Mem. Inst. Oswaldo Cruz, Rio de Janeiro, Vol. *85* (1): 75-78, jan./mar. 1990

HUMAN AND DOGS *TOXOCARA CANIS* INFECTION IN A POOR NEIGHBORHOOD IN BOGOTA

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Prevalence of Toxocara canis *antibodies was studied in a poor community of Bogotá, Colombia. Two-hundred-seven patients, from both sexes and all age groups, were studied. Positive ELISA titers were found in 47.5% of the population, a high prevalence compared with reports from developed countries.* T. canis *ova were positive in 43.6% of fecal samples from dog puppies. An endemic pattern of the disease is described: socioeconomic status, weather, pollution, poor hygiene and a significant population of infected dogs. Neither the physical examination nor ELISA titers could detect any case of* T. canis *disease.*

Key words: *Toxocara canis* – epidemiology – serology – ELISA – prevalence

Toxocara canis, as a dog parasite, is a relevant public health problem in many countries around the world. *T. canis* larvae affects several organs in dogs and humans; the adult parasite, however, only affects dogs (Pessoa & Viana, 1978).

A large proportion of *T. canis* infections are asymptomatic. However, larvae can migrate and produce granulomas in liver, lungs, brain, eyes, and ganglia. The larva migrans visceral form of the disease includes hepatomegaly, anorexia, fever, pulmonary symptoms, and malaise of the patient.

Ophthalmic larva migrans is a more severe form of the disease, causing endophthalmitis. This may be confused with retinoblastoma. Leucocytoses and eosinophilia may remain as sequeale. The immunologic response may be intense, and antibody levels may remain high for several years. Isohemaglutinins anti A anti B may also remain high.

An ELISA test can detect *T. canis* antibodies with a 73% sensitivity, and a 92% specificity (Schantz & Glickman, 1983). There exist the possibility of false positives due to cross-reaction to *T. cati* (Kennedy et al., 1987).

Received September 26, 1989.
Accepted December 19, 1989.

The epidemiologic characteristics of the disease have not yet been researched in Colombia. The purpose of this study is to assess some of this variables.

MATERIALS AND METHODS

This study was done between July 1987 and July 1988, in Bogotá, Colombia. This city is located at 2,600 m above sea level. It has a mean temperature of 13°C and an average relative humidity of 80%.

Populations and sample – Two-hundred-seven subjects were selected by random sampling. The universe was composed by 5,728 in 1987, from a population considered to be in the poorest socioeconomic stratum of the city.

The following variables were assessed: age, sex, blood type, antibody titers against *T. canis*, *Ascaris* eggs in feces, type of housing, garbage disposal, number of dogs and cats per family.

The number of observations records per variable were:

– Blood types	177
– *Toxocara* ELISA test	202
– *Ascaris lumbricoides*	199
– Blood types and ELISA	176
– *Ascaris* and ELISA	195

Dog study – Thirty-nine fecal samples of dogs under of 4 months of age, were examined; having been randomly selected among 230 houses, searching for *T. canis* eggs.

Sample manipulation – All blood samples were classified. The antibodies titers were done following the ELISA technique (Savigny et al., 1979). This was prepared and standardized by the Colombian National Institute of Health (Villarreal & Corredor, 1987). Antigens obtained from the secretory-excretory products of second stage *T. canis* larvae, were used, following the Savigny (1975) method. Titers over 0.4 were considered as positive. All human and dog samples were preserved in 5% formol. These fecal samples were studied by the Ritchie-Frick concentration technique (Ritchie, 1948; García et al., 1966).

Case and control groups – Thirty-six subjects were selected from the ELISA positive group as cases, and twenty-four ELISA negatives subjects as controls. Information was obtained about the following variables: geophagia; respiratory, neurological and ocular personal history. Special emphasis was placed in the physical examination of abdomen, skin and peripheral adenopathies. Eye examination: visual acuity and ophtalmoscopy. Blood test: hematocrite, hemoglobin, white cell count, and eritrosedimentation rate.

Statistical analysis – Statistic differences were done by z test, student t, and chi-square tests.

RESULTS

Zoonotic, environmental and social variables – Most of the population inhabited slums with poor quality floors and walls. Crowding, three or more people per room, was common. More than 50% of the population did not have running water or sewage disposal; more than 90% of the population did not have appropriate waste disposal.

There were dogs in 53% of the houses. There was one dog for every two humans. Cats were found in 7% of the houses.

