EPIDEMIOLOGICAL STUDY OF *Toxocara canis* IN BASRAH CITY

***Prof. Dr. A. H. H. Awad & **Ass. Prof. Dr. Suzan, A. A. A. Al-Azizz**
***Department of Biology, College of Education**
****Department of Microbiology, College of Veterinary Medicine**
University of Basrah

Abstract

A total of 117 stray dogs were dissected and examined for *T. canis* infection either by shooting gun or using strychnine sulphate tablets. Three main stations were chosen during the present study: the north station includes Garmat Ali and University of Basrah, the south station includes Al-Saraji district while, central station includes city center, gas stations, slaughter house, Basrah Veterinary Medicine Hospital and some gardens.

The present study revealed that 31 dogs (18 male and 13 female) were infected with *T. canis* with percentage infection equal to 26.5%. A high percentage infection (32.07%) was recorded in north station. Also, a high percentage infection (30.76%) was recorded during winter months.

Part of Ph.D thesis

Introduction

Toxocariasis of dogs caused by *T. canis* has been reported in nearly all parts of the world with infection rates approaching 100% in some populations of puppies (1). Unfortunately, this parasite is common in most domestic and pre-domestic dogs particularly young ones because of their life cycle which makes puppies acquire *Toxocara* larvae transplacentally from the infected mother (2). Dogs became infected with *T. canis* through ingesting infective eggs or infective larvae in tissue of paratenic hosts such as mice, birds, pigs, earth worms and others (3).

***T. canis* infection was found more often in adult male dogs than females and higher among stray and unwanted pets than in well cared dogs (4). Embryonated eggs of *T. canis* can survive at hard condition i.e. under freezing (-7– 20C^0) for 1-34 days. (5) Mentioned that *T. canis* eggs were less viable while *T. cati* exhibits more resistance to freezing than *T. canis.* (6) Showed faster development of *T. canis* eggs at 30C^0 in deionized water and continuous aeration, while organic compounds were found to reduce egg development.**

There are many studies on prevalence of *Toxocara* eggs in the soils along the world. (7) Examined 71 public grounds and children's play grounds in Vienna/ Austria and showed that 19 (26.7%) of them were infected with *T. canis* eggs. (8) Pointed out that 9 from 19 parks were positive with *T. canis* eggs in Madrid/ Spain. In London parks, (9) reported that the prevalence of *Toxocara sp.* eggs was 66% and 21% were considered viable and assumed to be *T. canis*. (10) Showed that the

prevalence of *T. canis* eggs in play grounds of Dublin city/ Irland was 15%. In Harare, a total of 81 soil samples were collected from six public parks and playgrounds and 5.6% were positive with *T. canis* eggs (11).

(12) Examined 112 soil samples in Poland and showed that 0.9% of samples were positive for *T. canis* eggs. In Argentina, twenty two percent were positive with *T. canis* eggs out of 324 sand samples examined by (13), while it was 22.22% in public squares in Buenos Aires (14).

The contamination of *T. canis* eggs was not found only in soil and Public Park and faeces, but on dogs' bodies and vegetables. (15) Found in some parts in China that 16-30% in 30 non-pet dogs and 25 pet dogs acquired *T. canis* eggs in their body surface which make direct contact with dogs as one of mode transmission of *T. canis* eggs to the human.

The clinical symptoms of infected dogs depend on the animal age, the number and location and stage development of the worms. Furthermore, *Toxocara* infection is high in puppies up to 6 months of age (16, 17). The vast majority of dogs infected with *T. canis* show no signs of disease, while, young puppies are mostly likely to show clinical signs. Generally, signs include noisy breathing, cough, nasal discharges, vomiting, diarrhea and distended abdomen. Death is rare but has been reported due to obstruction of the intestine or ulceration and perforation on the intestine wall (18).

The main objective of the present work was to investigate the epidemiology of infection with *T. canis* in the canine populations from three stations with different socioeconomic status and to find the relationship between infectivity and other parameters like sex, location and seasons.

Materials and Methods

- Study Area

Three main stations were chosen in Basrah city: north station includes Garmat Ali and University of Basrah, central station (city center, gas stations, slaughter house, Basrah Veterinary Medicine Hospital and some gardens) and south station which includes Al-Saraji district.

