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PREVALENCE OF TOXOCARA EGGS IN CHILDREN'S PLAYGROUNDS AROUND JOS AND BUKURU METROPOLIS

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ABSTRACT

A total of 91 soil and 29 dog faecal samples were obtained between the months of July and August 2002 from four areas: the University of Jos senior staff quarters, Kabong, Odus, and ECWA veterinary clinic Bukuru and analyzed for Toxocara eggs using Zinc Sulphate floatation technique. Of the 91 soil samples analyzed , none was positive, while 1(3.45%) of the 29 faecal samples analzyed had *Toxocara canis*. However, there was a high prevalence 11(37.93%) of Ancylostoma caninum in the faecal specimens examined. Also, 1(1.10%) of the soil specimens contained the eggs of *Faciola spp*. The high prevalence of *A caninum* in dogs emphasizes the risk for transmission to humans, especially children. It also suggests that, there is a low level of awareness on zoonotic transmission of diseases and the need for the elimination of parasites from pet animals.

INTRODUCTION

It is well known that the larvae of a number of species of nematodes develop in the tissues of host other than their 'normal' definitive host. The most important species infecting man in this way is *Toxocara sp* (Smyth, 1996). *Toxocara canis* and *T cati* are zoonotic parasites of dogs and cats respectively, known to infect man and cause toxocariasis.

High prevalence of *Toxocara* infection for dogs and cats, frequency of pet ownership in households, and indiscriminate defaecation by dogs in public places combine to provide widespread environmental contamination with *Toxocara* eggs and provide ample opportunities for zoonotic transmission. Pica (Compulsive eating of nonnutritive substances, such as ice, dirt, gravel, flaking paint or plaster, clay, hair, or laundry starch) practised by 10 to 30% of children between one and six years of age, is clearly associated with the probability of acquiring *Toxocara* infection. Most patients with clinical toxocariasis have a history of this habit. Geophagia (The habit of eating clay or earth) is the type of pica associated with the highest risk of transmission (Glickman and Schantz, 1981). Widespread environmental contamination with *Toxocara* eggs, the attraction of children to the animal and their environment, and the play habit of children combine to facilitate human infection with *Toxocara sp* (Schantz, 1989).

The importance of soil, as a vehicle capable of transmitting toxocaral infection in open public places has been reported by many researchers (Woodruff *et al.*, 1981; Collins and Moore, 1982; Duwel, 1984; Scottler, 1989; Mahdi and Ali, 1993; Santarem et al., 1998). In Jos, the habit of allowing dogs to move about unrestrained and unaccompanied allows indiscriminate contamination of the environment with their faeces. The continued surveillance of play grounds for soil contamination with Toxocara eggs due to animal faeces is therefore needed, due to the deplorable environmental hygiene in most play grounds.

This research was directed at determining the prevalence of Toxocara eggs in children's playgrounds within the Jos metropolis as well as establishing the possible source of contamination.

MATERIALS AND METHODS

Study Areas

Four areas around Jos and Bukuru metropolis: The University of Jos Senior Staff Quarters (Unijos SSQ), Kabong, Odus and ECWA Veterinary Clinic Bukuru were chosen as study area. Unijos SSQ was chosen on the assumption that inhabitants know the public health hazards of zoonoses and should be able to take necessary preventive measures including elimination of worms from dogs by treatment. Kabong is an area with a high population of pet ownership. The inhabitants include both the low and high income earners of the society. ECWA Veterinary Clinic Bukuru is a hospital where the science and art of prevention, cure or alleviation of disease and injury in animals and especially domestic animals is practiced. In this clinic dogs from different areas around Jos and Bukuru metropolis are taken for treatment. Odus has a relatively moderate population of dogs and was included as a study area because of the recovery of *Toxocara* ovum on the sole of shoe of a boy from that area.

Collection of Soil Samples
Ninety one (91) soil samples (Unijos SSQ-25, Kabong-26, Odus-20 and Bukuru – 20) were collected from the study areas. 10-20g of soil was collected from the uppermost inch of the sites. Such sites were as much as possible free of erosion and several metres apart.

Collection of faecal specimens
Twenty nine (29) dog faecal samples were collected from children's playgrounds and pets seen at the Veterinary Clinic.

Laboratory Analysis
The soil specimens were examined for Toxocara eggs, using the Zinc sulphate floatation technique (specific gravity 1.180 33% WV) described by Dada and Linguist (1978). The faecal specimens were also examined for parasite eggs using the Zinc Sulphate technique described by Paik (1980).

RESULTS
Of the 91 soil samples analyzed for contamination with *Toxocara* eggs, none was found to contain *Toxocara* eggs although 1(3.85%) sample from Kabong had *Fasciola sp* (Table 1).

Table 2 shows the prevalence of *T. canis* in dogs from same location. Only 1 (3.45%) of the dogs examined (from Kabong) was infested with *T. canis* eggs. Faecal samples from dogs in the other three areas tested negative for *T. canis* eggs.

The prevalence of *Ancylostoma caninum* in dogs is shown in Table 3. Of the 29 dog faecal specimens examined, 11 (37.93%) were positive for the parasite with 5 from Kabong and 3 each from Bukuru and Odus while none from Unijos SSQ had *A. caninum*. The difference between the rates of infection at the Unijos SSQ and other areas is statistically significant ($P<0.05$).There is however no difference in the prevalence of *Toxocara* eggs in children's playgrounds across the 4 locations. However, the prevalence of *Fasciola sp* (3.85%) in soil samples analyzed from Kabong is higher than those from the other 3 areas in which soil samples examined had no *Fasciola sp*. Furthermore, the prevalence of *T canis* in dogs from Kabong (11.11%) is higher than those of dogs from the other 3 areas in which stool samples examined tested negative for *T canis* eggs.

