

# A Survey of Canine Toxocariasis and Toxocaral Soil Contamination in Essex County, New Jersey

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**Abstract:** *Toxocara canis* eggs were found in the feces of 33 of 246 dogs and in two of 629 soil samples from 32 public parks in Essex County, New Jersey. Stool samples collected from these areas were free of *T. canis* eggs. The findings suggest that contamination of soil in public parks with *T. canis* eggs is not an important factor in the transmission of visceral larva migrans in this county. (*Am J Public Health* 1980, 70:1207-1208.)

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## Introduction

Visceral larva migrans (VLM) is a clinical syndrome caused by the migration of larval nematodes through the internal organs of an unnatural or abnormal host. Although a variety of nematodes are capable of infecting man in this manner,<sup>1</sup> it was recognized in the original description of VLM that *Toxocara canis* was probably the most common etiologic agent.<sup>2</sup> *T. canis* is a common nematode parasite of dogs, and human infection is by means of ingestion of embryonated eggs. Due to the prolonged period between the time eggs are passed and the onset of infectivity, dog ownership or recent dog contact may not be necessary for infection,<sup>3</sup> but is undoubtedly a significant factor in determining risk. Infection is most common in children 1-4 years old,<sup>4</sup> and is frequently associated with pica.<sup>5</sup>

Estimates of the prevalence of *T. canis* infection among dogs range from 1.6 per cent<sup>6</sup> to more than 96 per cent,<sup>7</sup> depending upon numerous factors such as the age of dogs examined, diagnostic technique, and geographic location. Since pica is an important epidemiological factor in VLM, estimates of the prevalence of *T. canis* eggs in the soil are also of interest. In 1936, 45 per cent of New Orleans door-yards were found to be contaminated,<sup>8</sup> as were 24.4 per cent of 800 soil samples from public places in Britain in 1973.<sup>9</sup> Since the available estimates of canine infection and soil contamination are from widely disparate sources, any correlation of the two remains largely conjectural. This study was undertaken to obtain coherent estimates of the prevalence of

soil contamination and canine infection with *Toxocara canis* in Essex County, New Jersey.

## Methods and Materials

Fecal samples were collected from 131 pet dogs and 115 strays housed in animal shelters in Essex County, NJ. The age of stray dogs was determined visually by the shelter personnel. A total of 629 samples were collected from the uppermost centimeter of soil in 32 of approximately 75 public parks in the county. At the time of soil collection, samples were also taken from 109 stools found in the parks. All fecal samples were preserved in 10 per cent formalin until examined; soil samples were stored dry.

Nematode eggs from the fecal and soil samples were concentrated by zinc sulfate centrifugation-flotation,<sup>10</sup> and identified microscopically. All samples were processed twice and recorded as positive if eggs were found at least once. Positive control samples were run periodically and, in the absence of *Toxocara* eggs, other nematode eggs were occasionally observed in the test specimens.

## Results

Of the 246 dogs examined, 33 (13.4 per cent) had patent *Toxocara canis* infections (Table 1). The prevalence in strays and pets was essentially the same, while more males (13.7 per cent) than females (11.2 per cent) were passing *T. canis* eggs. The age of the dogs had a considerable influence on prevalence, with a much higher proportion of dogs less than 1 year old being infected.

Considering the effect of age on *T. canis* prevalence, it is appropriate to reexamine the comparison of strays and pets. Among the dogs of known age, the stray group included only 10.3 per cent immature dogs, while the pets included 35.0 per cent immatures, and thus would be expected to have a higher prevalence. A comparison between mature pets and strays suggests that the prevalence in the latter group may be higher.

None of the stool samples collected within the parks contained *T. canis* eggs (Table 2).

Soil samples were randomly chosen from two different types of areas: along established footpaths where fecal contamination from leashed dogs would be concentrated, and in children's play areas where human contact with potentially contaminated soil was most likely. Only one sample from each type of locality was contaminated with *T. canis* eggs. The contaminated samples were from two different suburban parks.

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**TABLE 1—Prevalence of *Toxocara canis* Eggs in Fecal Specimens from Dogs in Essex County, New Jersey**

	Number Examined	Number Positive	Per Cent Positive
Strays	115	16	13.9
Pets	131	17	13.0
Males <sup>a</sup>	131	18	13.7
Females <sup>a</sup>	98	11	11.2
Immature (< 1 yr) <sup>b</sup>	54	16	29.6
Mature <sup>b</sup>	176	15	8.5
Mature Strays	103	13	12.6
Mature Pets	89	5	5.6
TOTAL	246	33	13.4

<sup>a</sup>The sex of 10 strays and 7 pets was unavailable.

<sup>b</sup>The age of 8 strays and 8 pets was unavailable.

## Discussion

Recent demonstrations of soil contamination with *Toxocara* eggs,<sup>9</sup> along with increased pet populations and public awareness of pet related problems,<sup>11</sup> indicate a need for current epidemiological data for toxocaral VLM. In Essex County, northern New Jersey, 13.4 per cent of all dogs examined were passing *T. canis* eggs. Fecal examination will not reveal all infections; however, most of the missed infections are light, immature or unisexual and therefore contribute little to disease transmission.

In 1955, 9 per cent of 100 stray dogs of unknown age from northern New Jersey were found to be infected with *T. canis* upon autopsy.<sup>12</sup> Fecal examination, as employed in the present study, may reveal as few as one-half of the toxocaral infections diagnosed at necropsy.<sup>13</sup> Considering this relative inefficiency of fecal examination, the current estimate of 12.6 per cent might indicate an increase in canine toxocariasis in this area.

The absence of *T. canis* eggs in the 109 stools found in parks may be an important factor in assessing the potential for human toxocaral VLM. Dogs defecating along the footpaths are likely to be leashed pets which, once wormed as pups, have little opportunity for reinfection with *T. canis*. It may be noted that the prevalence of *T. canis* in mature pets is very low (Table 1). In addition, since samples were taken from all stools found, it is likely that the samples represent fewer than 109 dogs. Of the 32 parks surveyed, nine were free of recognizable feces and 12 had only one to five stools in the areas checked. Four parks in one suburban town provided 59.6 per cent of all samples. Clearly, parks and school yards in the area are, with few exceptions, relatively clean and uncontaminated.

This observation is further supported by the data from the soil analyses. Only 0.3 per cent of 629 samples contained *Toxocara canis* eggs. This level of contamination is much lower than recent estimates of 10-30 per cent where other such studies have been completed.<sup>14</sup>

**TABLE 2—Prevalence of *Toxocara canis* Eggs in Fecal and Soil Samples from Selected Public Areas in Essex County, New Jersey**

	Number Examined	Number Positive	Per Cent Positive
Feces	109	0	0
Soil			
Footpaths	285	1	0.4
Play areas	344	1	0.3
TOTAL	629	2	0.3

In spite of a significant level of canine toxocariasis, soil contamination in public areas is a minor problem in Essex County, NJ. This finding, although encouraging, cannot be interpreted to mean that there is no danger of VLM in this area. Recent evidence indicates that close contact with puppies may be a significant risk factor<sup>15</sup> and the foci of infection might therefore be closer to home.

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