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IDENTIFICATION OF POTENTIAL ZOONOTIC PARASITIC ELEMENTS IN PARKS AND PLAYGROUNDS FOR CHILDREN IN TIMIŞOARA

IDENTIFICAREA UNOR ELEMENTE PARAZITARE POTENŢIAL ZOONOTICE ÎN PARCURI ŞI LOCURI DE JOACĂ PENTRU COPII DIN TIMIŞOARA

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ABSTRACT | REZUMAT

The diseases caused by parasites with zoonotic potential (ex. *Toxocara canis, Echinococcus spp*.) is a real problem for physicians and veterinarians, also.

For humans, the infestation possibilities are multiple, the major route being by direct contact with infected dogs which remove eggs in faeces. However, the distribution of parasitic elements in nature is not limited to places to deposit faeces, such as: parks, children playgrounds, gardens, sand pits.

The aim of this study is to identify potentially zoonotic parasitic elements by coprologic methods in samples of soil /sand /faeces collected from parks and playgrounds for children in Timişoara and to assess the risk of human contamination.

The study was conducted over a period of one year, and the samples were examined by flotation method and by direct examination (staining with Lugol solution). Parasitological examinations revealed the presence of parasitic elements belonging to the genera *Toxocara, Ancylostoma, Trichocephalus* in 88% of parks (22/25) and 100% in playgrounds (16/16).

Coproparasitological examinations revealed the presence of parasitic elements in 31 samples (37.80 %). The parasitic elements identified in fecal samples were: cyst *Giardia spp*., *Eimeria /Isospora* oocysts, *Taenia spp.* oncospheres*, Toxocara canis* eggs, *Ancylostoma/ Uncinaria* eggs, *Tricocephalus vulpis* eggs.

The contamination of parks and playgrounds for children with potential zoonotic parasitic elements from dogs is a public health problem. The enforcing of regulations regarding the movement of stray dogs which are a permanent source of environmental contamination, the education of dog owners about deworming dogs and feces collection, the information of the population about the danger of infestation are important links in the parasitological control implementation whose aim is to reduce significantly the risk of human infestation.

Key words: parasites, potential zoonotic, parks, children

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Bolile produse de paraziţi cu potenţial zoonotic (ex. *Toxocara canis, Echinococcus sp*.) reprezintă o reală preocupare pentru medicul uman şi cel veterinar, deopotrivă. Pentru om, posibilităţile de infestare sunt multiple, contactul direct cu câinii infectaţi care elimină ouăle prin fecale, reprezentând calea majoră. Dar distribuţia elementelor parazitare în natură nu este limitată la locurile de depunere a fecalelor, ele fiind găsite în parcuri, în locurile de joacă ale copiilor, în grădini, în gropile cu nisip.

Scopul studiului a fost identificarea prin metode coprologice a elementelor parazitare cu potenţial zoonotic din probele de sol/nisip/fecale recoltate din parcuri şi locuri de joacă pentru copii din oraşul Timişoara şi aprecierea riscului contaminării umane.

Au fost recoltate un număr 287 de probe de sol/ nisip şi un număr de 82 probe coprologice din 25 de parcuri publice (www.primariatimisoara.ro) şi 16 locuri de joacă pentru copii din oraşul Timişoara. Studiul s-a desfăşurat pe o perioadă de un an, iar probele au fost examinate prin metoda flotaţiei şi prin examenul direct (colorare cu soluţia Lugol).

Examenele parazitologice au relevat prezenţa elementelor parazitare aparţinând genurilor Toxocara, Ancylostoma, Trichocephalus în 88% din parcuri (22/ 25) şi 100% din locurile de joacă (16/16). Examenele coproparazitologice au relevat prezenţa elementelor parazitare în 31 probe (37,80%). Elementele parazitare identificate în probele de fecale au fost: chisturi de *Giardia spp.*, oochisturi de *Eimeria/Isospora,* oncosfere de *Taenia spp*., ouă de *Toxocara canis,* ouă de *Ancylostoma/Uncinaria,* ouă de *Tricocephalus vulpis.*

Contaminarea parcurilor şi a locurilor de joacă pentru copii cu elemente parazitare potenţial zoonotice provenite de la câini reprezintă o problemă de sănătate publică. Reglementarea circulaţiei câinilor fără stăpân, sursă permanentă de contaminare a mediului, educaţia proprietarilor cu privire la deparazitarea câinilor şi colectarea fecalelor, informarea populaţiei privind pericolul infestării sunt verigi importante ale implementării unui plan de control parazitologic al cărui scop este reducerea în mod semnificativ al riscului infestării umane.