Table 1: The prevalence of *Toxocara* and other parasitic eggs in soil samples from various locations in Jos.

Study Site	No. Examined	Parasite type and No.(%) positive	
		Toxocara s.p	*Fasciola sp.*
Unijos SSQ	25	0(0)	0(0)
Kabong	26	0(0)	1(3.85)
Odus	20	0(0)	0(0)
Bukuru	20	0(0)	0(0)
Total	91	0(0)	1(1.10)

Table 2: The prevalence of *T. canis* eggs in dog faecal specimens in Jos.

Study Site	No. examined	No. (%) positive
Unijos SSQ	10	0(0)
Kabong	9	1(11.11)
Odus	5	0(0)
Bukuru	5	0(0)
Total	29	1(3.45)

Table 3: The prevalence of *A. caninum* in dog faecal specimens in Jos.

Study Site	No. examined	Number (%) positive
Unijos SSQ	10	0(0)
Kabong	9	5(55.55)
Odus	5	3(60.00)
Bukuru	5	3(60.00)
Total	29	11(37.93)

DISCUSSION
A total of 91 soil samples were analyzed in this study for *Toxocara* eggs across four locations in Jos and Bukuru metropolis. None of the samples contained *Toxocara* eggs which falls short of our expectation and may suggest a very low prevalence of toxocariasis in these areas and an improvement in the sanitary conditions of the surroundings examined. This result differs markedly with the prevalence obtained in Frankfurt/ Main by Duwel (1984) in which 27(87%) out of 31 sandpits in children's playgrounds were contaminated with *Toxocara* eggs.

Analysis of stool samples obtained from dogs around the study sites revealed that only 1 dog out of 29 (3.45%) had *T. canis*. The low prevalence probably explains the absence/inability to detect the eggs of the parasite in the soil samples examined. The detection of *T. canis* egg however,

supports the reports of Glickman and Schantz (1981) that *T. canis* infects canids in all tropical and temperate regions of the world.

Interestingly, the low prevalence (3.45%) of *T canis* in dogs differs markedly with the high prevalence (37.93%) of *A caninum*, which is widely distributed across the study areas with the exception of the unijos SSQ. In Unijos SSQ, none (0%) of the 10 samples examined was positive for *A caninum*. This may be related to the level of awareness of the inhabitance who should know the public health hazards of zoonoses and should be able to take necessary preventive measures including elimination of worms from dogs by treatment.

Ancylostoma caninum is a common parasite of dogs but does not thrive well in cats (Miller, 1979). Lack of adequate sanitary and hygienic conditions surrounding humans and pet animals may have contributed to the high prevalence of the parasite in Kabong, Odus and Bukuru. The high prevalence of *A. caninum* in dogs emphasizes the risk for transmission to human. Although *A. caninum* is not associated with toxocariasis, it is one of the zoonotic nematode parasites that are associated with cutaneous larva migrans or creeping eruption. Unlike the case with *Toxocara,* infection with *A. caninum* rarely requires ingestion of eggs. Human contact with the dog hookworm leads to penetration of the skin, but the larvae are then unable to complete their migratory cycle. Trapped larvae may survive for some weeks or even months, migrating through the subcutaneous tissues. They may evoke a fairly severe reaction, forming serpiginous tunnels through the tissues, erythematous and sometimes vesicular eruptions of the advancing end, fading out and becoming dry and encrusted in the older portion. This condition may often be characterized by intense pruritis, and secondary bacterial invasion may result from scratching (Markell *et al.,* 1986).

It is expected that since dogs were infected with *A. caninum,* eggs of the parasite passed in stool should have been detected in soil samples examined. But this was not the case as none of the soil samples had *A. caninum* eggs, although one had *Fasciola sp* egg (Table 1). This may be due to the susceptibility of *A. caninum* eggs to hatching when passed out in stool. Eggs were seen hatched when stool samples were left unpreserved for more than 10 hours. Rainfall may also be a contributing factor. Unlike *Toxocara* eggs that remain infective and available for humans for months, or perhaps even years in the environment depending on the soil type and climatic condition (Glickman and Schnatz, 1981), no information is available on the infectivity and persistence of *A. caninum* eggs in the environment.

From this study, it may be concluded that children's playgrounds in the four locations (Unijos SSQ, Kabong, Odus, and Bukuru) around Jos and Bukuru metropolis are free of contamination with *Toxocara* eggs and, therefore, pose no risk of zoonotic transfer of toxocariasis. Dogs in these areas are also moderately free of infection with *T. canis*.

However, dogs were heavily infected with *A. caninum* and this poses a high risk of transmission to humans, especially infants. This is a reflection of the fact that there is a low level of awareness on the risk of zoonotic transmission and the need to eliminate parasites from pet animals in some areas. Therefore there is the need to improve the sanitary and hygienic conditions of human and pet animal surroundings in Jos, with a view to preventing the possible spread of zoonotic diseases. In addition, Veterinarians should be effective in providing pet owners with sound advice on zoonotic disease risks.

The special risks of children with pica should be explained, and such children should be protected from environment suspected to be contaminated with stool of dogs. Family pets would need to be regularly dewormed in order to reduce the risk of transmission.

It may also be important to examine the impact of climatic changes on the transmission and prevalence of zoonotic diseases, especially *Toxocara sp* and *A. caninum* in Jos and the surrounding communities.

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