Toxocara canis ova were found in 17 puppies (43.6%) of the puppies. 82.3% of them were minor infections with 160 to 960 ova per gram of feces.

ELISA seropositivity did not correlate either with dog ownership ($\chi^2 = 0.1$, $p > 0.05$) or cat ownership ($\chi^2 = 1.36$, $p > 0.05$).

Toxocara canis *serology* – Positive *T. canis* titers were found in 47.5 % of the sample. There was a positive case in a 1 year old child, and three in adults older than 60 years of age. There is an increase of the prevalence with age from 0 to 24 years; the highest prevalence is in the range from 10 to 39 years (Fig. 1). Females had a significantly higher prevalence rate than males ($z = 3.98$, $p = 0.01$).

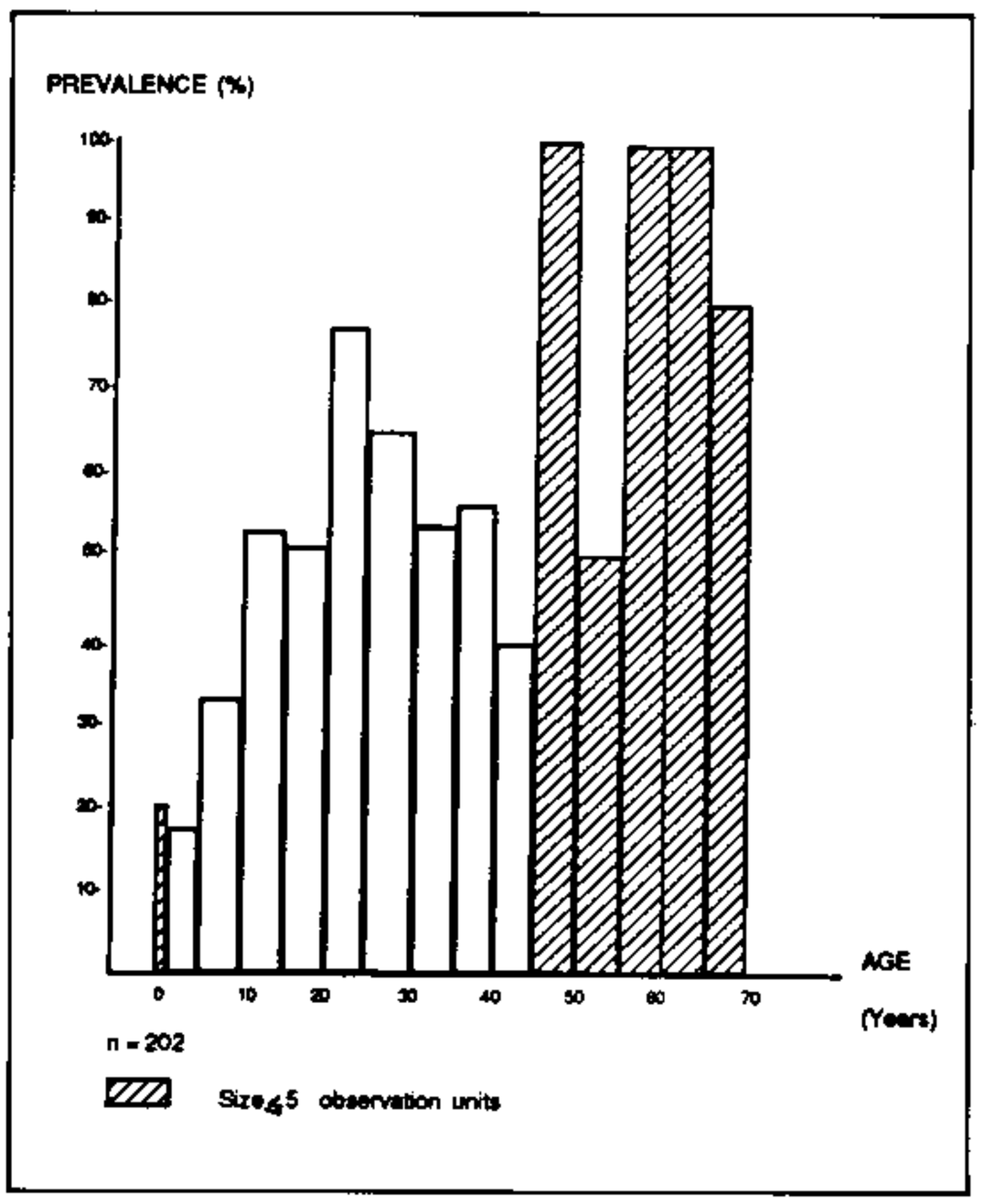

Fig. 1: age prevalence of *Toxocara canis* infection by ELISA titers.