Cuvinte cheie: paraziţi, potenţial zoonotic, parcuri, copii

The studies on parasitic zoonoses highlight the importance of the risk factors, the sources and infestation routes to humans and their contamination through environment as a problem of public health (4, 5, 12, 14, 16, 22).

The intestine parasitic protozoa *Giardia duodenalis* (sin. *Giardia intestinalis*, *Giardia lamblia*) is frequently identified in the dog feces. The recognition of the zoonotic potential of each species is based on the identification of the hosts or features of the species host.

There are four main cycles of transmission where different types of *Giardia* are involved, with both hosts and zoonotic features which are found in the environment. Humans are infected with cysts of both human and zoonotic origin while ingesting raw vegetables or contaminated water. *G. canis* is incriminated for this problem since the dog is the main source of contaminating the water and the environment (13, 17, 18, 21).

There are some nematodes (*Toxocara, Ancylostoma, Strongyloides*) that accidentally invade the human body locating in diferent tissues and organs and causing disorders which were called *larva migrans visceralis* or *larva migrans cutaneous*. The term *larva migrans* is frequently used for the extraintestinal infestations, mainly caused by *Toxocara canis* (1, 14).

There are multiple ways of human infestation, but the major route is by direct contact with infected dogs which eliminate eggs in feces. The distribution range of parasitic elements is extended to parks, children playgrounds, gardens, sand pits (2).

Therefore, the aim of this study is to identify potentially zoonotic parasitic elements by coprological methods in samples of soil /sand /feces collected from parks and playgrounds for children and to assess the risk of human contamination.

MATERIALS AND METHODS

The study was conducted over a year at the Clinic of Parasitology and Parasitic Diseases of the Faculty of Veterinary Medicine in Timişoara). A total of 287 of soil /sand and 82 coprologic samples from 25 public parks (26) and 16 playgrounds for children were collected.

The coprological examinations were carried out using the flotation method and the direct method (staining with Lugol solution).

RESULTS AND DISCUSSIONS

The parasitological examinations performed on 287 samples of soil /sand collected from 25 public parks and 16 playgrounds for children in Timişoara, revealed the presence of parasitic elements in 88% of parks (22/25) and 100% in the playgrounds (16/16).

The prevalence of the parasitic elements found in 266 positive samples of soil/sand (154 samples from parks and 112 from playgrounds) was as following:

- *Toxocara canis* eggs – 62,03% (165/266);
- *Ancylostoma / Uncinaria* eggs -22,55% (60/266);
- *Tricocephalus spp*. eggs – 15,42% (41/266).

The coproparasitological examinations performed on 82 fecal samples collected from 25 public parks and 16 playgrounds for children revealed the presence of parasitic elements in 31 samples (37, 80%).

The parasitic elements identified were: *Giardia spp*. cysts; *Eimeria / Isospora* oocysts; *Taenia spp*. oncospheres; *Toxocara canis* eggs; *Ancylostoma /Uncinaria* eggs; *Tricocephalus vulpis* eggs (Fig. 1, 2, 3).

When comparing the results of this study to the results found by other Romanian and foreign authors, it is not difficult to point out some epidemiological aspects which might be of particular interest to veterinary and physicians, dog owners, the population of Timişoara and authorities of the Town Hall.

The presence of parasitic elements in 88% of the parks and 100% of the playgrounds for children, the identification of eggs which belong to genera with zoonotic potential (*Toxocara, Ancylostoma, Tricocephalus*), in soil/sand samples, the coprological and other zooparasite diagnosis (*Giardia, Taenia*) in 37.8% of the samples collected from parks and playgrounds are major issue for health. The study is not aimed at the molecular identification of species if we refer to the presence of tapeworms oncospheres, so we are precautious about the potential infestation with *Echinococcus granulosus*, a tapeworm responsible for a serious zoonosis, which is human hydatidosis. Moreover we warn against the possibility of human infestation only by direct contact with the parasitic elements eliminated by the parasitic dog and never by consumption of viscera with hydatid cyst (4, 7, 22).

