

Original Article

Study on Seroprevalence of IgG antibody of *Toxocara canis* in Exposed People in Sylhet

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Abstract:

Toxocara canis is a widespread gastrointestinal nematode parasite of dog and a causative agent of zoonotic disease in human known to produce three recognized clinical entities, i.e. visceral larva migrans, ocular larva migrans and covert toxocariasis. The aim of this study was to see the seroprevalence of IgG antibody of *Toxocara canis* in exposed people. Blood samples from 92 people in Sylhet who were exposed to dog were obtained to determine the presence of antibodies to *Toxocara canis*. The sera were tested by ELISA method. Demographic data regarding age, gender, residence, socioeconomic status, contact history with dog and also having pet dog at home or neighborhood were collected by questionnaires. All results were evaluated statistically using the X² (Chi-square) & ANOVA test. Seroprevalence rate was 75.00%. Seroprevalence rate of IgG antibody of *Toxocara canis* in exposed people are statistically significant ($p < 0.05$) in chi-square test. Seropositivity were related to age, gender, residence, socioeconomic status and contact history with dog. High seropositivity of *Toxocara canis* suggests infection by the organism and presence of *Toxocariasis* in our country. *Toxocara canis* can cause severe illness which can be cured by antihelminthic, antiprotozoal treatment. Its high prevalence in this study warrants greater awareness among clinicians so that they can suspect the disease on clinical ground and either send them for diagnostic evaluation or initiate empirical treatment. A large scale multilevel study is needed to get a clear picture of seropositivity of *Toxocara canis* infection in every region of Bangladesh. Additional public health measures to prevent dog exposure should be explored in this high risk population and further studies are needed to confirm and extend the seroprevalence findings.

Key words: *Toxocara canis*, IgG antibody, Toxocariasis

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Introduction:

Toxocara canis is a widespread gastrointestinal nematode parasite of dog and a causative agent of zoonotic disease in human^{1,2,3}. *Toxocara* is known to produce three recognized clinical entities, i.e. visceral larva migrans⁴, ocular larva migrans⁵ and covert toxocariasis⁶. In 1950, Campbell-Wilder was the first to describe toxocariasis in humans; she published a paper describing ocular granulomas in patients with Endophthalmitis, Coats Disease, or Pseudoglioma. Two years later, Beaver et al. published that presence of *Toxocara* larvae in granulomas removed from patients with symptoms similar to those in Wilder's patients⁷.

Transmission of *Toxocara* to humans is usually through ingestion of infective eggs (Centers for Disease Control and Prevention, 2004; Centers for Disease Control and Prevention, 2007). Many objects and surfaces can become contaminated with infectious *Toxocara* eggs. Flies that feed on feces can spread dirt (pica) are at risk of developing symptoms^{3,7,8}. Humans can also contaminate foods

by not washing their hands before eating. Dogs and foxes are the reservoir for *Toxocara canis*, but puppies and cubs pose the greatest risk of spreading the infection to humans^{9,10}.

In the United States, about 10,000 cases of *Toxocara* infection are reported in humans each year. Almost 14% of the US population is infected with *Toxocara*, a parasite of dogs and cats that can be passed from animals to humans. In Cleveland, Ohio, the prevalence of *Toxocara canis* infection in the cohort ages 2, 3, and 4-10 years was 2%, 12%, and 12%, respectively^{11,12}.

Seroprevalence is higher in developing countries, but can be considerable in first world countries, as well. In Bali, St. Lucia, Nepal and other countries, seroprevalence is over fifty percent⁷. Previous to 2007, the U.S. seroprevalence was thought to be around 5% in children⁸. However, Won et al. discovered that U.S. seroprevalence is actually 14% for the population at large^{9,11}.

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The infection was also reported in other Asian countries including Pakistan, Japan, Korea, Indonesia and Malaysia¹³⁻¹⁷. In Nepal, another nearest country of Bangladesh, a high seroprevalence rate (81%) was observed among the people of Kathmandu¹⁸.



