

THE ROLE OF TOXOCARIASIS IN CHILDHOOD WHEEZING

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ABSTRACT

With the introduction of enzyme linked immunosorbent assay (ELISA) using *Toxocara canis* antigen it has been shown that Toxocariasis is commoner than previously believed to be. Dogs in Sri Lanka are known to be heavily infected with *Toxocara canis* and man gets infected by ingestion of infective eggs in the soil, or on contaminated hands. Children especially with poor hygienic habits are at increased risk of developing Toxocariasis. Wheeze is common during childhood, and it is a known clinical manifestation of Toxocariasis. A study was undertaken to determine whether *Toxocara canis* infection is a significant aetiological factor in childhood wheezing. The study group consisted of children aged six months to ten years admitted with wheezing/asthma, during the same period. A questionnaire was used to obtain basic data. White blood cell counts and *Toxocara* antibody tests ELISA technique were done on the patients and the controls. 18 (24.6%) Children out of a total of 73 were found seropositive in the test group as compared to 10 (17%) out of 59 in the control group.

Introduction

Toxocara Canis is the common round worm of dogs, and has a wide spread distribution through out the world. This is shown in Table 1.

Table I. Prevalence of *Toxocara Canis* in naturally infected dogs

Australia - Brisbane	100% of pups, 9% of dogs
- Melbourne	38.5% of pups, 21.8% of dogs
France - Marseilles	13.5% of dogs
India - Calcutta	82.8% of dogs
Iraq - Baghdad (female)	18.4% (male), 7.9%
New Zealand	"common" in dogs
U.K. - Wales	23.7% of dogs
- Cambridge	70.8% of dogs
U.S.A. - Boston	20% of dogs
Indiana	21% of dogs

In Sri Lanka a survey done in Kandy (Fernando 1968) reported that over 90% of puppies aged one to three months were heavily infected with *T. canis*. Man gets infected by ingestion of infective eggs in the soil, or by consumption of contaminated food. Young children especially those with the habit of "Pica" and unhygienic habits are at increased risk of acquiring the infection. Studies in other countries have shown that 10% - 30% of soil samples in public playgrounds and parks, are contaminated with *T. canis* eggs. Fernando(1968) reported 4,000 - 12,000 eggs per gramme of faeces of pups in Kandy. Hence our soil is likely to be heavily contaminated with *T. canis* eggs. These eggs are covered with thick shells and are known to survive in humid soil for years.

Following ingestion, the eggs hatch in the proximal small intestines of man and the released ova penetrate the intestinal mucosa and migrate to the liver via the portal circulation. From there

they follow vascular channels to the lungs and then enter the systemic circulation. The larvae actively bore through the vessel wall and migrate to surrounding tissue, and may invade the liver, eye, brain or myocardium.

The first proven case of visceral larva migrans due to *T. canis* in Sri Lanka using the ELISA test was reported in 1993 (Jayasena et al 1993). This was a child admitted with an attack of wheezy bronchitis who was incidentally found to have an enlarged liver and a marked eosinophilic leucocytosis.

A large number of children are admitted to the Teaching Hospital, Peradeniya with wheezy bronchitis/asthma. Since wheezing is a known clinical manifestation of Toxocariasis this study was undertaken to determine whether *T. canis* infection is a significant aetiological factor in childhood wheezing.

Subjects and Methods

The study group consisted of children aged six months to ten years admitted to the teaching Hospital Peradeniya from Jan 1994 - July 1995. Age and sex matched controls were children admitted during the same period for illnesses other than wheezing/asthma and who had no past history of wheezing. The socioeconomic status of both groups were similar. A questionnaire was used to obtain information such as presence of pica, history of contact with dogs or puppies or possibility of contamination of the surroundings by dog faeces. The children were examined for evidence of hepato-splenomegaly. A white cell and differential count were done in all patients & 2 ml of venous blood obtained for the Toxocare immunosorbent assay (ELISA test). Excretory secretory products of cultured infective larvae of *T. canis* were used as the antigen for ELISA test.

Results

The seroprevalance of *T. canis* infection in our children is shown in Table II.