In Japan there was found an incidence of the intestinal parasitosis of 38% and 39.2% in a study conducted over 5 years on stray dogs; *T. canis* (25%, 12.5% respectively) had the highest prevalence in young dogs and *Tricocephalus vulpis* in adult dogs (8%, 23.3 % repectively) (24). Another study conducted in Malaysia points out a high prevalence of parasitism with *Ancylostoma caninum* of 74.4% as compared to ascarides and tricocephals (5). In Argentina, *Tricocephalus vulpis* (26.19%), *E. granulosus* (19.5%) and *U. stenocephala* (14.29%) were the most frequent species (3).

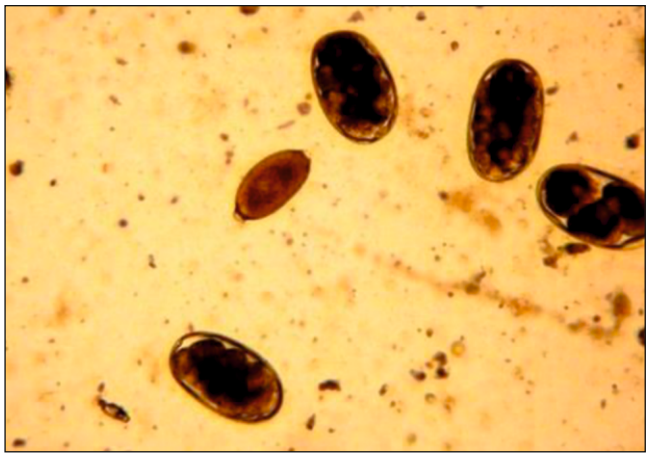

Fig. 1. *Tricocephalus vulpis, Ancylostoma/Uncinaria* eggs

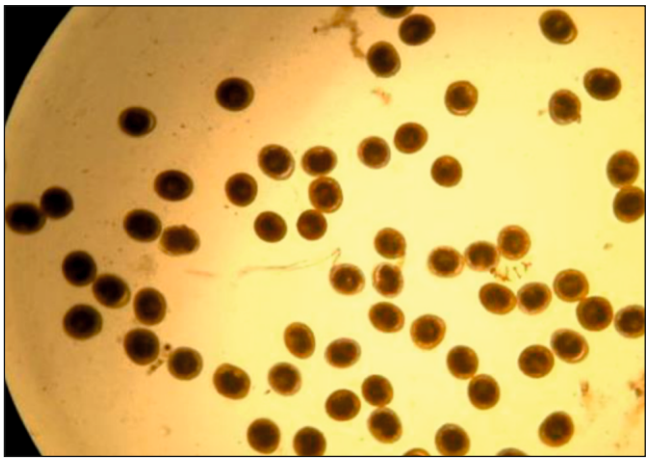

Fig. 2. *Toxocara canis* eggs

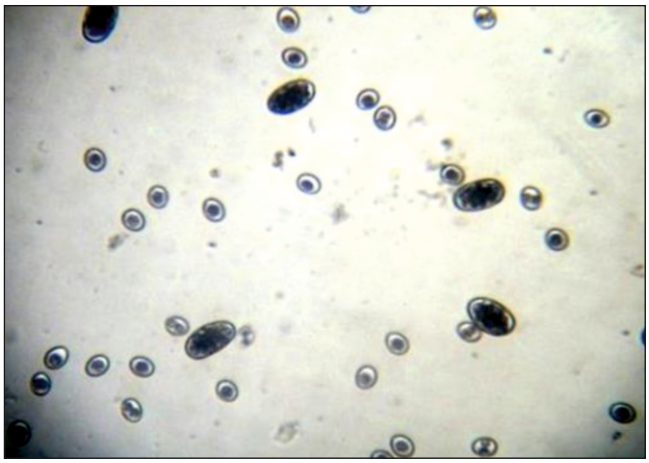

Fig. 3. *Eimeria/Isospora* oocysts, *Ancylostoma/Uncinaria* eggs

Similar studies were conducted by Sorescu and col. (2010) in the western Romania (Timiş county) on a population of 35 dogs of different breeds, age and sex, and the estimated prevalence was 48% *Giardia spp*., 6% *Cryptosporidium spp*., 11% *Isospora spp.,* 29% *Toxocara spp*., 14% *Ancylostoma spp.,* and 9% *Trichocephalus spp*. (18).

Mircean and col. (2012) estimated a prevalence of infestation with *Giardia spp.* of 47.7% followed by *T. canis* (26.9%), *Ancylostoma caninum* (17.3%), *Tricocephalus vulpis* (11.5%), *Isospora* 7.7%, *Dipylidium caninum* (1.9%) and *Toxascaris leonina* (1.9%) (6).

The study conducted by Traub and col. (2004) brought the first evidence of the direct zoonotic transmission from dogs to humans and found the same genotype of *Giardia* both in dogs and humans not only in the same household but also in the same village (23).

The main problem in checking the parasitism with *T. canis* in dogs is the maternal reservoir of larvae which is difficult to control (3, 8, 9).

The dogs could be a reservoir of ancylostomes, but humans are never contaminated by direct contact with parasitic dogs; instead they are infested through the soil which contains L3 after it had been covered with feces of infested animals. The biggest risk of infestation is for the children who walk barefoot or crawl on the ground (12, 16).

Humans are infested with *Tricocephalus trichiura* and *Tricocephalus vulpis* through water or when the fruits and vegetables contaminated with eggs L1 and are not properly washed (14).

