



## Study on Prevalence of *Toxocara canis* in Stray and Pet Dogs of Kathmandu Valley, Nepal

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### Abstract

The objective of this study was to determine the prevalence of *Toxocara canis* in street and pet dogs in Kathmandu valley and to understand the associated risk factors for *Toxocara canis* (*T. canis*) infestations in dogs and to assess the awareness on canine helminth zoonoses among pet owners. A cross-sectional study was carried out from February to April 2019 within Kathmandu valley, Nepal. A total of 110 faecal samples were randomly collected from 55 pet and street dogs each per-rectally via the faecal loop. Wisconsin centrifugation flotation method was used to examine the presence of *T. canis* eggs. A questionnaire survey was conducted among 55 dog owners. Descriptive statistics were calculated using IBM © SPSS statistics version 22 and MS-Excel 2016. We found that 13.64% dogs (15/110) were found for *T. canis*. Comparatively, prevalence was higher in stray dogs than in pet dogs (20% versus 7.27%); dogs below one year 13.95%; in female dogs 15.63%; in dog getting in contact with other dogs 10.53%; in non-dewormed dogs 23.08%. Out of 55 pet owners surveyed, 41.82% were aware that they can get diseases from dogs but only 14.55% of the owners had some idea about canine helminth zoonoses. *T. canis* being the parasite having high zoonotic significance, there is a need to carry out awareness programs to educate pet owners regarding canine zoonoses and on appropriate anthelmintic treatment. A viable system should be in place to maintain stray dogs such as animal birth control programs which will help to reduce the prevalence of *T. canis* among street dogs.

**Keywords:** Canine Zoonoses; Faecal; Flotation; Treatment; Awareness

### Abbreviations

SPCA: Society for the Prevention of Cruelty to Animals; *T. canis*: *Toxocara canis*; CRVH: Central Referral Veterinary Hospital; CVDH: Central Veterinary Diagnostic Laboratory

### Introduction

Dogs are simply the most loved companions adapted to human habitation worldwide and have been kept as pets for over 14 centuries. Evidence has shown that owning a pet can increase the activity of pet owners and consequently reduced serum cholesterol, low triglyceride levels and fewer cardiovascular events providing sort of physical, social and emotional benefits [7]. Despite of these benefits, close association of dogs with humans remain as a major threat to public health thus, increasing the risk of zoonotic diseases transmission from dog to mankind.

Dog is the definitive host for many gastrointestinal nematodal parasites. *Toxocara* is a genus of order *Ascaridida*, which primarily harbours in small intestine of various mammals [3]. Since Larvae of *Toxocara canis* causes "Toxocarosis" manifested as visceral larva migrans, ocular larva migrans and neuro- toxocarosis in human beings, it is one of the most widespread public health and economically important zoonotic parasitic infections that humans do share with the dogs [8]. Diagnosis of patent infestations can be obtained by faecal examination [12].

Kathmandu valley has a sizeable dog-owning population as well as a growing uncontrolled stray dog population. The study was conducted to determine the prevalence of *Toxocara canis* among street and pet dogs in Kathmandu valley and to understand the associated

risk factors for *Toxocara canis* infestations in dogs, considering the increasing trend of keeping dog as pets among the households of Kathmandu valley.

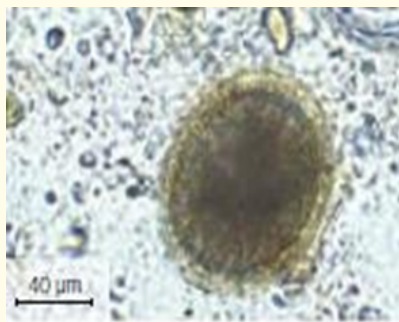
**Materials and Methods**

The cross-sectional study was carried out from February to April 2019 within Kathmandu valley, Nepal. Stray dog’s faecal samples were collected from various dog Rescue and animal welfare centers like Animal Nepal, Chobhar, SPCA Nepal, Hattigauda; Shree’s Animal Rescue Nepal, Lalitpur. Pet dog faecal samples were collected from Central Referral Veterinary Hospital (CRVH), Tripureshwor. For simplicity, dogs approximately up to one year of age group were classified as young pups, while dogs between one to five years of age were considered as adults and dogs above five years were considered as older dogs.

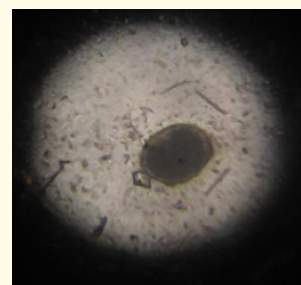
A total of 110 faecal samples (55 each from pet and street dogs) was collected per-rectally via the faecal loop and kept in a well-labelled zip lockbag. The samples were then immediately taken to the Central Veterinary Diagnostic Laboratory (CVDL), Tripureshwor for parasitological procedures. A questionnaire survey was designed and was conducted among 55 dog owners respectively.

**Laboratory procedures**

Wisconsin centrifugation flotation method was followed to determine *Toxocara canis* eggs using Sheather’s sugar solution as a flotation medium having specific gravity of 1.27. Each observed egg or ova was identified by analysing their morphological characteristics with reference to “Text Book of Clinical Parasitology in Dogs and Cats” by Beugnet F, *et al* [1]. Sample was classified as *Toxocara canis* positive if at least one egg was observed.



**Figure 1:** *Toxocara canis* egg in dog faeces [1].



**Figure 2:** Egg of *Toxocara canis*.

Data thus, obtained were analysed by using descriptive statistical method through IBM©SPSS statistics version 22 and MS-Excel 2016. Effect of dog type (stray or pet), sex, age, BCS and deworming pattern on the prevalence of *T. canis* was evaluated by Chi-square ( $\chi^2$ ) goodness of fit test while Fisher’s Exact Test performed for groups having expected count less than 5. Values of  $p \leq 0.05$  within 95% confidence level were considered as significant.

