

Prevalence of *Toxocara canis*, *Toxascaris leonina* and *Dirofilaria immitis* in dogs in Chuncheon, Korea (2004)

Yong-Hun KIM and Sun HUH*

Department of Parasitology, College of Medicine, Hallym University,
Chuncheon 200-702, Korea

Abstract: The intestines and hearts of dogs were examined for *Toxocara canis*, *Toxascaris leonina*, and *Dirofilaria immitis*, after necropsy between June 26 and September 29, 2004 in Chuncheon, Korea. Of the 662 dogs examined, 6 were infected with *T. canis* (0.9%), 86 with *T. leonina* (13.0%). Fifty dogs were infected with *D. immitis* among 500 dogs examined (10.0%). Five were co-infected with *T. canis* and *T. leonina*, and three were co-infected with *T. leonina* and *D. immitis*. The cumulative positive infection rate for three species was 134/662(20.2%). Considering previously reported seropositive rates of *T. canis* excretory-secretory antigen, i.e., 5% in the adult population in Korea, the possibility of toxocariasis caused by *T. leonina* should be reevaluated.

Key words: toxocariasis, *Toxocara canis*, *Toxascaris leonina*, *Dirofilaria immitis*, prevalence, dogs, Korea

We undertook the survey to determine the prevalences of *Toxocara canis*, *Toxascaris leonina*, and *Dirofilaria immitis* in dogs, since dogs act as natural hosts of these parasites. From June 26, 2004 to September 29, 2004, the intestines and hearts of 662 dogs were examined by naked eye after sacrifice in an abattoir in Chuncheon, Korea. The collected *Toxocara* spp. worms and *Toxascaris leonina* were identified in the laboratory after observing cephalic alae and egg morphology under a microscope (Fig. 1). Cephalic alae allowed *T. canis* and *T. leonina* to be differentiated from *Toxocara cati*.

T. canis was identified in 6 dogs (0.9%), and *T. leonina* in 86 dogs (13.0%). Cardiac ventricles and atria of dogs were observed in 500 of the 662 dogs. *D. immitis*

was found in 50 dogs (10.0%), 5 dogs (0.7%) were co-infected with *T. canis* and *T. leonina*, and 3 dogs were co-infected with *T. leonina* and *D. immitis*; no other intestinal helminthes were found. The cumulative positive rate was 20.2% (134/662).

A Korean survey of 245 feces of dog from 1992 to 1995 showed that the infection rates of *T. canis* and *T. leonina* were 8.2% and 2.0% respectively (Youn et al., 1995). In a report issued more than 20 years ago from July 10 to August 1, 1977 in Eunjungbu City, Kyunggi-Do, 102 dogs were examined, and 72 were found to be infected with helminthes at autopsy: *Dipylidium caninum* (47%), *Ancylostoma caninum* (26%), *T. leonina* (16%), *T. canis* (13%), *Taenia pisiformis* (9%), *Echinostoma hortense* (4%), *E. cinetorchis* (2%) and *Spirometra mansoni* (2%) (Cho et al., 1981). And, a study conducted from July 1980 to August 1981 in 16 cities on dog stools using the formalin-ether concentration method, reported the following infection frequencies; *T. canis* 14.4%, *Trichuris vulpis* 9.5%, *A. caninum* 8.0%, *T. leoni-*

• Received 28 February 2005, accepted after revision 6 May 2005.

• This work was supported by the Korea Research Foundation Grant (KRF-2003-015-E00113).

*Corresponding author (e-mail: shuh@hallym.ac.kr)

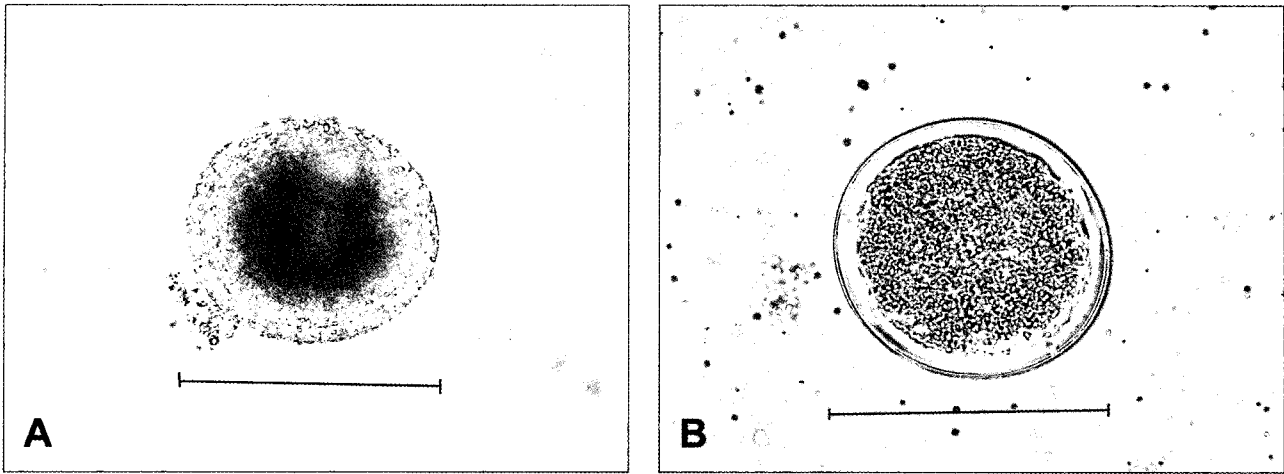


Fig. 1. Eggs of *Toxocara canis* and *Toxascaris leonina*. A. *T. canis*, bar = 80 μm . B. *T. leonina*, bar = 87.5 μm . The two species can be differentiated by egg shell morphology: egg shell of *T. canis* is granular and that of *T. leonina* is lamellated.

