

Original Article

Gastrointestinal Helminthic Parasites in Stray Cats (*Felis catus*) from North of Iran

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Abstract

Background: Cats play a crucial role in the epidemiology of gastrointestinal helminthic parasites and also play a major role in transmitting of these parasites through faecal contamination of soil, food or water. The aim of this study was to determine the species of gastrointestinal helminthes parasites in stray cats from a rural area of Bandar-e-Anzali, Iran.

Method: Gastrointestinal helminthes were collected from 50 necropsied stray cats (*Felis catus*) after capturing them by trapping from different regions of the city and humanely euthanatized in Bandar-e-Anzali, a port in the Caspian Sea in northern Iran, from March to November 2003.

Results: The prevalence of infection was 90%, with those of individual parasites being *Diplopylidium nolleri* 54%, *Physaloptera praeputialis* 32%, *Ancylostoma tubaeforme* 20%, *Joyeuxiella pasqualei* 10%, *Toxocara cati* 8%, *Pterygodermatites affinis* 6%, *Ancylostoma caninum* 4%, and *Taenia taeniaeformis* 2%. Concurrent infections with two or more parasites were recorded in 34% of the individuals. In relation to the sex, the differences were not significant.

Conclusion: *P. praeputialis*, *T. cati*, *D. nolleri* and sometime *J. pasqualei* are the commonest Helminthes in cats. This is the first reported isolation of *P. affinis* and *A. caninum* infections from cats in Iran.

Keywords: Stray cat, Gastrointestinal helminth, Pterygodermatites affinis, Iran

Introduction

Parasites are the most common causes of gastrointestinal disease in domestic cats. Stray cats provide a potential reservoir of helminthic parasites to domestic cats, especially in rural areas (1). Rural cats prowl in urban and rural regions near residential areas. They are reservoir of many zoonotic infestations such as hookworm & ascariasis (2, 3). Excretion of large quantities of faeces by rural cats, presents a health hazard to the human population especially children.

The aim of this study was to determine the species of gastrointestinal helminthes parasites in stray cats from a rural area of Bandar-e-Anzali, Iran.

Materials and Methods

During the period from March to November 2003, a total of 50 (34 males and 16 females) cats were captured by trapping (baited cage-traps) from different regions of the Bandar-e-Anzali, north of Iran. All cats were humanely euthanatized (Confirmation No B-86/955 Iran S.P.C.A). The trapped cats were fixed by two pieces of wood at the corner of the cage and anesthetized by 3 ml ketamine 10% and then killed. The abdominal cavity was opened, the esophagus was detached and the stomach and intestinal tract stripped separately from the mesentery. Then the gastrointestinal tract was

opened along its entire length and examined for the presence of mature and immature helminthes, both in the contents of the gut and in scraping of the mucosa. They were washed in sieve No. 60 and examined under a magnifying lens providing a six times magnification.

All obtained helminthes parasites were collected and relaxed in water, then fixed in 70% alcohol and 5% glycerin (4) and examined under the microscope. Nematodes were mounted and cleared in lactophenol (4) and tapeworms were mounted and stained in acid alum carmine for identification and counting. The number of individuals of each species was recorded. The number of cestodes was calculated according to the number of scoleces. All parasites were identified using the keys of Yamaguti (5) and Soulsby (6).

Results

Five species of nematodes, *Ancylostoma tubaeforme*, *A. caninum*, *Toxocara cati*, *Pterygodermatites affinis* & *Physaloptera praeputialis* & three species of cestodes, *Joyeuxiella pasqualei*, *Diplopylidium nolleri* and *Taenia taeniaeformis* were found in this study. Of the 50 examined cats, 45 (90%) were infected with at least one species of helminths. Twenty seven cats were parasitized by one species, 11 by two and 7 by three species. Among the species found, the two most common and numerous were *D. nolleri* (54% with a total of 181 worms, 6.7 ± 3.09) and *P. praeputialis* (32% with a total of 74 worms, 4.56 ± 2.33). The number of infected cats, and the prevalence and intensity of infection are listed in Table 1. As no significant difference in the prevalence of parasitic infection was found between male and female cats the results for both sexes have been combined.