Figure-1: *Toxocara canis* (Milan Kořinek, 2010)

Toxocara canis infections are more likely to be a hazard for people exposed to contaminated environments. This seemed to be confirmed in a survey by Woodruff¹⁹ among 02 British dog breeders that showed a significantly higher degree of infection 15.7% ELISA positive compared with 922 healthy adult controls 2.6% positive. In other studies in which animal hospital employees²⁰, kennel workers²¹ and cat breeders²² were involved, no serological evidence of an increased risk could be established. The suggested explanation was the reasonable standard of personal hygiene by the personnel.

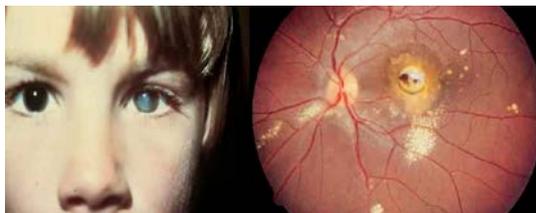


Figure-2: Ocular toxocariasis (Source: cueflash)

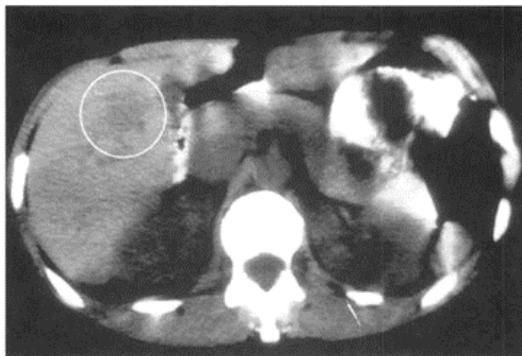


Figure-3: Liver CT scan showing a low-density area (circled) due to toxocariasis (Dupas et al., 1986; Ishibashi et al., 1992).

There is rarity of data on Toxocariasis in Bangladesh. Some seroprevalence study of *Toxocara canis* was carried out in India where total seroprevalence of *Toxocara canis* antibodies in children of Kashmir valley was 32.86%²³. In different parts of the world, serological studies have demonstrated a variation in *Toxocara canis* seroprevalence ranging from 2.3% to 86%^{24,25}.

However that study showed a higher rate of infection (32.86%) than that of (6.4%) subjects residing in a rural area near Chandigarh²⁴, Slovak Republic²⁶ which may be due to low standards of hygiene, frequent contact with the contaminated soil and less paternal education.

All the epidemiological information quoted in relation to *Toxocara canis* infection in human so far has been derived from studies carried out in developed countries and some developing countries except Bangladesh²⁷.

Though some studies were carried out in animals^{27,28} of our country but no seroprevalence studies in any region of our country people has ever been attempted. So the incidence is still not known.

Considering the presence of huge number of dog population and different influencing factors like dog and cat ownership, lack of knowledge regarding personal and social hygiene, fecal contamination of drinking water, soil and park in the city and urban area, probability is very high of *Toxocara canis* infection to occur in Bangladesh.

This study is undertaken to ascertain the seroprevalence of *Toxocara canis* infection in exposed people in Sylhet and to define associated risk factors in the exposed group.

Materials and Methods:

This was a cross sectional study conducted in the department of Microbiology at Sylhet MAG Osmani Medical College, Sylhet from July 2012 to June 2013. Study variables were IgG antibody of *Toxocara canis*, age, sex, residence, socioeconomic status, chorioretinitis and contact with Pet Dog. A total number of 92 (Ninety Two) exposed people related to *Toxocara canis* infection were studied. Sample was collected from both indoor and outdoor patients of Department of Paediatrics and Department of Ophthalmology, Sylhet MAG Osmani Medical College, Sylhet. All information as per questionnaire were taken. Informed written consent was obtained from parents/guardians of all participants. Ethical permission was obtained from the ethical review committee of Sylhet MAG Osmani Medical College beforehand. All the ethical committee guidelines were followed during the conduction of the study. Serum IgG antibodies

against *Toxocara canis* was measured by the ELISA method for the detection of IgG antibodies to *Toxocara canis* in human serum. All data were checked and were analyzed with the help of SPSS (Statistical Package for Social Science) with version 20.0 by using the X2 (Chi-square) and ANOVA test.