na 4.0%, *Clonorchis sinensis* 2.4%, *Metagonimus yokogawai* 1.3%, *Paragonimus westermani* 0.8% and *Spirometra* sp. 0.9% (Min, 1981). These results demonstrate that the prevalence of *T. canis* infection in dogs has reduced, but that *T. leonina* infection has persisted. The absence of other helminthes such as intestinal trematodes and cestodes may be due to the fact that most of the dogs sacrificed were reared on artificial feed. *Toxocara* spp. can be transmitted through an egg-contaminated environment and *D. immitis* can be transmitted by mosquitoes. However, other trematodes or cestodes are transmitted via contaminated feed. Seropositivity to *T. canis* excretory-secretory antigen was reported to be as high as 5% in apparently healthy residents in Gangwon-do (Park et al., 2002), and clinical reports have been issued on toxocariasis in the eye, lung, and brain (Park et al., 2000; Kim et al., 2002b, 2003). The causative role of *T. leonina* as an agent of visceral larva migrans has been suggested by previous reports of larva migrans by *T. leonina* to lungs in 96% of 168 infected mice (Prokopic and Figallova, 1982), and cross reactions between *T. canis* excretory-secretory antigen and sera of rabbits infected with *T. leonina* (Smith, 1982). Therefore, the possibility of toxocariasis caused by *T. leonina* should be considered and reevaluated in Korea, although it is very difficult to detect the larvae of *Toxocara* spp. in a lesion.

Recent data on the prevalence of dirofilariasis in Korean dogs showed an infection rate of 10.2% (13/127) among 127 dogs by the microfilarial test, but 28.3% (36/127) by the antigen test from October 1994 to August 1995 (Lee et al., 1996). Also, 339 (40.0%) of 848 dog serum samples taken during 2001 and 2002 produced a positive reaction for *D. immitis* antigen (Song et al., 2003). Recent human dirofilariasis have been reported. For example, a 39-year-old man without any evidence of systemic symptoms was found incidentally to have a hepatic nodule during a routine physical check-up (Kim et al., 2002a). Also, a 47 year-old man, who complained of chest pain for 1 month in 1998, was diagnosed as pulmonary dirofilariasis (Lee et al., 2002). Even though human dirofilariasis is rare, it should be ruled out during the differential diagnosis of a nodule in organs. Moreover, dogs should be screened and treated for *T. canis*, *T. leonina* and *D. immitis* infections.

REFERENCES

- Cho SY, Kang SY, Ryang YS (1981) Helminthes infections in the small intestine of stray dogs in Ejungbu City, Kyunggi Do, Korea. *Korean J Parasitol* 19: 55-59.
- Kim MK, Kim CH, Yeom BW, Park SH, Choi SY, Choi JS (2002a) The first human case of hepatic dirofilariasis. *J Korean Med Sci* 17: 686-690.

- Kim YB, Ko YC, Jeon SH, Park HM, Shin WC, Lee YB, Ha KS, Shin DJ, Lim YH, Ryu JS, Chung MS (2003) Toxocariasis: An unusual cause of cerebral infarction. *Korean Neurol Assoc* **21**: 651-654.
- Kim YC, Shin SJ, Lee JH, Kim MO, Shon JW, Yang SC, Yoon HJ, Shin DH, Park SS, Ryu JS, Jeong MS (2002b) A case of pulmonary infiltration with eosinophilia in visceral larval migrans by *Toxocara canis*. *Tuberc Respir Dis* **53**: 71-78.
- Lee JC, Lee CY, Shin SS, Lee CG (1996) A survey of canine heartworm infections among German shepherds in South Korea. *Korean J Parasitol* **34**: 225-231.
- Lee KJ, Park GM, Yong TS, Im K, Jung SH, Jeong NY, Lee WY, Yong SJ, Shin KC (2000) The first Korean case of human pulmonary dirofilariasis. *Yonsei Med J* **41**: 285-288.
- Min HK (1981) An epidemiological study on zoonoses in Korea. *Korean J Parasitol* **19**: 60-75.
- Park HY, Lee SU, Huh S, Kong Y, Magnaval JF (2002) A seroepidemiological survey for toxocariasis in apparently healthy residents in Gangwon-do, Korea. *Korean J Parasitol* **40**: 113-117.
- Park SP, Park I, Park HY, Lee SU, Huh S, Magnaval JF (2000) Five cases of ocular toxocariasis confirmed by serology. *Korean J Parasitol* **38**: 267-273.
- Prokopic J, Figallova V (1982) The migration of larvae of *Toxascaris leonina* (Linstow, 1909) in experimentally infected white mice. *Folia Parasitol (Praha)* **29**: 233-238.
- Smith HV, Quinn R, Bruce RG, Girdwood RW (1982) Development of the serological response in rabbits infected with *Toxocara canis* and *Toxascaris leonina*. *Trans R Soc Trop Med Hyg* **76**: 89-94.
- Song KH, Lee SE, Hayasaki M, Shiramizu K, Kim DH, Cho KW (2003) Seroprevalence of canine dirofilariasis in South Korea. *Vet Parasitol* **11**: 231-236.
- Youn HJ, Hong KO, Lee BC, Oh HG (1995) Prevalence of intestinal parasites in dogs and its control in Korea. *Korean J Vet Public Health* **19**: 257-261.