Table 1: Prevalence and intensity of helminth parasites in the gastrointestinal tract of 50 stray cats in Bandar-e-Anzali, Iran

Parasite	Number of infected cats	Prevalence (%)	Intensity (mean \pm SD)	Range
<i>T. cati</i>	4	8	3 ± 0.81	2 – 4
<i>P. praeputialis</i>	16	32	4.56 ± 2.33	2 – 9
<i>A. tubaeform</i>	9	18	3.11 ± 0.62	2 – 5
<i>A. caninum</i>	2	4	3	3
<i>P. affinis</i>	3	6	1.66 ± 0.57	1 – 3
<i>D. nolleri</i>	27	54	6.7 ± 3.09	3 – 18
<i>J. pasqualei</i>	5	10	1.4 ± 0.54	1 - 2
<i>T. taeniaeformis</i>	1	2	-	-

Discussion

The parasitic infection rate (number of cats infected by at least one species of helminths) in this study of 90% was similar to that reported in earlier studies, i.e. 98.5% in Isfahan(7), Iran, 89.7% in Spain (1) and 89.6% in Brazil (3).

Several studies on the prevalence of endoparasites, as determined at autopsy, in stray cats in

Iran have been reported (7-12). The results of these studies are summarized in Table 2. The *Toxocara cati* prevalence of 8% found in the current study was similar to that of other studies in Iran at around the same time - 8.3% in Ahvaz (11); 16% in Tehran, (8); and 13% in Isfahan, (7). Nevertheless the prevalence rate in this study was lower than that found in the earlier studies in Iran by Mirzayans (13) and Sadighian

(12), with parasitism rates of 42.31% and 67.5%, respectively. However the prevalence encountered in this study was very similar to

that of Iraq (15%) (14), but far lower than Spain (55.2%) (1), England (53.3%) (15), Greece (66.7%) (16) and Denmark (79%) (17).

Table 2: Previous studies of helminthes parasites in the gastrointestinal of stray cats (*Felis catus*) in various regions of Iran

Place	Reference	Collected parasites
Tehran	10	<i>Physaloptera praeputialis</i> , <i>Toxocara cati</i> , <i>Toxascaris leonina</i> , <i>Taenia taeniaeformis</i> , <i>Mesocestoides lineatus</i> , <i>Dipylidium caninum</i>
Tehran	8	<i>Toxocara cati</i> , <i>Physaloptera praeputialis</i> , <i>Diplopylidium nolleri</i> , <i>Toxascaris leonina</i>
Northern parts of Iran	9	<i>Toxocara cati</i> , <i>Physaloptera praeputialis</i> , <i>Ancylostoma tubaeforme</i> , <i>Mesocestoides lineatus</i> , <i>Spirometra mansoides</i> , <i>Taenia taeniaeformis</i> , <i>Metrochis albidus</i> , <i>Opisthorchis felineus</i> , <i>Corinosoma</i> sp.
Isfahan	7	<i>Toxocara cati</i> , <i>Physaloptera praeputialis</i> , <i>Taenia taeniaeformis</i> , <i>Diplopylidium nolleri</i> , <i>Mesocestoides lineatus</i> , <i>Joyeuxiella pasqualei</i> , <i>Joyeuxiella echinorhincoides</i>
Ahwaz	11	<i>Taenia taeniaeformis</i> , <i>Dipylidium caninum</i> , <i>Diplopylidium nolleri</i> , <i>Diplopylidium acanthotetra</i> , <i>Joyeuxiella pasqualei</i> , <i>Toxocara cati</i> , <i>Physaloptera praeputialis</i> , <i>Rectalaria</i> sp, <i>Toxoplasma gondii</i> , <i>Sarcocystis</i> sp.

Physaloptera praeputialis was the nematode species found in the present survey with the highest prevalence (32%). This is higher than the estimated prevalence previously found in Iran of 7% (8) and 3.8% (13) as well as 18% in Iraq (14).