In the distribution of *T. canis* antibody titers there is a decreasing pattern. The mean titer for the negative serology was 0.18 with a range between 0 and 0.382. The positive group had a mean titer of 0.742, and a 0.408 to 1.890 range (Fig. 2).

There was no significant differences among subjects with positive titers in both sexes ($t = 0.98$, $p > 0.05$). The 0-4 age group had significantly higher titers than the 15-44 age group ($t = 2.54$, $p = 0.025$). No significant differences were found among other age groups. Age and ELISA titers showed a high degree of freedom between them as evidenced by the r^2

coefficient of 0.0356. No significant correlation between *T. canis* serological titers and blood types was found ($\chi^2 = 0.003$, $p > 0.05$). Neither was found any relation with *Ascaris lumbricoides* ($\chi^2 = 0.22$, $p > 0.05$).

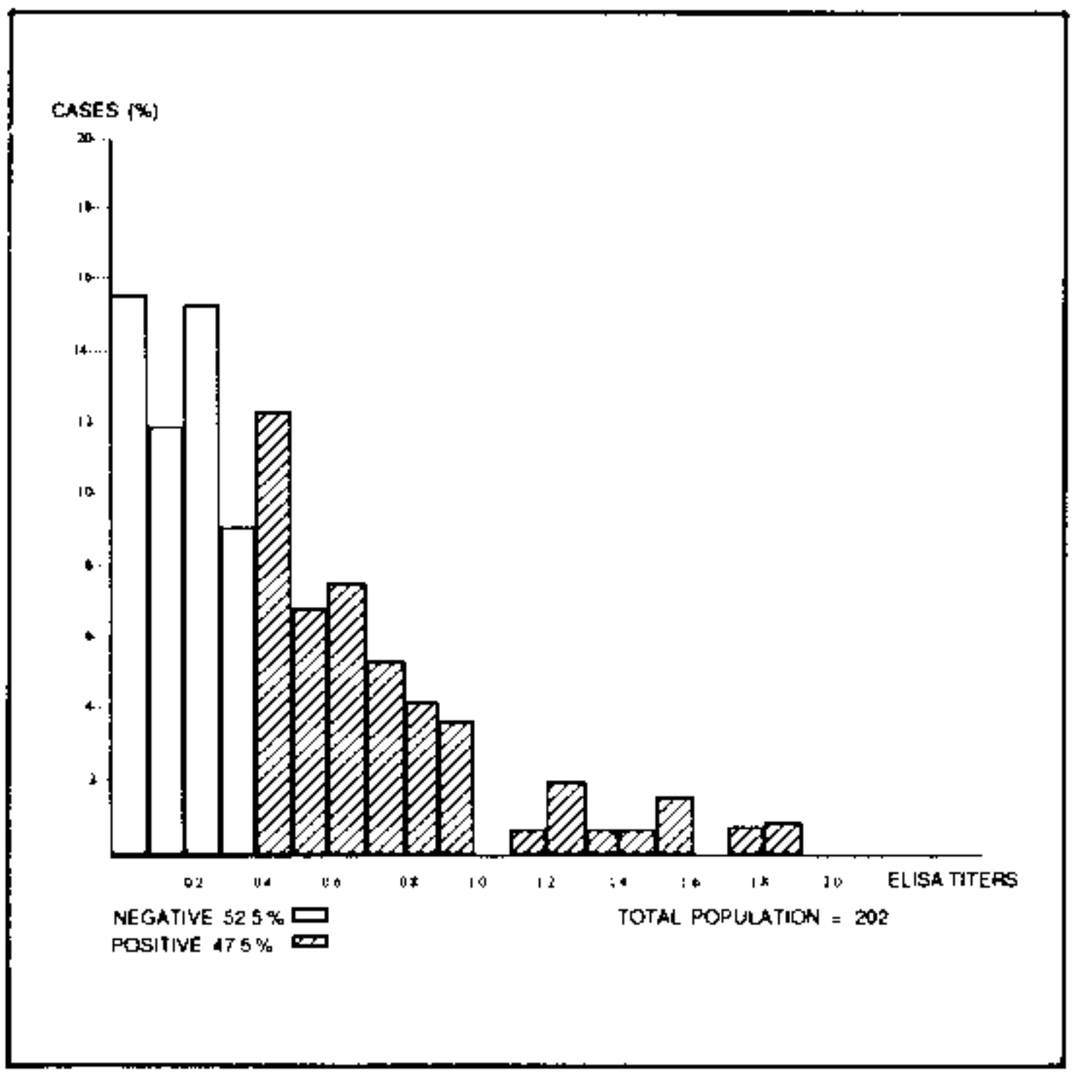

Fig. 2: frecuency of positive and negative cases for *Toxocara canis* by ELISA titers.