The risk of human infestation was also recorded in Italy in the studies made on 463 and 409 coprological samples collected from cities and villages. The genera with zoonotic potential were: *Toxocara, Strongiloides, Giardia, Cryptosporidium, Ancylostoma* (25).

The studies conducted in the last years showed the danger of human infestation with parasitary elements eliminated by dogs in feces. The eggs of *Toxocara canis*, *Ancylostoma spp*., *Taenia spp*. were found using the flotation method in a percentage of 57.44 to 81.19. Most of the studies show *Toxocara canis* as having the highest zoonotic potential because its eggs are infesting elements for humans and they are transmitted by dogs in their feces and fur (8, 9, 10,11).

The contamination of urban and rural parks from many continents with eggs of *T. canis*, *Ancylostoma spp*, *Tricocephalus spp*, *Strongyloides spp*. was shown by examinating the soil and feces samples (19, 20).

The studies conducted in 2015 (15) were meant to identify the prevalence of antibodies against *Toxocara canis* in 183 serums taken from children aged 3-16. The positive samples were identified in a percentage of 12.02 with risk factors derived from keeping infested dogs with short hairs and sleeping with them.

The enforcing of regulations regarding the move-

ment of stray dogs which are a permanent source of environmental contamination, the education of dog owners about deworming dogs and feces collection, the information of the population about the danger of infestation are important links in the parasitological control implementation whose aim is to reduce significantly the risk of human infestation.

CONCLUSIONS

The parasitological examinations performed on 287 samples of soil/sand collected from 25 public parks and 16 playgrounds for children in Timişoara, revealed the presence of *Toxocara canis* eggs, *Ancylostoma / Uncinaria* eggs, *Tricocephalus vulpis* eggs in 88% of parks (22/25) and 100% in the playgrounds (16/16).

The coproparasitological examinations performed on 82 fecal samples collected from 25 public parks and 16 playground for children in Timişoara revealed the presence of parasitic elements in 31 samples (37,80%).

The parasitic elements identified in fecal samples were: *Giardia spp*. cyst, *Eimeria /Isospora* oocysts, *Taenia spp*. oncosphere, *Toxocara canis* eggs, *Ancylostoma / Uncinaria* eggs, *Tricocephalus vulpis* eggs.

The contamination of parks and playgrounds for children with potential zoonotic parasitic elements from dogs is a public health problem.

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