Table II . Seroprevalance of T. Canis in the children under study

	Test	Control
<0.2	55	49
0.2 - 0.7	09	07
> 0.7	09	03
Total	73	59
Total No.of seropositive	18 (24.6%)	10 (16.9%)
< 0.2	-	No serological evidence of <i>T. canis</i> infection.
0.2 - 0.7	-	Compatible with past infection or current light infection.
> 0.7	-	Compatible with recent infection

It was found that 18 out of 73 (25%) children with wheezy bronchitis were seropositive to *T. canis*.

There were 10 children in the control group of 59 (17%) with seropositivity to *T. canis*.

Table III . Seroprevalance in relation to age

Age	< 0.2		0.2 - 0.7		> 0.7	
	T.	C.	T.	C.	T.	C.
6m - 1y	13	11	-	-	01	-
> 1y - 5y	37	33	03	05	06	02
> 5y - 10y	05	05	06	02	02	01

Most of the children who were found to be seropositive were more than 1 year (Table III).

Contact with dogs - Test - 82% Control - 75%

17 out of 18 (94%) with positive serology had either contact with a dog or puppy or possibility of contamination of their surroundings by stray dogs.

Table IV. Relationship between the income and the prevalence of seropositivity

Income Group	< 0.2		0.2 - 0.7		> 0.7	
	T.	C.	T.	C.	T.	C.
< Rs. 2000	16	13	03	02	04	01
Rs.2000 - Rs.4000	26	27	06	03	05	01
> Rs. 4000	13	09	-	02	-	01
Total	55	49	09	07	09	03

All 18 children with positive serology in the study group and 7 out of 10 in the control group with seropositivity belonged to families where the monthly income was Rs. 4000/- or less (Table IV).

Eosinophilia and hepatomegaly were not significant in the seropositive children. Only 3 children with positive serology admitted to the habit of "pica".

Discussion

The well documented manifestations of Toxocariasis are visceral larva migrans and ocular Toxocariasis. The introduction of the ELISA test (De Savigny, Voller & Woodruff 1978) which is a very sensitive and specific test revealed that toxocariasis is much more common than previously believed to be.

Taylor et al (1988) using the ELISA test have shown a much wider spectrum of disease due to *T. canis* infection, and visceral larva migrans is but one manifestation of the disease and that eosinophilia is not essential for the diagnosis. Most of the features were common, non-specific symptoms which are likely to be dismissed as not of any significance and unworthy of further

investigations. They suggested the term "convert toxocariasis" for the category where the signs and symptoms do not fall into the recognised categories of either visceral or ocular larva migrans.

The Ten children who were found to be seropositive in our control group of non-wheezees could possibly be having "covert toxocariasis". These children need to be studied further.

An epidemiological study by Thompson et al (1986) in a Caribbean community in St. Lucia reported a seroprevalence of *T. canis* of 86% among children as determined by the ELISA test. This is the highest level so far recorded. This high value is attributed to a high prevalence of infection with *T. canis* in a large unconstrained dog population combined with poor standards of hygiene and the frequent habit of the children eating dirt or "non-food substances".

The host trait "pica" has been reported to be very closely associated with the presence of *Toxocarara canis* infection. In our study only three children with positive serology were identified to have this trait. It is possible that a questionnaire is an unreliable method to identify this habit.

In Sri Lanka we have a large population of infected stray dogs that roam about freely and there is probably wide spread environmental contamination. Since infection of humans occur by direct hand to mouth transfer of contaminated soil, or ingestion of contaminated food. Children from poor socio-economic strata and especially those with unhygienic habits are at the greatest risk of acquiring *T. canis* infection.

In conclusion the finding of 25% seropositivity in the children with wheezy bronchitis and 17% in the control group in our study means Toxocariasis is a significant problem in Sri Lanka.

Much of the chronic ill health found among the children especially those from the low socio-economic group could be due to "covert toxocariasis".

Unless people are made aware that the problem of Toxocariasis exists, no preventive measures will be taken.

Further studies need to be done in this field, and preventive aspects need to be emphasised through health education of the community.

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