RESEARCH NOTE

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


Instituto de Medicina Tropical de São Paulo, Av. Dr. Enéas de Carvalho Aguiar 470, 05403-000 São Paulo, SP, Brasil *Instituto de Medicina Tropical Daniel A. Carrión, Av. Colonial, Casilla 10138, Lima 1, Perú ***Banco de Sangre del Instituto del Niño, Av. Brasil 1680, Lima 11, Perú ****Banco de Sangre del Hospital María Auxiliadora, Av. Pachacútec, Cdra 25, Lima 32, Perú

Key words: visceral larva migrans - toxocariasis - Toxocara canis - Lima - Peru

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 (TErhhard & SKernbaum 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 Wild Hith 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 (OBarriga 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, PSalinas et al. 1987 Bol Chile Parasit 42: 33-36).
Among the 1,023 sera examined 75 (7.33%) showed anti-\textit{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-\textit{Toxocara} antibodies suggests the existence of a considerable parcel of that population with \textit{Toxocara} infection.

In summary, the presence of soil contamination by \textit{Toxocara} eggs in many public places in Lima and the finding of anti-\textit{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.

\begin{table}[h]
\centering
\begin{tabular}{lcc}
\hline
Square & August 1989 & January 1990 \\
\hline
Chorillos Park & - & - \\
Los Héroes Park & + & + \\
Children Park I & +\textsuperscript{a} & + \\
Children Park II & + & - \\
Vista Alegre & + & + \\
Los Bomberos & - & - \\
Children Park III & +\textsuperscript{a} & + \\
Benjamin Doig & + & + \\
Zona D Park & + & + \\
Campo de Marte & + & +\textsuperscript{a} \\
\hline
\end{tabular}
\caption{Presence of \textit{Toxocara} eggs in 10 squares of Lima (Peru), 1989-1990}
\end{table}

\textsuperscript{a}: viable embryonated \textit{Toxocara} eggs were found.

\begin{table}[h]
\centering
\begin{tabular}{lcccc}
\hline
Age (years) & Male & & Female & \\
& Examined & + (%) & Examined & + (%) & Examined & + (%) \\
\hline
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) \\
\hline
\end{tabular}
\caption{Frequency of anti-\textit{Toxocara} antibodies in 1,023 inhabitants of Lima (Peru) according to sex and age groups, 1989-1990}
\end{table}

Chi-square = 6.7253 (p>0.05)