Intestinal parasites of zoonotic importance in dogs from the District of General Pueyrredón (Buenos Aires, Argentina)

Lavallén, C.M.; Dopchiz, M.C.; Lobianco, E.; Hollmann, P.; Denegri, G.

Abstract
Lavallén, C.M.; Dopchiz, M.C.; Lobianco, E.; Hollmann, P.; Denegri, G.: Intestinal parasites of zoonotic importance in dogs from the District of General Pueyrredón (Buenos Aires, Argentina). Rev. vet. 22: 1, 19–24, 2011. Dog feces harbouring infective parasitic forms (larves, eggs, cysts of helminths and oocysts of protozoan) are potential sources of environmental contamination, representing a high risk of infection for people. The feces of 46 dogs housed at the Municipal Centre of Zoonoses of Mar del Plata City were analyzed to determine the prevalence of intestinal parasitic forms. The overall prevalence of parasites was 89.13%. Detected parasites were Ancylostoma caninum (71.74%), Toxocara canis (63.04%), Trichuris vulpis (45.65%), Uncinaria stenocephala (41.30%), Capillaria aerophila (17.39%), Echinococcus granulosus (8.69%), Giardia spp. (10.87%) and Isospora spp. (2.17%). The geographical characteristics and the wet weather of the region under consideration, together with the cultural habits and the socio–economic situation of the population may favor transmission. The prevalences of stray and domesticated infected dogs were 88% and 95.24%, respectively. Because stray dogs are often free–roaming, environmental contamination with parasite forms had likely already occurred. The prevalences of A. caninum and T. vulpis were significantly higher in < 6 years–old dogs rather than in older animals. Parasite–specific immunity is usually acquired during development, probably as a consequence of single or repeated exposures. Multiple infections were more frequent (80%) than infections with a single parasite (20%) and the most common parasite association (21.87%) was among A. caninum, T. vulpis, T. canis and U. stenocephala. The high prevalence of poly–parasitized animals together with the zoonotic potential of the parasites found in the samples, indicate that dog feces could be the source of several parasite infections for human as well as canine populations of the region under study. The parasite zoonoses transmitted by dogs are still a sanitary problem in the District of General Pueyrredón.

Key words: dog, intestinal parasites, zoonoses.

Resumen
Lavallén, C.M.; Dopchiz, M.C.; Lobianco, E.; Hollmann, P.; Denegri, G. Parásitos intestinales de importancia zoonótica en perros del Partido de General Pueyrredón (Buenos Aires, Argentina). Rev. vet. 22: 1, 19–24, 2011. La materia fecal canina que contiene formas parasitarias infectivas (larvas, huevos, quistes de helmintos y ooquistes de protozoos) es una fuente potencial de contaminación ambiental, representando un importante riesgo para las personas. Las heces de 46 caninos albergados en el Centro Municipal de Zoonosis de la ciudad de Mar del Plata, fueron analizadas para determinar la presencia de formas parasitarias intestinales. La prevalencia general de parásitos fue 89,13%. Los parásitos hallados fueron Ancylostoma caninum (71,74%), Toxocara canis (63,04%), Trichuris vulpis (45,65%), Uncinaria stenocephala (41,30%), Capillaria aerophila (17,39%), Echinococcus granulosus (8,69%), Giardia spp. (10,87%) e Isospora spp. (2,17%). Las características geográficas y el clima húmedo de la región de estudio sumado a los hábitos culturales y la situación socio–económica de la población, pueden favorecer la transmisión de parásitos. La prevalencia de perros callejeros y domésticos infectados fue 88% y 95,24% respectivamente. Debido a que los perros callejeros deambulan frecuentemente por las calles, es altamente probable que se genere contaminación ambiental con formas parasitarias. Las prevalencias de A. caninum...
The ubiquitous distribution of dogs around the world and the vast differences in their roles, have led to their exposure to infectious organisms and their unwitting participation in the transmission of over 60 zoonotic infections. Dogs are definitive hosts for several endoparasites with zoonotic potential such as *A. caninum*, *T. vulpis*, *C. aerophila*, *E. granulosus*, Giardia spp., or coccidians like Cryptosporidium spp. Dog faeces harbouring infective parasitic forms (larvae, eggs, cysts of helminths and oocysts of protozoan) are potential sources of environmental contamination representing a high risk of infection for the people and therefore have been recognized as a significant public health problem worldwide, especially in developing countries and communities that are socioeconomically disadvantaged. In Mar del Plata city there are between 10,000–12,000 stray dogs and one domesticated dog each four or five inhabitants. This situation generates a huge contamination of the city with dog faeces. The District of General Pueyrredón counts with the Municipal Centre of Zoonoses (MCZ) which performs dog and cat castrations and also shelters stray and biting dogs, among others activities.