The other nematode isolated from cats was *Ancylostoma tubaeforme* with a mean prevalence of 20%, which was similar to 29.3% in Spain (1) but higher than the prevalence of 8.9% found in Brazil (3). *Ancylostoma* spp. transmission depends on infected dogs eliminating eggs in their feces, fecal samples being left on moist ground for 2-8 days and upon a susceptible host either ingesting larvae or being actively infected through the skin. In other studies, the estimated prevalence was 45.4% in Gilan and Mazandaran in the north of Iran (9). Baker *et al.* (18) reported the isolation of *A. caninum* from a cat in South Africa. This is the first report of *A. caninum* from stray cats in Iran.

Pterygodermatites affinis (*Rictolarai cahirensis*) is a wide spread parasite of the intestine of carnivores (such as e.g. Canidae, Felidae) (19). Quentin *et al.* (20) found larvae encapsulated in

the insect. Larvae, which were in the wall of the ileum behind its junction with the malpighian tubules, were given to a young cat, which passed eggs 38 days later. In this study we report the first isolation of *P. affinis* from cats in Iran where a prevalence of 6% has been found. *P. affinis* has been isolated from foxes and jackals in northern parts of Iran (9, 21). This nematode has also been found in a cat in Iraq (22).

In the present survey, *Diplopylidium nolleri* had the highest prevalence (54%) of the cestodes that were isolated from gastrointestinal tract of *Felis catus*. This prevalence rate was higher than previously recorded rates in Iran, with moderate rates having been found as 37.75% (23) and 15% (11). In some areas very low rates have been found. Bahadori *et al.* (8) found a prevalence of 1% in Tehran and Jamshidi *et al.* (7) reported a rate of 0.7% in Isfahan. It seems that in the Northern part of Iran (Bandar-e-Anzali) with a humid climate, conditions for transmission of the parasite are good, but the dry urban areas, of Tehran and Isfahan, to be unsuitable for the survival of the

insect intermediate hosts. This results in failure parasite of *D. nolleri* to complete its life cycle leading to an absence of very low numbers of the parasite. In studies elsewhere the prevalence of *D. nolleri* was 36.4% in Egypt (24) and 57.7% in Greece (25).

The *Joyeuxiella pasqualei* prevalence (10%) was lower than that found earlier as 75.6% (7) and similar to Dalimi *et al.* finding as 3.92% (23). Mirzayansdid not find *J. pasqualei* in her study (10). In other parts of the world (1, 22) *J. pasqualei* has also been reported in *Felis catus*. Little is known about the biological cycle of this species. Lopez Neyra (26) reported a reptile as the single intermediate host, while other authors have reported rodents as paratenic hosts, or arthropods and reptiles as first and second intermediate hosts, respectively (27, 28). *D. nolleri* and *J. pasqualei* transmission depends on coprophagus beetles. Cysticercoid of *D. nolleri* develops in beetles and reptiles. Small mammals serve as second intermediate hosts (6).

The *Taenia taeniaeformis* prevalence (2%) was similar to that found by Mirzayans (10) in Tehran as 0.95% and Nihad *et al.* (14) in Iraq as 4% and was lower than a previous study in Isfahan as 9.2% (7). In wild cats, foxes and jackals the prevalence of this cestode was found as 50%, 27% and 10%, respectively (9).

In conclusion, *P. praeputialis*, *T. cati*, *D. nolleri* and sometimes *J. pasqualei* are the commonest helminthes in cats together with *A. tubaeform*, *Mesocostoides lineatus* and *T. taeniaeformis* which are the helminthes species more frequently encountered in Iran.

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The authors declare that they have no Conflict of Interests.