- Samples Collection

One hundred and seventeen stray dogs were killed by shooting gun or by using strychnine sulphate tablets during the period from January 2003 to December 2004.

The intestine (small and large) of killed dogs was dissected lengthwise, worms were removed and the intestine contents placed in clean crystalline dishes and examined for the presence of the parasites. The parasites was classify according to (19, 20).

Intensity of infection was calculated as:

$$\frac{\text{No. of Parasites}}{\text{No. of dog's infected}} \times 100$$

Results

Monthly examination of dogs' intestines from Basrah area shows that 31 from 117 dogs were infected with *T. canis* (18 male and 13 female) as shown in

table (1). A high number of dogs (6) were infected at January 2004, while the low number was in January and February 2003 and April, September, October and November 2004 (1). No dogs were infected in March and October 2003 and February and July 2004. Statistical analysis using SPSS program showed no significant differences between number of dogs, sex of dogs and months under study (P > 0.05, F=0.472, 0.429).

A high number of worms (22) (6 males and 16 females) were counted at January 2004, a low number of worms (1) were collected at October 2004, while there were no worms detected at March and October 2003 and February and July 2004 (Table 1). No significant differences were found between sex of worms and months under study (P > 0.05, F= 0.541).

A high percentage of infection (60%) was recorded at June 2004, while a low percentage (16.6%) was recorded at April and September 2004 .The high mean intensity of infection (10) was found at January 2003 while the low mean intensity (1) was found in March
and October 2004 (Table 1). The Chi-Sq shows no significant differences between percentage of infection, the mean intensity of infection and months (P > 0.05, X2 = 0.804, 0.771).

Table (2) shows the percentage of infection of the dogs with *T. canis* at three stations. The high number (17) of dogs (11 males and 6 females) were infected at the north station, while, the low number (5) (3 males and 2 females) were infected at the south station. Furthermore, the total percentage of infection was high in north station (32.07%) as compared with the other two stations. The analysis of varians (SPSS, 1998) program showed that there was no significant differences between percentage of infection with locations and sex (P > 0.05, F=0.464, 0.739).

Table (3) shows the comparison between seasons, temperature and percentage infection of dogs infected with *T. canis.* The cold months (winter) show a high percentage of infection (30.76%) as compared to other seasons. The one-way analysis of variance showed a significant differences between seasons, temperature and percentage of infection with *T. canis* (P > 0.05, F= 0.016). Also, there was a negative but weak correlation between temperature and percentage of infection (R= - 0.218).

Table (1): The monthly percentage and mean intensity infection of the dogs with *T. canis* in Basrah.

Month	No. dogs exam.		No. dogs inf.		% Inf.	No. worms		Mean Intensity
	♂	♀	♂	♀		♂	♀	
January 2003	4	0	1	0	25	7	3	10
February	2	3	0	1	20	0	2	2
March	1	3	0	0	0	0	0	0

October *	**2**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
November	**2**	**3**	**1**	**1**	**40**	**2**	**8**	**5**
December	**1**	**3**	**0**	**2**	**50**	**3**	**1**	**2**
January 2004	**9**	**3**	**5**	**1**	**50**	**6**	**16**	**4**
February	**4**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
March	**7**	**4**	**4**	**1**	**45.45**	**2**	**2**	**1**
April	**3**	**3**	**0**	**1**	**16.6**	**0**	**3**	**3**
May	**9**	**4**	**2**	**1**	**23.1**	**8**	**11**	**6**
June	**5**	**0**	**3**	**0**	**60**	**8**	**2**	**3**
July	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
August	**5**	**3**	**1**	**1**	**25**	**1**	**6**	**4**
September	**3**	**3**	**0**	**1**	**16.6**	**1**	**3**	**4**
October	**2**	**3**	**0**	**1**	**20**	**0**	**1**	**1**
November	**1**	**4**	**0**	**1**	**20**	**3**	**6**	**9**
December	**5**	**2**	**1**	**1**	**28.5**	**2**	**6**	**4**
Total	**70**	**47**	**18**	**13**	**26.5**	**43**	**70**	**3.6**

*** (Due to the last war 19-3-2003, no samples were collected).**

P > 0.05, F= 0.472, 0.429

P > 0.05, X^2= 0.541, 0.804, 0.771

Table (2): The percentage infection of dogs with *T. canis* from the three main stations in Basrah.

