

A Survey on *Toxocara canis* of Stray Dogs in Ibaraki Prefecture, Japan

KIYOSHI NAKAUCHI, HIDEYASU OHTAKA, KEIKO MORISHIMA AND MASAO HIKI

(Accepted for publication; April 28, 1993)

Key words: prevalence, stray dog, *Toxocara canis*

Toxocara canis widely distributed throughout the world is known as the important causative agent of both canine and human toxocarosis. Epidemiological studies on toxocarosis among dogs in several areas in Japan, such as Hokkaido (Miyamoto and Kutsumi, 1978), Sapporo (Kamiya *et al.*, 1975), Tokyo (Ohishi *et al.*, 1973), Shiga (Tada *et al.*, 1991), Hyogo (Uga *et al.*, 1982), and Okinawa (Asato *et al.*, 1985) have shown 12.1–21.5 per cent of the *T. canis* infection. However, no surveys have yet been made to determine the prevalence of *T. canis* in Ibaraki Prefecture.

This paper presents the results of a survey for *T. canis* infection in the stray dogs in Ibaraki Prefecture.

A total of 153 samples of stray dogs captured in Ibaraki Prefecture were examined from June to December, 1992. Age of the dogs was estimated based on external appearance in addition to the degree of dental development. The dogs killed with carbon dioxide were necropsied as soon as possible, and then the worms were collected from the intestines. The recovered worms were fixed in 10% formalin and then cleared in lactophenol for a light microscopic examination. *T. canis* was identified in conformity to Georgi and Georgi (1990) and Sprent (1958).

The prevalence and number of *T. canis* in respective sex and age of host are given in Table 1. The prevalence decreased suddenly over 6 months of host age. Higher prevalence was found in under 6 month-old dogs than in over 6 month-old animals.

The highest prevalence (86.0%) was obtained from less than 3 month-old dogs and the lowest one (0.03%) from the dogs more than 12 month-old. The number of worms in respective ages was similar to each other, but the largest number (11.8) was obtained from the 3–6 month-old dogs followed by 7.9 in the dogs less than 3 month-old ones. No statistical differences were recognized in prevalence and number of the recovered worms between male and female dogs. Average number of parasitized *T. canis* was 9.4 per infected dog, and the male to female ratio was 1:0.73 (Table 2). Fifteen cases (20.8%) of unisexual infection were recognized in this study (male worms only; 1 case, female worms only; 14 cases). Neither *T. cati* and *Toxascaris* sp. were found in this study.

The prevalence in each group of the hosts obtained in the present survey was similar to various surveys (Asato *et al.*, 1985; Kamiya *et al.*, 1975; Ohishi *et al.*, 1973). It is reported that the prevalence rate in dogs is fallen to very low level over 6 months of age (Ash, 1962; Ohishi *et al.*, 1973; Sprent, 1958). A marked decrease of prevalence after the age of 6 months was also noticed in the present results. Evidence from canine parasite surveys indicates that the resistance may be accomplished within the age of 6 months of the host (Ohishi *et al.*, 1973). On the other hand, Ehrenford (1957) reported that male dogs exhibited less resistance to *T. canis* as compared to females. Further investigation would be needed to clear the sex-dependent susceptibility.

Prenatal infection of *T. canis* has been considered to be the most important route of infection of dogs (Georgi and Georgi, 1990; Sprent, 1958). Sprent (1958) reported that the larva of *T. canis* was distributed to the somatic tissues and did not reach the

Animal Administrative Guidance Center, 47 Hizawa, Kasama, Ibaraki 309-16, Japan.

中内 潔 大高英康 森島啓子 比気正雄 (茨城県動物指導センター)

Table 1 Prevalence and number of *Toxocara canis* by sex and age of host in stray dogs

Age (months)	Sex*	No. of dogs examined	Prevalence (%)	No. of worms/infected dogs
				Mean ± S E
< 3	M	20	95.0	6.7 ± 1.4
	F	23	78.3	9.1 ± 1.8
	Total	43	86.0	7.9 ± 1.2
3-6	M	14	78.6	13.0 ± 3.3
	F	25	76.0	11.2 ± 2.2
	Total	39	76.9	11.8 ± 1.9
6-12	M	11	27.3	8.0 ± 1.2
	F	20	0.1	1.0 ± 0
	Total	31	12.9	6.3 ± 1.8
12 <	M	20	0.1	6.0 ± 0
	F	20	0	0 ± 0
	Total	40	0.03	6.0 ± 0

*: M; male, F; female.

Table 2 Number of *Toxocara canis* in infected stray dogs (n=72)

Sex of worm	Range Min.-Max.	No. of worms/infected dogs
		Mean ± S E
Male	0-23	5.5 ± 0.6
Female	0-28	4.0 ± 0.5
Total	1-42	9.4 ± 1.0

alimentary tract of over 5 week-old dogs in experimental infection. Hence, high prevalence in puppies indicates that the arrested infective larvae of *T. canis* may be present in most of dogs.