The knowledge of parasites with sanitary importance brings the possibility to estimate the parasitic situation of the region in order to design or intensify prevention strategies about this environmental problem. Therefore, the objective of this study was to determine the prevalence of parasites in faeces of dogs being kept in the MCZ of Mar del Plata city by coprological procedures and coproantigen tests. We evaluated parasite prevalences regarding the gender, age, origin of the dogs and mixed infections.

**INTRODUCTION**

The ubiquitous distribution of dogs around the world and the vast differences in their roles, have led to their exposure to infectious organisms and their unwitting participation in the transmission of over 60 zoonotic infections. Dogs are definitive hosts for several endoparasites with zoonotic potential such as *A. caninum*, *T. vulpis*, *T. canis*, *C. aerophila*, *E. granulosus*, Giardia spp., or coccidians like Cryptosporidium spp. Dog faeces harbouring infective parasitic forms (larvae, eggs, cysts of helminths and oocysts of protozoan) are potential sources of environmental contamination representing a high risk of infection for the people and therefore have been recognized as a significant public health problem worldwide, especially in developing countries and communities that are socioeconomically disadvantaged.

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**MATERIALS AND METHODS**

**Study area and design.** A descriptive study was carried out during autumn 2004 in Mar del Plata and Batán, two of the most important cities of General Pueyrredón District, with an area of 1,453 km² and located on the southeast coast of Buenos Aires Province, Argentina (38° S; 57°33’W) (Figure 1). The total population reported for the District in 2010 was 614,350 inhabitants, most of the people live in the area under study. The rest of the population is distributed in small villages and in rural areas.

*Source of samples and parasitological procedures.* Between May and June 2004, 46 samples of fresh dog faeces were collected from the MCZ and conserved in plastic containers in duplicate (groups A and B). Group A was conserved with 10% formaldehyde and group B was freeze without preservatives until its utilization. For each dog an epidemiological file was kept with the following information: sex, age, breed, origin and reason for admission to the centre. The samples of group A were processed in the parasitological laboratory of the MCZ by Ritchie sedimentation method and Sheather flotation method. Identification of parasites was performed by morphological procedures.

**Figure 1.** Geographic location. A. Argentina in South America and Buenos Aires Province in Argentina. B. Location of the District of General Pueyrredón.
characteristics. A sample was recorded as positive if at least one parasitic form was observed by any method.

To the coproantigen determination the group B of samples was kept at −20°C for 20 days and then was sent to the Regional Laboratory of Environmental Health from Bariloche (Argentina), following the general indications to transport biological material. All the positive samples determined by the Copro–ELISA test were processed through the confirmation test Copro–Western Blot to identify E. granulosus, following standard techniques 2, 15, in the Parasitological Unit of the National Institute of Microbiology “Carlos Malbrán” (Buenos Aires, Argentina). This diagnostic system was considered undetermined when Copro–ELISA was positive and Copro–WESTERN BLOT was negative and it was considered positive when both techniques were positive.

Data analysis. Data analysis was performed using EpilInfo 3.3.2 (CDC, Atlanta, USA) and SPSS 11.5. The comparisons of prevalences between dichotomous categories (stray dogs versus domiciliary dogs, male versus female, and <6–year–old versus >6–year–old) were made using the Fisher Exact test for two qualitative variables 23. It was considered statistically significant when p < 0.05.

RESULTS

The analysis of the epidemiological files evidenced the following data: from the total of dogs kept in the MCZ 76.10% were male and 23.90% female; 93.40% were mixed–breed dogs and 6.60% pure–breed; the ages oscillated from two to nine years–old; the 54.40% used to be stray dogs and the 45.60% pet dogs; the 67.30% entered to the MCZ for being biting dogs and the 32.70% for being abandoned.

The overall prevalence of parasites was 89.13% among the 46 faecal samples analyzed. The most frequently observed parasite was A. caninum (71.74%), followed by T. canis (63.04%), T. vulpis (45.65%), U. stenocephala (41.30%), C. aerophila (17.39%) and others with minor percentages (Table 1).