Results:

Age range of the population was 2 to 18 years who were divided into two groups, 2 to 10 years and 11-18 years. In exposed individuals the seropositivity rate for the age group of 11-18 years was 60.6% (20 out of 33) where for the age group of 2-10 years of age showed higher seropositivity 83.1% (40 out of 59).

Among the exposed people seropositivity of IgG antibody of *Toxocara canis* in gender distribution is also statistically significant ($p < 0.05$) in chi-square test, showing a male predominance.

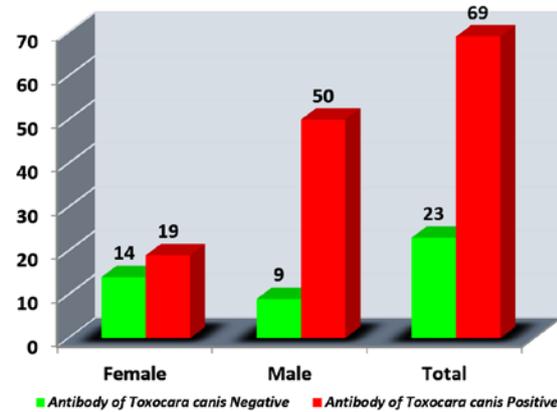


Figure-4: Distribution of Serologic Results according to Gender of Exposed Population

Among 92 exposed people seropositivity of IgG antibody of *Toxocara canis* in residence distribution is also statistically significant ($p < 0.05$) in chi-square test, showing a rural predominance of 58 (84.1%).

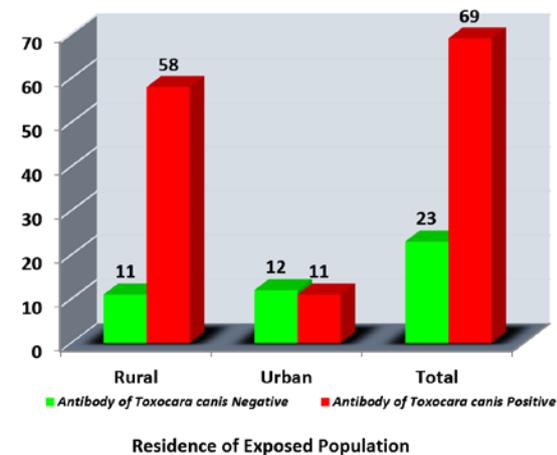


Figure-5: Distribution of Serologic Results according to Residence of Exposed Population

Among 92 exposed people the seropositivity rate of lower class is 48 (81.4%) higher than middle class 18 (78.3%) and high class 3 (30.0%). One way ANOVA test was done among these three classes of people. In exposed people the difference was significant between lower class and high class where p value is < 0.05 , but in both aspect p value is < 0.05 . But the difference between middle class and high class was not statistically significant in ANOVA test ($p > 0.05$).

Among 92 exposed people, 53 person has given history of contact with their pet dog (domestic) and rest 39 person has given history of contact with dog but those were semidomesticated or in neighborhoods. Seropositivity for IgG antibody of *Toxocara canis* among those having pet was higher 44 (83.0%) than those having no pet 25 (64.1%).

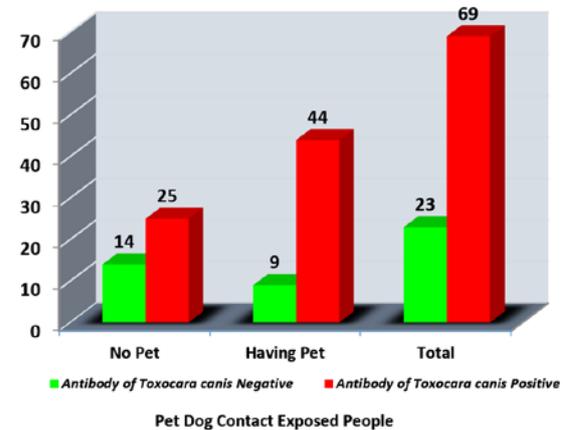


Figure-6: Distribution of Serologic Results according to the contact with the Pet Dog of Exposed People.

The patient having Chorioretinitis is very rare. So, among 92 exposed people, only 6 of them were found having a confirm diagnosis of Chorioretinitis between the age of 2 and 18 years and of them, 5 (83.3%) patient were found seropositive.