Ohishi *et al.* (1973) reported that average number, unisexual infection rate and the male to female ratio of worms in the house dogs were 13.1, 22.8% and 1:0.95, respectively. Our results indicated that prevalence of *T. canis* in stray dogs is the same as in house dogs. High prevalence (81.7%) of *T. canis* indicates that stray dogs under 6 month-old are one of the important sources of contamination of the environ-

ment.

Although recent investigations showed that the contamination with the *Toxocara* spp. eggs excreted by dogs and cats in the sandpits of public parks is an important source of toxocarosis (Igarashi and Yatomi, 1992; Uga *et al.*, 1989), Uga *et al.* (1990) reported that human toxocarosis could not be associated with contamination of sandpit by immunological diagnosis. Dogs and human beings have many possible routes of exposure to *T. canis* (Ishii, 1959; Ito *et al.*, 1986; Pegg, 1971; Takahashi *et al.*, 1990). Further investigation would be needed to elucidate the main route of human toxocarosis in Japan.

References

- 1) Asato, R., Hasegawa, H., Kuniyoshi, S. and Higa, T. (1985): Prevalence of helminthic infections in Okinawa prefecture, Japan. *Jpn. J. Parasitol.*, 34, 501-506. (In Japanese with English abstract)
- 2) Ash, L. R. (1962): Helminth parasites of dogs and cats in Hawaii. *J. Parasitol.*, 48, 63-65.
- 3) Ehrenford, F. A. (1957): Canine ascariasis as a potential source of visceral larva migrans. *Am. J. Trop. Med. Hyg.*, 6, 166-170.

- 4) Georgi, J. R. and Georgi, M. E. (1990): Parasitology for veterinarians, 5th ed., W.B. Saunders Co., Philadelphia, 311–312.
- 5) Igarashi, K. and Yatomi, K. (1992): Pollution by *Toxocara* eggs of sandpits in public parks in Higashi-Harima region, Hyogo prefecture. J. Jpn. Vet. Med. Assoc., 45, 597–599. (In Japanese with English summary)
- 6) Ishii, T. (1959): Studies on larva migrans, hatchability of *Toxocara canis* in the earthworm. Jpn. J. Parasitol., 8, 659–663.
- 7) Ito, K., Sakai, K., Okajima, T., Ouchi, K., Funakoshi, A., Nishimura, J., Ibayashi, H. and Tsuji, M. (1986): Three cases of visceral larva migrans due to raw chicken or cow liver. Nihon Naikagaku Zassi, 75, 759–766. (in Japanese)
- 8) Kamiya, H., Seki, N. and Tada, Y. (1975): Helminth of stray dogs in Sapporo. II. Jpn. J. Parasitol., 24, 41–47. (In Japanese with English abstract)
- 9) Miyamoto, K. and Kutsumi, H. (1978): Studies on zoonoses in Hokkaido, Japan 1. An epidemiological survey of protozoan and helminthic infections of stray dogs in Kamikawa district. Jpn. J. Parasitol., 27, 369–374. (In Japanese with English abstract)
- 10) Ohishi, I., Kobayashi, S. and Kume, S. (1973): A survey on canine parasites in the Tokyo area. J. Jpn. Vet. Med. Assoc., 26, 228–233. (In Japanese with English summary)
- 11) Pegg, E. J. (1971): Infection of dogs by *Toxocara canis* carried by flies. Parasitology, 62, 409–414.
- 12) Sprent, J. F. A. (1958): Observations on the development of *Toxocara canis* (Werner, 1782) in the dogs. Parasitology, 48, 184–209.
- 13) Tada, Y., Ohta, T., Soohara, S. and Suzuki, Y. (1991): Helminth infection of dogs in Shiga, Japan with reference to occult infection of *Dirofilaria immitis*. J. Vet. Med. Sci., 53, 359–360.
- 14) Takahashi, J., Uga, S. and Matsumura, T. (1990): Cockroach as a possible transmitter of *Toxocara canis*. Jpn. J. Parasitol., 39, 551–556. (In Japanese with English abstract)
- 15) Uga, S., Matsumura, T., Aoki, N. and Kataoka, N. (1989): Prevalence of *Toxocara* species eggs in the sandpits in Hyogo prefecture, Japan. Jpn. J. Parasitol., 38, 280–284.
- 16) Uga, S., Mastumura, T., Fujisawa, K., Okubo, K., Kataoka, N. and Kondo, K. (1990): Incidence of seropositivity to human toxocariasis in Hyogo prefecture, Japan, and its possible role in ophthalmic disease. Jpn. J. Parasitol., 39, 500–502.
- 17) Uga, S., Mizuno, T., Ito, T., Shiomi, Y., Watanabe, Y., Yamada, T., Onishi, T. and Goto, M. (1982): A helminthological survey of stray dogs in Hyogo prefecture. Jpn. J. Parasitol., 31, 407–413. (In Japanese with English abstract)