The faecal samples analyzed trough copro ELISA + Western blot to identify E. granulosus, evidenced 4 (8.69%) samples positive and 2 (4.35%) undetermined. One of the positive samples also had Taeniid eggs.

Among the total of stray and domiciliary dogs sheltered in the MCZ, the 88% and the 95.24% respectively were infected with at least one parasite. The specific prevalences were similar between the two populations (Table 2).

In regard to gender, there was no significant difference in the overall prevalence between males and females (88.57% versus 90.90%), and the prevalence of each parasite was similar between the genders (Table 3).

The general prevalence between age categories showed no significant difference (96.80% versus 73.30%). However the prevalences of A. caninum and T. vulpis were significantly higher in < 6 years–old dogs than in older dogs (83.90% versus 46.70%; \(X^2 = 6.901, p = 0.0248\) and 61.3% versus 13.30%; \(X^2 = 9.370, p = 0.0046\)) (Table 3).

Multiple infections were remarkably more frequent (80%) than infections with a single parasite (20%) and

### Table 1. General and relative prevalence of parasitic agents in faeces

<table>
<thead>
<tr>
<th>parasites</th>
<th>number of positive samples</th>
<th>general prevalence (a) (n = 46) (%)</th>
<th>relative prevalence (b) (n = 41) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>helminths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. caninum</td>
<td>33</td>
<td>71.74</td>
<td>80.49</td>
</tr>
<tr>
<td>T. canis</td>
<td>29</td>
<td>63.04</td>
<td>70.73</td>
</tr>
<tr>
<td>T. vulpis</td>
<td>21</td>
<td>45.65</td>
<td>51.22</td>
</tr>
<tr>
<td>U. stenocephala</td>
<td>19</td>
<td>41.30</td>
<td>46.34</td>
</tr>
<tr>
<td>C. aerophila</td>
<td>8</td>
<td>17.39</td>
<td>19.51</td>
</tr>
<tr>
<td>E. granulosus</td>
<td>4</td>
<td>8.69</td>
<td>9.76</td>
</tr>
<tr>
<td>total</td>
<td>41</td>
<td>89.13</td>
<td>100</td>
</tr>
<tr>
<td>protozoan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giardia spp.</td>
<td>5</td>
<td>10.87</td>
<td>12.19</td>
</tr>
<tr>
<td>Isospora spp.</td>
<td>1</td>
<td>2.17</td>
<td>2.43</td>
</tr>
<tr>
<td>total</td>
<td>6</td>
<td>13.04</td>
<td>14.63</td>
</tr>
</tbody>
</table>

\(a\) general prevalence was estimated in relation to total number of samples analyzed.

\(b\) relative prevalence was estimated in relation to total number of positive samples.

\(c\) prevalence of parasites was estimated taking account positive results in the Copro–ELISA and the Copro–Western Blot tests.

\(d\) more than 1 parasite agent can be present in a single sample.

### Table 2. Comparison of the specific prevalences in faeces of stray and domiciliary dog

<table>
<thead>
<tr>
<th>parasites</th>
<th>stray dogs (a) (n = 25) (%)</th>
<th>domiciliary dogs (b) (n = 21) (%)</th>
<th>(X^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. caninum</td>
<td>72</td>
<td>71.43 (0.002)</td>
<td></td>
</tr>
<tr>
<td>T. canis</td>
<td>60</td>
<td>66.66 (0.104)</td>
<td></td>
</tr>
<tr>
<td>T. vulpis</td>
<td>40</td>
<td>52.38 (0.705)</td>
<td></td>
</tr>
<tr>
<td>U. stenocephala</td>
<td>40</td>
<td>42.86 (0.038)</td>
<td></td>
</tr>
<tr>
<td>C. aerophila</td>
<td>16</td>
<td>19.05 (0.074)</td>
<td></td>
</tr>
<tr>
<td>E. granulosus</td>
<td>8</td>
<td>9.52 (0.526)</td>
<td></td>
</tr>
<tr>
<td>Giardia spp.</td>
<td>16</td>
<td>4.76 (1.488)</td>
<td></td>
</tr>
<tr>
<td>Isospora spp.</td>
<td>0</td>
<td>4.76 (1.217)</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>88</td>
<td>95.24 (0.753)</td>
<td></td>
</tr>
</tbody>
</table>

\(a\) prevalence of parasites was estimated in relation to total number of stray dogs.

\(b\) prevalence of parasites was estimated in relation to total number of domiciliary dogs.

