six months and two or three dogs had to be euthanatized at each time, for being seropositive.

All animals lived in the same house, sheltered in contiguous cells, individually or in pairs, and were fed a commercial dog food. Dogs were regularly immunized against rabies, leptospirosis, distemper, parvovirus, coronavirus, type II adenovirus and parainfluenza; they were also dewormed and received adequate control of external parasites (fleas and ticks) with fipronil (Frontline®, Merial) which was used each three months or whenever necessary.

SEROLOGICAL TESTS

The antigen for the Enzyme Linked Immunosorbent Assay (ELISA) test was from promastigotes of Leishmania amazonensis, strain MHOM/BR/1960/BH6, grown from four to seven days in LIT medium (Liver Infusion Tryptose) [4]. For preparation of the antigen parasites were washed three times in PBS pH 7.2 and sonicated. After centrifugation at 14,000 g protein content in the supernatant was determined. The sample was divided in 0.1 ml aliquots, maintained at -70°C and used at the concentration of 5 g per well.

A goat anti-dog IgG conjugate labelled with peroxidase was utilized. These antibodies were produced by the Phoneutria Biotecnologia e Serviços Ltda - Belo Horizonte, Minas Gerais.

The test was performed according to the method described by VOLLEH et al. [21]. Sera were diluted 1/400 and absorbance readings were done using a 496 nm filter.

OBSERVATIONS

All animals received collars impregnated with 4% deltamethrin (Scalibor® Protector Band, Intervet) at the time of collecting blood samples for serological diagnosis. The collars were changed every four months, according to the manufacturer recommendation. This study did not use a control group, with dogs exposed the infection, by reasons of animal welfare, as it is usual in field works.

Dogs that had shown positive serology for visceral leishmaniasis in any phase of the observation were submitted to treatment with alopurinol 10 mg/kg BID, orally, in constant use [18]. After five, 14 and 24 months dogs were again examined through the serological test.

Results

Three animals were positive and five showed board-line cut-off test in the first serological examination. After five months, three other animals showed serum conversion, two of them were board-line cut-off test. After 14 months, four dogs died but only one was serum positive, one of them maintained the board-line cut-off test in the first examination. Causes of deaths are shown in Table I. Two other animals, both serum negative, died 24 months after the beginning of the observation; in this same period, one animal was converted from positive to negative in the serological test (animal 5). Among the remaining 11 animals, none showed changes in the serological test; thus four were positive and seven were negative. The serological results during the study period are shown in Table II.

Discussion

When observation started 17.6% (3/17) of the animals were serum positive for visceral leishmaniasis. Five months
later, three animals serum converted from negative to positive, totalling six serum positive animals in the group (35.3%). On this occasion, it could not be affirmed whether the implemented control measures had been successful, since these animals could have been previously contaminated without showing detectable levels of antibodies in the serological tests [6, 10]. After 24 months, one animal showed serum conversion from positive to negative and none of the serum negative animals became positive. This dog had always exhibited a normal clinical pattern, specially considering its age (14 years-old) and indicated good therapeutic result and tolerance to the drug. These data can be considered an indicator that the measures were efficient as previously reported [3, 5, 11, 13, 17].

As for the six deaths, only one was a serumpositive dog which suffered, however, of an advanced case of hepatic neoplasm. The other five dogs, 9.3 years of age on average, were serum negative. Age was probably the most important determinant factor for the observed mortality, since the causes of death pointed out are frequent in older animals.

It seems to us adequate to conclude that the implemented measures achieved good results in the dog population studied here. Serum conversion was not observed in negative dogs between the fifth and the twenty-fourth month of the observation period and the serum positive animals, submitted to treatment with allopurinol, maintained their good physical conditions and one of them exhibited serum negativity after chemotherapy. Security measures should be investigated and applied in order to allow that in controlled situations, serum positive dogs can continue to live with their owners.

References