Station	No. dogs exam.		No. dog inf.		% Inf.		% Inf. (Total)
	♂	♀	♂	♀	♂	♀	
North Station (Garmat Ali)	**41**	**12**	**11**	**6**	**26.8**	**50**	**32.07**
South Station (Al-Saraji)	**11**	**13**	**3**	**2**	**15.3**	**27.2**	**20.83**
Central Station (City Center)	**18**	**22**	**4**	**5**	**22.2**	**22.7**	**22.50**

Total	**70**	**47**	**18**	**13**	**25.7**	**27.65**	**26.5**

P > 0.05, F = 0.464, 0.739

Table (3): The relationship between season and percentage infection of dogs with *T. canis*.

Season	Temperature (mean) C^0	No. dogs inf.	% Inf.
Winter	**17.1**	**12**	**30.76**
Spring	**26.4**	**9**	**26.47**
Summer	**40.1**	**5**	**27.77**
Autumn	**32.1**	**5**	**19.23**
Total		**31**	**26.5**

P > 0.05, F = 0.016*
Correlation R= -0.218

- **Significant**

Discussion

***Toxocara canis* infection in dogs is a public health problem in most countries, although it has been poorly documented in many of them, even Iraq.**

The present study shows a high percentage of infection of dogs with *T. canis* (26.5%) that indicates a high contamination levels with this parasite in Basrah city. (21) Pointed out that the percentage of infection of 35 stray dogs with *T. canis* in Mosul city was 25.7%, while, (22) reported that 19 dogs from 58 examined dogs (32.6%) were infected with *T. canis* in Mosul city. Dissection of 48 stray dogs in Najaf region showed that 46% of them were infected with *T. canis* (23). (24) Found that during his survey on intestinal nematodes that the percentage of infection with *T. canis* of 51 dissected stray dogs in Basrah was 23.5%.

(25) Found that 6% was the infection rate with *T. canis* between stray dogs in Konya province/ Turkey. (26) Reported that 66.6% was found to be infected with *T. canis* from 21 stray dogs from Izmir/ Turkey. (27) Showed that the percentage of infection with *T. canis* eggs was 6.55% when they examined 305 faecal samples from pet dogs in Tehran/ Iran.

(28) Examined 76 puppies aged between 2-4 months in Japan and showed that 68.4% were infected with *T. canis*. (29) Pointed out that *T. canis* was the major parasite in all age groups of dogs after they examined 1126 stray dogs in Japan.

The high prevalence in the present study with *T. canis* infection indicates that there is high risk for human toxocariasis and there should be a prompt evaluation of the significance of *T. canis* for public health.

No significant differences in infection were found between male and female dogs, but female worms of *T. canis* were higher than males. This result was in agreement with that of (30) who examined 153 stray dogs in Japan, and they showed no significant differences between male and female dogs, but male worms were found only in one case while female worms were found in 14 cases. High percentage of infection (40%) with *T. canis* was reported in female dogs as

compared with 14% in males when 157 dog faecal samples were examined in Poland (31). (32) Showed that the prevalence of *T. canis* was higher in female adult dogs (6.3-25.2%) than in males (4.8-18.2%) in Poland. Furthermore, (33) pointed out that males of stray dogs were more frequently infected with hookworms, while ascarids were more frequent in younger dogs (males or females). (26) Found that the prevalence of helminthes infections did not differ significantly between dogs of different ages and sexes.

(34) Reported that sex of the host had no significant influence on the degree of parasitism with *T. canis* infection. Also, (35) showed that the prevalence of *T. canis* infection was similar in both sexes and *T. canis* was most prevalent in dogs aged less than 3 months. (36) Pointed out that there was no significant difference in *T. canis* prevalence between male and female dogs. Younger animals (aged under 2 years) seemed to be more prone to infection with *T. canis* than the older ones (37). (38) Showed that male's dogs were more often infected than females.

The number of dogs infected with *T. canis* varied at three main stations in Basrah city under study, and the highest was shown in the north station. This high value may be due to a socioeconomic level which is low and most families in this station have guard dogs exposing them to the high risk of infection. Even though, the north station is open habitat with high contaminated level of dead various animals which make pollution level high with many infections including parasites. Furthermore, there are many factors that can influence the rate of infection including age, sex and source of dogs.