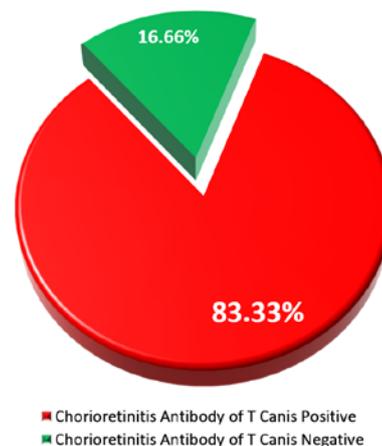


Figure-7: Pie Chart of the Seroprevalence among the patients of Chorioretinitis

Among the 92 exposed people, 59 (64.13%) were male and 33 (35.86%) were female. Seroprevalence rate was 75%. Seroprevalence rate of IgG antibody of *Toxocara canis* in exposed people is statistically significant ($p < 0.05$) in chi-square test.

Discussion:

This was a cross sectional study conducted in Sylhet with a view to see the seroprevalence of IgG antibody of *Toxocara canis* in exposed people. A total of 92 persons were taken as exposed to history of contact with dog. IgG antibody of *Toxocara canis* were found positive in 75% of the respondents. No national serosurvey or even study of limited scale could be traced in our country with which our data could be compared.

Among the exposed people seropositivity of IgG antibody of *Toxocara canis* in gender distribution is also statistically significant ($p < 0.05$) in chi-square test, showing a male predominance in exposed male patients. This may be due to fact that males had more contact with dogs^{29,30}.

In this study exposed individuals with the age group of 2-10 years showed higher seropositivity rates (83.1%) compared to the age group of 11-18 years. Young children are most at risk of infection from playing outside and placing contaminated objects and dirt in their mouths^{3,7,8}. In Brazil, it was found that children of 5-8 years old were more likely to be positive for *Toxocara canis*³¹.

Among 92 exposed people, 69 were living in rural areas of them 58 (84.1%) were seropositive whereas among the remaining 23 people living in urban areas 12 (52.2%) of them were seronegative was statistically significant ($p < 0.05$) in chi-square test. In a study of Northwestern Part of Turkey significant levels of anti-*Toxocara* antibodies were detected in 73 out of 430 (16.97%) children from rural area while only one child (0.71%) had positive level of anti-*Toxocara* antibodies from urban area³².

Seropositivity across three socioeconomic status among exposed people the difference was significant between lower class and high class but was not significant ($p > 0.05$) between lower and middle class in one way ANOVA test. Socio-economic level is a factor that influences *Toxocara* seroprevalence^{33,34}. While some studies report that *Toxocara* seroprevalence increases with low socio-economic status^{30,35-37}, there are others which claim that it does not change^{32,38}.

In 92 exposed individuals the seropositivity rate for those having pet was 83.0% whereas for those having no pet seropositivity rate was 64.1%. Some authors reported a higher frequency of infection for individuals who maintained contact with dogs³⁹.

In this study among 92 people, due to limitation of age group and time, only 6 patient were found having a confirm diagnosis of Chorioretinitis in the Department of Ophthalmology of Sylhet MAG Osmani Medical College Hospital. High seroprevalence rate 83.3% (5 out of 6) was noted among the patient of Chorioretinitis. In a study among patients suspected of ocular toxocariasis in Slovenia out of the 239 patients, 67 (28%) were *Toxocara* seropositive⁴⁰.

Conclusion:

Toxocara canis is a widespread gastrointestinal nematode parasite of dog and a causative agent of zoonotic disease in human known to produce three recognized clinical entities, i.e. visceral larva migrans, ocular larva migrans and covert toxocariasis. The aim of this study was to see the seroprevalence of IgG antibody of *Toxocara canis* in exposed people. The questionnaires were evaluated to investigate the effects of factors that might increase the risk for the acquisition of the infections, e.g. age, gender, residence, socioeconomic status, contact history with dog and also having pet dog at home or Neighborhood. The high seroprevalence rate (75%) in this study suggests the presence of *Toxocara canis* infection in Bangladesh and the statistically significant association of above risk factors with the serological status of *Toxocara canis* also suggests calls for more clinical awareness among the stakeholders.

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