

THE CONTAMINATION OF THE ENVIRONMENT WITH *TOXOCARA* EGGS IN MAZOWIECKIE VOIVODSHIP AS A RISK OF TOXOCAROSIS IN CHILDREN

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ABSTRACT. The home surroundings (109 places) of 120 children with diagnosed toxocarosis were examined to assess if the presence of *Toxocara* spp. eggs in the soil corresponds with the occurrence of clinical cases. 31 places (28.4%) were found to be contaminated. The highest level of soil contamination was revealed in rural and suburban regions (15.6% and 11.9%, respectively), while in urban areas it was 0.9%. These results confirmed that soil contamination might be recognized as a very important factor in the epidemiology of human toxocarosis.

Key words: children, contamination, soil, *Toxocara* spp, toxocarosis.

INTRODUCTION

Human toxocarosis is caused by an infection with larvae of canine or feline roundworm *Toxocara* spp. *T. canis* and *T. cati* are common parasites of young dogs and cats. Infection in Poland was recorded in 18.2-36.3% puppies in towns and 58.0-72.7% young dogs in shelters (Kozakiewicz 1983, Okulewicz 1996, Mizgajska and Luty 1998, Kornaś et al. 2001). *Toxocara cati* was noted in 40% cats in Łódź (Głuszkowska 1955), 68% in Wrocław (Ramisz and Martynowicz 1963), 10.5-62% in Warszawa (Żebrowska 1961, Borecka 1999) and 50% in Lublin and Puławy (Gundlach et al. 1991).

Humans are paratenic hosts of dog and cat roundworms. Men become infected through ingestion of infective eggs containing infective larvae. The major risk of infection is for children, because of their close contacts with puppies, poor hygiene, specific behaviour (geophagy) and lower level of resistance when compared with adults (Glickman et al. 1979, Marczyńska 1999, Ołdakowska et al. 1999).

In humans larvae of *Toxocara* spp. migrate to the liver or other internal organs, but can also cause serious ocular damage by migrating into the retina. According to localisation of larvae, toxocarosis can appear as the visceral form (*visceral larva migrans*), the ocular form (*ocular larva migrans*) or covert toxocarosis. Clinical

manifestation of toxocarosis depends on the number of larvae ingested and frequency of infection, distribution of larvae in the body and intensity of the host immunological response (Baever et al. 1952, Juszko et al. 1994, Ołdakowska et al. 1999).

The contamination of the environment with *Toxocara* eggs has been studied in towns in Poland, in Poznań – 6.3-10.0% soil samples positive (Mizgajska 1997, Maśnik 2000), in Wrocław – 6.0% (Mizgajska 1999), in Lublin and Puławy – 22.0-71.4% (Gundlach et al. 1996), in Warszawa – 5.6% (Borecka 2001), in Kraków – 17.0% (Mizgajska et al. 2001) and in Elbląg – 23.6% (Jarosz 2001).

The aim of the study was to assess if the presence of *Toxocara* spp. eggs in the soil corresponds with the occurrence of clinical cases in children.

MATERIAL AND METHODS

In 2002-2003 the home surroundings of children with diagnosed toxocarosis were examined. The entire group of patients comprise 120 cases with visceral, ocular and covert toxocarosis (52.5%, 25.8% and 21.7%, respectively) from rural areas (60%), suburban regions (30%) and towns (10%) in central of Poland (Table 1). Sand and soil samples were collected in total of 109 places, in backyards, gardens, sandboxes and playgrounds. In each place ten samples, each one about 100 grams were taken. *Toxocara* eggs were extracted using the Dada method.

Table 1. Clinical cases of toxocarosis in children in Mazowieckie voivodship

Form of toxocarosis	Number of cases	Area		
		rural	suburban	urban
Visceral	63	38	19	6
Ocular	31	20	9	2
Covert	26	14	8	4

The dried soil samples were sieved through a mesh. 10 gram samples were transferred to volumetric flasks containing 50 ml of 0.1% Tween 80, and vortexed for 30 min. The suspensions were transferred to 60 ml centrifuge tubes, then centrifuged at 1500 rpm for 10 min, after which the supernatant free of ova was decanted. A saturated flotation solution – ZnSO₄ (specific gravity 1.52) was added and the tubes were vortexed again, then centrifuged at 1500 rpm for 10 minutes, after which the solution was added to form a meniscus and a coverslip was overlaid. The coverslip was transferred to a glass slide after 15 min, and examined under x100 magnification and the number of *Toxocara* spp. ova were counted.

RESULTS AND DISCUSSION

The highest level of soil contamination was revealed in rural and suburban regions (15.6% and 11.9%, respectively), while in urban areas it was 0.9% (Table 2).

The results showed that in Poland, similarly as in other European countries there is a potential risk of toxocarosis for humans. This especially concerns rural areas, where the high number of toxocarosis cases had been noted (Table 1).

Comparable results of the soil contamination was recorded by Mizgajska and Luty (1998) and Jarosz et al. (2003) in villages near Poznań – Murowana Goślina (8% samples positive), Kołaczkowo (14.7%) and Lusowo (8%), near Kraków – Grodkowice and Łązkowice (16%) (Mizgajska 2000). A higher level of soil contamination with *Toxocara* eggs was found by Gundlach et al. (1996) in villages near Lublin and Puławy (35.5%).

Table 2. Contamination of soil with *Toxocara* eggs in Mazowieckie voivodship

Places examined/contaminated (%)			Total
rural	suburban	urban	
64/17	15.6%	37/13	11.9%
8/1	0.9%	109/31	28.4%

The present results revealed much smaller percentage of soil contamination with *Toxocara* eggs in urban areas (0.9%), when compare to village environments (15.6%) in Mazowieckie voivodship. The results of other authors in Poland have shown high level of soil contamination in towns – in Poznań 6.3% – 12.0%, in Wrocław 18.6%, in Elbląg 16.6%, in Kraków 16.0% and in Bytom 20.3% (Mizgajska and Luty 1998, Maśnik 2000, Mizgajska 2000, Mizgajska et al. 2001, Petryszak 2001, Petryszak et al. 2002, Petryszak and Nosal 2003).

The present study revealed that in the country children infect with toxocarosis in their home environment through contaminated soil. However, the direct contact with dogs and cats cannot be excluded as a source of infection. The examinations of Wolfe and Wright (2003) in the USA have shown that dogs hair can be a source of *Toxocara canis* infective eggs. Their results suggested that dogs infected with *T. canis* may infect people through direct contact.

ACKNOWLEDGMENTS

Work supported by funding from the State Committee for Scientific Research project No 3PO5D 074 23 – „Dependence of clinical cases of toxocarosis in children upon the prevalence of *Toxocara* spp. in dogs and cats and contamination of environment with *Toxocara* eggs”.

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Zaakceptowano do druku 14 czerwca 2004