The present study shows that there were significant differences between infection with *T. canis* and seasons, even high percentage infection was found in winter months (32.76%) and the low value was in autumn (19.23%). This result agrees with (25) who shows that cold months have percentage infection higher than others. (34) Reported that the prevalence of *T. canis* infection was higher in warmer months at U.K. No effect of season on the occurrence of the different parasite genera observed, but young animals were found to shed more nematode eggs in faeces than adult dogs (39).

The infectivity of dogs with *T. canis* is influenced by a complex of interacting ecological and physiological factors such as climatic, aggregation of stray dogs, high offspring and distribution puppies. This type of study is varied from one country to another depending on the distribution of veterinary hospitals, monthly examination of the owner of dogs and dog's treatments.

REFRENCES

1- Overgaauw, P. A. M. (1997). General introduction aspects of Toxocara epidemiology, toxocariasis in dogs and cats. Crit. Rev. Microbiol., 23: 233-251.

2- Despommier, D. (2003). Toxocariasis: Clinical aspects, epidemiology, medical ecology and molecular aspects. Clin. Microbiol. Rev., 16: 265-272.

3- Maqbool, A.; Raza, S. H.; Hayat, C. K. & Shafiq, M. (1998). Prevalence andchemotherapy of toxocariasis in the dog in Faisalabad (Punjab), Pakistan. Vet. Arh., 68: 121-125.

4- Collins, G. H. (1981). A survey of gastro-intestinal helminthes of dogs in New Zealand. New Z. Vet. J., 29: 163-174.

5- O'Lorcain, P. (1995). The effects of freezing on the viability of *Toxocara canis* and *Toxocara cati* embryonated eggs. J. Helminthol., 69: 169-171.

6- Gaspard, P.; Wiart, J. and Schwartzbrod, J. (1996). A method for assessing the viability of nematode eggs in sludge. Env. Tech., 17: 415-420.

7- Pfeiffer, H. (1983). The contamination of public gardens and sand pits in Vienna with permanent stages of human pathogenic parasites of dogs and cats. Mitt. Ost. Ges. Trop. Parasitol., 5: 83-87. (English Summary).

8- Augulo-Madero, R.; Puente, C. & Guillen-Liera, J. L. (1987). Contamination of the soils of public parks with *Toxocara canis*. Rev. Iber. Parasitol., 165-171.

9- Snow, K. R.; Ball, S. J. & Bewick, J. A. (1987). Prevalence of *Toxocara* species eggs in the soil of five east London parks. Vet. Rec., 120: 66-67.

10- O'Lorcain, P. (1994a). Prevalence of *Toxocara canis* ova in public playgrounds in the Dublin area of Ireland. J. Helminthol., 68: 237-241.

11- Mukaratirwa, S. & Toruvinga, M. (1999). A survey on enviromental contamination of sub urban parks and playgrounds in Harare, Zimbabwe, with canine helminths of zoonotic significance. J. South Afr.Vet. Assoc., 70: 119-121.

12- Masnik, E. (2000). Relationship between the prevalence of *Toxocara* eggs and soil.Wiadov. Parazytol., 46: 239-244.

13- Milano, A. M. & Oscherov, E. B. (2002). Contamination with dog's parasites eggs of zoonotical importance in sand of the beaches of the city of Corrientes, Argentina. Parasitol. Latinoam., 57: 119-123.

14- Andersiuk, M. V.; Denegri, G. M.; Esardella, N. H. & Hollman, P. (2003). Coproparasitological canine survey in public squares of Mar del Plata city, Buenos Aires, Argentina. Parasitol. Latinoamer., 58: 17-22.

15- Jiang, X. Y.; Guirong, L. & Jianmin, P. (2000). The contamination situation of *Toxocara canis* eggs on the body surface of the dog. J. Ecol. Anim., 4: 50-52.

16- Sprent, J. F. (1956). The life history and development of *Toxocara cati* (Schrank, 1788) in the domestic cats. Parasitology, 46: 54-78.

17- Visco, R. J.; Corwin, R. M. & Selby, L. A. (1978). Effect of age and sex on the prevalence of intestinal parasitism in cats. J. Am. Vet. Med. Assoc., 172: 797-800.

18- Internet (1999). *Toxocara canis*. Notes for pet owners.provet helthcare information.www.provet.co.uk/health/diseases/*Toxocara canis*.htm.

