

RESEARCH NOTE

Soil Contamination and Human Infection by *Toxocara* sp. in the Urban Area of Lima, Peru

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The visceral larva migrans syndrome (VLM) is the result of prolonged migration of helminth larvae into the body of unusual hosts, especially man (PC Beaver et al. 1952 *Pediatrics* 9: 7-19). Most frequently caused in humans by *Toxocara canis*, the common ascarid of dogs, VLM mainly affects children, although more than 10% of human cases have been described in adults (T Ehrhard & S Kernbaum 1979 *Bull Inst Pasteur* 77: 225-287).

In developed countries VLM may be the second most common type of human helminthic infection [PM Schantz 1989 *Am J Trop Med Hyg* 41(Suppl): 21-24]; in developing countries, although other helminthic infections are more frequent, there are some reports of high prevalence of human infection by *Toxocara* larvae (J Thompson et al. 1986 *Bull Wld Hlth Org* 64: 283-290, C Agudelo et al. 1990 *Mem Inst Oswaldo Cruz* 85: 75-78, PP Chieffi et al. 1990 *Rev Inst Med Trop S Paulo* 32: 204-210).

In the present study the presence of *Toxocara* eggs in the soil of public places in the urban area of Lima (Peru) as well as the frequency of anti-*Toxocara* antibodies in adult inhabitants of the same area were determined.

In August 1989 and January 1990 soil samples were collected from 10 squares of the urban area of Lima. Each sample consisted of approximately 250 g of material collected from the superficial soil layer, at five different points in each square.

In the laboratory each soil sample was carefully mixed and 15 g were separated and washed with water. Then, the material was diluted in a saturated NaCl solution and allowed to rest for 30 min. Five tubes were set up for each sample and three slides were prepared with aliquots of the superficial layer of each tube and examined under light microscope for the presence of *Toxocara* eggs.

At the same time serum samples from 1,023 subjects (740 males and 283 females) living in Lima, aged 16 to 83 years, were obtained. A total of 895 serum samples belonged to volunteers who had donated blood at three hospitals in Lima: Maria Auxiliadora Hospital (565 samples), Children's Institute (50 samples) and the Army's Hospital (280 samples). The remaining 128 serum samples were obtained from patients who showed negative results to serological tests for some parasitic infections performed at the Tropical Medicine Institute of the University of San Marcos. All sera were stored at -20°C in Eppendorff tubes.

All serum samples were submitted to an enzyme-linked immunosorbent assay (ELISA), employing a second stage-larva *Toxocara* excretion-secretion antigen (DH DeSavigny & IR Tizard 1977 *Trans R Soc Trop Med Hyg* 71: 501-507). Because of the high prevalence of infection by *Ascaris lumbricoides* in the region where the study was carried out all sera considered to be positive for anti-*Toxocara* antibodies were absorbed with *Ascaris suum* extracts in order to avoid cross-reactions with common *Ascaris* antigens (PP Chieffi et al. 1990 *Rev Inst Med Trop S Paulo* 32: 204-210).

Toxocara eggs were found in 8 squares in 1989 and in 7 in 1990. Many eggs were embryonated but only on three occasions viable larvated eggs were observed (Table I).

In several regions of the world *Toxocara* eggs were found contaminating the soil and allowing the occurrence of human infections by this dog ascarid (O Barriga 1988 *Vet Parasitol* 29: 195-234). In Lima we found a high frequency of contamination by *Toxocara* eggs in public parks commonly used as children's playgrounds, as well as observed in other South American countries (PP Chieffi & EE Muller 1976 *Rev Saúde Públ* 10: 367-372, P Salinas et al. 1987 *Bol Chile Parasit* 42: 33-36).

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Among the 1,023 sera examined 75 (7.33%) showed anti-*Toxocara* antibodies at significant levels. As shown in Table II, no significant differences

were found between sexes or among age groups, in spite of a slight predominance of a higher frequency of infection in females (8.48%) and in individuals over 45 years old (10.82%).

Although the serum samples examined in this study should not be considered as truly representatives of Lima's population because they did not have a real stratified and random distribution, the finding of 7.33% of the examined sera with anti-*Toxocara* antibodies suggests the existence of a considerable parcel of that population with *Toxocara* infection.

In summary, the presence of soil contamination by *Toxocara* eggs in many public places in Lima and the finding of anti-*Toxocara* antibodies in 7.33% of 1,023 adult subjects examined in this region strengthen the role of VLM as a possible health hazard for the Peruvian population, emphasizing the importance of dog worm control as a preventive measure.

TABLE I

Presence of *Toxocara* eggs in 10 squares of Lima (Peru), 1989-1990

Square	August 1989	January 1990
Chorillos Park	-	-
Los Héroes Park	+	+
Children Park I	+ ^a	+
Children Park II	+	-
Vista Alegre	+	+
Los Bomberos	-	-
Children Park III	+ ^a	+
Benjamin Doig	+	+
Zona D Park	+	+
Campo de Marte	+	+ ^a

a: viable embryonated *Toxocara* eggs were found.

TABLE II

Frequency of anti-*Toxocara* antibodies in 1,023 inhabitants of Lima (Peru) according to sex and age groups, 1989-1990

Age (years)	Male		Female		Total	
	Examined	+ (%)	Examined	+ (%)	Examined	+ (%)
16 - 25	425	24 (5.65)	97	4 (4.12)	522	28 (5.36)
26 - 35	163	13 (7.97)	75	10 (13.33)	238	23 (9.66)
36 - 45	91	7 (7.69)	51	4 (7.84)	142	13 (10.82)
> 45	61	7 (11.50)	60	6 (10.00)	121	13 (10.74)
Total	740	51 (6.89)	283	24 (8.48)	1,023	75 (7.33)

Chi-square = 6.7253 (p>0.05)