**Results**

A total of 110 faecal samples of dogs comprised of 55 samples each from street and pets were screened for the *T. canis* infestation, as shown in table 1.

Dogs	Total Number of samples	Number of positive samples (n)	Prevalence of <i>T. canis</i> (%)
Stray	55	11	20
Pets	55	4	7.27
Total	110	15	13.64

**Table 1:** Prevalence of *T. canis* in total sampled dog population. There was significant difference in zoonotic helminth positivity between stray and pet dogs ( $p \leq 0.05$ ).

With respect to age of dogs, prevalence was found to be insignificantly higher ( $P \geq 0.05$ ) within age groups below 1 years 13.95% than in middle ages 12.82% and older ages 13.29% groups. Considering sex-wise prevalence, out of total sample taken female dogs were found to be more affected 15.63% than male dogs 10.87% though the result didn’t make much more significant differences ( $P \geq 0.05$ ). However, within pet dogs, there was no significant association regarding breed wise prevalence of *T. canis* ( $P \geq 0.05$ ). Likewise, in case of pet dogs significantly higher ( $p \leq 0.05$ ) prevalence of 23.08% was found in dog which were non- dewormed yet rather than the

dogs being dewormed at frequent intervals 2.38%. The prevalence was significantly higher ( $P \leq 0.05$ ) with the dog getting in contact with other dogs 10.53% than staying alone inside owner's house 5.56% (2/36).

Out of 55 pet owners surveyed, 41.82% were aware that they can get diseases from dogs but only 14.55% of the owners surveyed had some idea about canine helminth zoonoses including Toxocarosis. Similarly, according to questionnaire data 49.09% pet owners were familiar about need and importance of periodic deworming schedule.

## Discussions

In our present study, 13.64% of dogs were found to be positive for *T. canis* infestation around Kathmandu valley which is lower than previous finding by Satyal R., *et al.* [14] in Kathmandu, Nepal that revealed 19.52% prevalence. This findings however, was higher than findings in North central Colorado which was only 8% [5,11]. Prevalence of Toxocarosis was comparatively lower than the reports of Minnaar WN and Krecek RC [10], Traub RJ., *et al.* [16] but almost similar to the findings of MH Rahman [9] in Bangladesh and of Sariego I., *et al.* [13] in Cuba.

Stray dogs had significantly higher prevalence rate of 20% as compared with owned dogs, where infection rate is only 7.27% which was in accordance with the finding of Surgan MH., *et al* [15]. Higher prevalence in stray dogs might be associated with free exposure, repeated access to infection, poor health condition, paratenic infection due to their widespread and random distribution, scavenging habit and unrestricted fouling of environment through their excreta.

Recent study mentioned the higher prevalence of *T. canis* in dogs up to one year age groups (13.95%) than dogs above one year. Results seems to be consistent with findings of Biu AA., *et al.* [2] and DR. Giri [4]. This is highlighted by underdeveloped immune system of young dogs, and due to the probable chance of prenatal and trans-mammary transmission of *T. canis* infestations in young dogs [6].

Prevalence rate in female dogs (15.63%) is found slightly higher than in male dogs (10.87%) as in case of male dogs, larvae eventually die out usually after about a year whereas, in bitches, the encysted larvae may remain infective for several years in dormant form and can get reactivated during oestrus period or in late pregnancy under hormonal influences [1].

Purebred pet dogs (6.06%) were found to be slightly less infected with *T. canis* than the crossbred dogs (9.09%) and is consistent with the study of Ethiopia [10]. This may be due to better access to anthelmintic treatment, nutrition, good management, sanitation and proper disposal of faeces in household pedigree dogs.

Significantly higher prevalence of *T. canis* infestations in non-dewormed pet dogs (23.08%) than in dewormed pet dogs (2.38%) which shows the effectiveness of anthelmintic usage in dogs. Similar result was found by Satyal R., *et al* [14].

It was evident from this study that most of owners are not aware of the zoonotic potential of the parasites carried by their dogs, or their mode of transmission to humans. This lack of knowledge seems to be the main reason for the apparent negligence of the owners in deworming their dogs [7].

Although the present study has demonstrated that *T. canis* infection in dogs largely relies on host sex, age, and deworming pattern. There are clearly several other mechanisms in the population biology of *T. canis*, i.e. fecundity and intestinal dynamics of repeated infections, which need further evaluations. Moreover, study needs to be replicated in other districts of Nepal to give an overall variation of *T. canis* infestations among dogs.

## Conclusion and Recommendations

*Toxocara canis*, being highly prolific and resistant in nature, their infestations must be controlled because of its prevalence, its veterinary and economic impact on breeding facilities and kennels, and the risk of zoonotic transmission.

The result of this study showed that stray dogs, young puppies, bitches, and non-dewormed dogs are more likely potential for Toxocarosis. For dogs at high risk of shedding *Toxocara* eggs, more frequent faecal examinations, when proven necessary additional deworming treatments and strict enforcement of cleaning-up of dog faeces seem to be the most recommendable means for reducing the environmental contamination with *Toxocara* eggs by household dogs.

A viable system should be in place to adopt or maintain stray dogs such as animal birth control programs. Closer collaboration between research institutions and public health authorities may render such endeavours more fruitful. There is a need of carrying out awareness programs as community programs to educate pet owners regarding canine zoonoses and appropriate anthelmintic treatment of the dogs.

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## Conflict of Interest

There exists not any financial interest or any conflict of interest.

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