19- Soulsby, E. J. (1968). Helminthes, arthropods and protozoa of domesticated animals, 6th ed. Williams and Wilkins, Baltimore. 824 pp.

20- Yamaguti, S. (1961). Systema helminthum, III the nematodes of Vertebrates. Part I and II. Inter science Publishers inc., New York and London, Pp: 1261.

21- Al-Khalidi, N. W.; Daoud, M. S.; Shubber, A. H. & Al-Alousi, T. I. (1988). A survey for internal and external parasites in dogs in Mosul (Iraq). Iraqi J. Vet. Sci., 1: 9-17.

22- Abul-Eis S. E. (1983). Studies on parasites of public health importance from dogs in Mosul. M. Sc. Thesis, Coll. Vet. Med., Univ. Mosul: 128 pp.

23- Sultan, B. E. (1997). Epidemiological study of *Toxocara canis* in Najaf area. Ph. D. thesis, Coll. Vet. Med., Univ. Baghdad: 78 pp. (in Arabic).

24- Al-Emara, G. Y. (1999). Epidemiological study of nematode in digestive tract of dogs in Basrah area. M. Sc. thesis, Coll. Vet. Med., Univ. Baghdad. 86 pp. (In Arabic).

25- Aydenizoz, M. (1997). Helminthological investigations of dogs in Konya province. Acta Parasitol. Turcica, 21: 429-434.

26- Korkmaz, M.; Yilmaz, M.; Uner, A. & Altintas, N. (2000). the prevalence of *Toxocara canis* infection in stray dogs in Izmir, Turkey. Turk. Parazitol. Derg., 24: 211-213. (English Summary).

27- Dalimi, A.; Mojarad, S. & Jamshidi, S. (2001). Intestinal parasites of pet dogs in Tehran and evaluation of knowledge of dog owners about zoonotic risk of parasites of dog. J. Fac. Vet. Med. Univ. Tehran., 4: 13-16. (English Summary).

28- Fukase, T. (1986). *Toxocara canis* infections of puppies in Kangawa prefecture. J. Jap.Vet. Med. Assoc., 39: 640-643.

29- Itoh, N. & Itoh, S. (1998). Survey of intestinal nematodes in young dogs. J. Vet. Med. Jap., 51: 983-986.

30- Nakauchi, K.; Ohtaka, H.; Morishima, K. & Hiki, M. (1993). A survey on *Toxocara canis* of stray dogs in Ibaraki prefecture, Japan. Jap. J. Parasitol., 42: 365-367.

31- Gaca, K.; Michalski, M. M.; Szelagiewicz, M.; Sokol, R. & Seimionek, J. (1998). Prevalence of nematodes in dogs. Med. Wet., 54: 407-408.

32- Kornas, S.; Nowosad, B. & Skalska, M. (2001). *Toxocara canis* infection in dogs in Cracow's shelter for stray animals.Wiadov. Parazytol., 47: 755-762.

33- Coggins, J. R. (1998). Effect of season, sex and age on prevalence of parasitism in dogs from Southeastern Wisconsin. J. Helminthol. Soc. Wash., 65: 219-224.

34- Baker, D. G. & Strombeck, D. R. (1985). Intestinal parasitism in dogs from a placer country, California, animal control facility. Calif. Vet., 39: 32-36.

35- Schandevyl, P.; Mbundu, T. & Sumbu, W. (1987). Prevalence of intestinal parasites in dogs in Kinshasa, Zaire. Ann. Soc. Belg. Med. Trop., 67: 369-374.

36- O'Lorcain, P. (1994b). Epidemiology of *Toxocara spp.*in stray dogs and cats in Dublin, Ireland. J. Helminthol., 68: 331-336.

37- Rahman, W. A. (1990). Intestinal helminths of pet dogs from residential area in Penang, Malaysia. Trop. Biomed., 7: 195-196.

38- Umeche, N. & Hogan, U. E. (1989). A study of intestinal helminths of dog in Calabar, Nigeria. Arch. Vet. Ital., 40: 128-131.

39- Oliveira, S. T.; Amarante, A. F.; Ferrari, T. B. & Nunes, L. C. (2002). Prevalence of intestinal parasites in dogs from Sao Paulo State, Brazil. Vet. Parasitol., 103: 19-27.