\(c\) prevalence of parasites was estimated taking account positive results in the Copro–ELISA and the Copro–Western Blot tests.

\(d\) more than 1 parasite agent can be present in a single sample.
the most common parasite association (21.87%) was between *A. caninum*, *T. vulpis*, *T. canis* and *U. stenocephala*. Helminthic infections (89.13%) were more frequent than protozoan (13.04%).

**DISCUSSION**

According to worldwide studies conducted in recent years, the prevalence of intestinal parasites among dogs showed heterogeneous results: from 12.5% to 96% in Argentina. In countries where poor socioeconomic conditions were present and cultural habits were favorable to parasitic transmission, high rates of infection were detected. In contrast, surveys conducted in areas with adequate sanitary conditions showed that prevalence of intestinal parasites were lower than 33% in Argentina and also produces important diseases in dogs. As *C. aerophila*, the rest of parasites found in this study have zoootic importance.

Geohelminths are involved in several human infections such as *cutaneous larva migrans* caused by *A. caninum* and *U. stenocephala*, as well as *visceral larva migrans* and *ocular larva migrans* caused by *T. canis* and *T. vulpis* is a parasite whose zoontic potential is frequently disputed; nevertheless some researches reported *visceral larva migrans* syndrome and enteric trichuriasis in adult people and children. The prevalence of protozoan diagnosed in the present study was lower than that reported by several authors. The time elapsed before samples were used or the sedimentation method used to process them could affect the recovery of these parasitic agents.

The coproantigen tests used in this study to identify *E. granulosus* showed the presence of stray and domiciliary dogs with echinococcosis in the District of General Pueyrredon. This fact poses a severe threat to human health as *E. granulosus* is the causative agent of cystic echinococcosis, an important zoonoses in the southeast region of the Buenos Aires Province, included the district under study. Studies conducted in this region evidenced in the urban area a high number of cases of human hydatidosis and the existence of squares contaminated with *E. granulosus* eggs, and in the rural area 14.30% of bovine cattle with hydatid cysts and a prevalence of 16.60% of canine echinococcosis.

The dogs infected with *E. granulosus* belonged to the center and to a periferic neighborhood of Mar...
del Plata city. As a consequence, these places could be identified as potentially risky areas 9.

The coincidence of the finding of *Taenid* egg with a positive result to the coproantigen test in the same sample, confirms the presence of *E. granulosus* in this sample. The absence of *Taenid* eggs in the rest of the samples could be explained if we consider that conventional sedimentation and flotation methods have low sensitivity to recover *Taenid* eggs 10. This is the first report of *E. granulosus* eggs in dog faeces in the District of General Pueyrredón.

Most of faecal samples presented parasite associations in contrast with the results provided by other studies in the region 25. The high prevalence of poly-parasitized animals added to the zoonotic potential of the parasites found in the samples, mean that dog faeces could be the source of several parasite infections for the human and canine population of the region under study. Mixed infections also may play an important role in the epidemiology of parasitic disease because they reveal the proportion of dogs requiring combined drug treatment 14.

The general parasite prevalence of stray and domiciliary dogs was high and similar. The specific prevalences were also similar between the two groups. Because stray dogs are often free-roaming, environmental contamination with parasite forms had likely already occurred over a fairly dispersed area, resulting in the presence of infectious stages that pose a risk of infection to pet dogs and to people who walk along these places. The high prevalence of domiciliary dogs with parasites showed the lack of veterinary care and the existence of risk factors for canine intestinal parasite infections to the dog owners who are possibly not aware of the zoonotic potential of the parasites carried by their dogs, or their mode of transmission to humans. To prevent or minimize zoonotic transmission dog owners should perform a responsibly care of their pets; in that way veterinary practitioners acting as information sources about canine zoonoses are also required 14.

It is also necessary that sanitary institutions take control measurements to prevent the increasing number of infection due to transplacental and transmammary transmission, and parasite-specific immunity is usually acquired with age, probably as a consequence of single or repeated exposures 24.

Taking into account the high parasite prevalence found and their zoonotic potential, the parasite zoonoses transmitted by dogs is still a sanitary problem in the District of General Pueyrredón. People are exposed to a broad spectrum of zoonotic parasites by means of environmental contamination with dog faeces. It is evident that the parasite control measurements applied are not enough and that the behavior of the human population favors the propagation of parasites. Consequently, a consistent and integral sanitary programme must be included in public health government actions to achieve the control of intestinal parasites in dogs.

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**REFERENCES**