Ascaris lumbricoides *infection* – *Ascaris lumbricoides* ova were found in 9.5% of the fecal samples. Three cases presented as moderate infection, and two as severe infections. The remainder had minor infections. The highest prevalences were in the 30-34 (18.3%), and the 1-4 age groups (16.3%) of the total.

Case-control groups – There were no significant differences between both groups in any of the four areas under analysis: history, physical exam, eye exam and blood test. Geophagia was not important ($t = 0.509$, $p > 0.05$). The remainder variables were negative in 80 to 92% of the cases in both groups. There were neither clinical hepatomegaly, nor leucocytosis, nor oesinophilia among those with higher ELISA titers. Controls presented 10% more eosinophilia than cases. Consequently, there were no clinical cases of visceral or ocular larva migrans.

DISCUSSION

Prevalence rates of *T. canis* infection are higher in Colombia than those reported in other countries. The prevalence in the United States, confirmed by ELISA, is in the 2.8-7.3% range for any age group. Prevalence in a group of black children 6-11 years old was 30% (Schantz & Glickman, 1983; Herrmann et al., 1985). A study of urban population in New Zealand found a 2.8% overall prevalence (Clementt et al., 1987). Thompson et al. (1986), found a prevalence of 7.1% among healthy children in the Netherlands. Besides, prevalence in a group of healthy British adults was 2.6%. The same study showed a prevalence of 86% in a rural population of children in Santa Lucia.

The prevalence rate of *A. lumbricoides* infection in the study population is lower than those found in other towns in Colombia (Ministerio de Salud, 1969). This may imply that a zoonosis has replaced an intestinal parasitosis as the first parasitic disease in the population. It may be caused by the frequent use of anti-helminthic drugs, the epidemiologic characteristics of *T. canis* infection, and the lack of a program of treatment of infected dogs.

The prevalence differences among age groups is the result of the *persistence* of antibodies for many years after the first infection, and also, because of repetitive infections. Therefore, prevalence increases with age until the mid-twenties. The high prevalence in females may be related with the longer daily exposure of women to contact with infected dogs. Most women in the neighborhood did not have a permanent job. There were not any high *T. canis* titers in children or males. Savigny et al. (1979), described the same results. Probably, there are several routes of infection which may carry more epidemiologic weight than geophagia.

The number of houses with dogs, and the rate of dogs per person is higher in Colombia than in the United States. The dog population represents 15% of the human population in the U. S. A., and between 30-50% of houses have a dog (Schantz & Glickman, 1979).

The prevalence of dog infection is high when compared to that of: United Kingdom, 7 to 21% (Woodruff, 1975; Turner, 1977); Australia, 38% (Blake & Overend, 1982); Canada 34%, United States 11 to 49% (Thompson, 1986); Latin America, 7 to 53% (Schantz & Glickman, 1978, 1983). However, a high prevalence of infected dogs in developed countries is counterbalanced by a low prevalence among humans.

The endemic pattern found in this study, implies the presence of several simultaneous factors that may help us to explain the high prevalence of *T. canis* infection, such as: poverty, poor environmental health conditions, favorable weather factors, continuous exposure to the infectious agent, free wandering of stray dogs and poor personal hygiene.

Our results confirm that there is not any relationship between serological titers, and development of clinical disease.

The scarcity of clinical cases of *T. canis* disease (only one) may indicate that: 1. There is a high infection prevalence and a low disease prevalence. 2. High prevalence of infection, massive and recurrent infections trigger an extensive immunological response in humans that may lead to the predominance of asymptomatic or mild clinic forms of disease.

ACKNOWLEDGEMENTS

To Guillermo Botero, M. D.; Juana Bonilla, R. N., José Herrera, Ana Torres, Raquel Araújo, Blanca Sarmiento, Rosaura Torres and Misael Kuan.

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