References

1. Calvete C, Lucientes J, Castillo JA, Estrada R, Gracia MJ, Peribanez MA, Ferrer M. Gastrointestinal helminth parasites in stray cats from the mid-Ebro Valley, Spain. *Vet Parasitol.* 1998;75:235–240.
2. Fisher M. *Toxocara cati*: an underestimated zoonotic agent. *Trends Parasitol.* 2003;19:167-170.
3. Laberthe N, Serrao ML, Ferreira AMR, Almedia NKO, Guerrero J. A survey of gastrointestinal helminthes in cats of the metropolitan region of Rio de Janeiro, Brazil. *Vet Parasitol.* 2004;123:131-9.
4. Ash LR, Orihel TC. Parasites: A guide to laboratory procedures and identification. ASCP Press, American Society Pathologists Chicago; 1987.
5. Yamaguti S. *Systema Helminthum*, Vol II. The cestodes of vertebrates. Inter Science, New York; 1959.
6. Soulsby E.J.L. *Helminths, Arthropods and Protozoa of Domesticated Animals.* (Baillier Tindal London; 1982.
7. Jamshidi Sh, Meshki B, Toghani M. A study of helminthic infection of gastrointestinal tract in stray cats at urban areas in Isfahan, Iran. *J Fac Vet Med Univ Tehran.* 2002;57(2):25-7.
8. Bahadori ShR, Eslami A, Meshgi B, Poor Hoseini S. Study on stray cats infested with parasitic helminthes in Tehran, Iran. *J Fac Vet Med Univ Tehran.* 2004;59(2): 171-4.
9. Dalimi A, Mobedi I. Helminth parasites of carnivores in the northern part of Iran. *Annals of Tropical Medicine & Parasitology.* 1992; 86(4):395-7.
10. Mirzayans A. Incidence of gastrointestinal helminthes of the domestic cats in Tehran area of Iran. *J Parasitol.* 1971;57:1296.
11. Navidpour Sh. A study of gastrointestinal parasites of stray cats in Ahwaz, Iran.

- Scientific and Research quarterly of Agricultural Jahad. 2003; 58:6-7.
12. Sadighian A. Helminthes of wildcats in the Shahsavar area, Caspian region, Iran. *J Parasitol*. 1970;56:270.
 13. Mirzayans A. *Toxocara cati* in a new mammalian host. *Vet Record*. 1973;92(10): 262.
 14. Nihad W, Al-Khalidi Tafiq-I, Al-Alousi Subber A. Internal and external parasites in cats in Mosul, Iraq. *Vet Parasitol*. 1988; 2:137-8.
 15. Nichol S, Ball SJ, Snow KR. Prevalence of intestinal parasites in feral cats in some urban areas of England. *Vet Parasitol*. 1981;9:107-110.
 16. Haralabidis ST, Papazachariadou MG, Koutinas AF, Rallis TS. A survey on the prevalence of gastrointestinal parasites of dogs in the area of Thessaloniki, Greece. *J Helminthol*. 1988; 62:45-9.
 17. Engbaek K, Madsen H, Olesen S. A survey of helminthes in stray cats from Copenhagen with ecological aspects. *Z Parasitenkd*. 1984;70:87-94.
 18. Baker MK, Lange L, Verster A, Van Der Plaats S. A survey of helminths in domestic cats in the Pretoria area of Transvaal, Republic of South Africa: I. The prevalence and comparison of burdens of Helminths in adult and juvenile cats. *J S Afr Vet Assoc*. 1989; 60:139-42.
 19. Anderson RC. Nematode Parasites of Vertebrates. Their Development and Transmission. 2nd Edition. CABI Publishing, Wallingford, Oxon (UK); 2000.
 20. Quentin JC, Seureau C, Vernet R. Cycle biologique du nematode rictulaire *Pterygodermatites (Multipectines) affinis* (Jagerskiold, 1904). *Annals de Parasitologie Humaine et Comparee*. 1976; 51: 51-64. In Anderson RC. Nematode Parasites of Vertebrates. Their Development and Transmission. 2nd Edition. CABI Publishing, Wallingford, Oxon (UK); 2000.
 21. Sadighian A. Helminth parasites of stray dogs and jackals in Shahsavar area, Caspian region, Iran. *J Parasitol*. 1969;55:372-4.
 22. Daoud I, Tae-Ara Salman Y. Prevalence of gastrointestinal helminthes in cats from Iraq. *J Biol Sci Res*. 1988;19:363-8.
 23. Dalimi A, Sadraei J, Tabaei SJ. A survey on helminth parasites of cats in Tehran. 8th International Congress of Parasitology. 10/14 Oct. 1994, Izmir, Turkey, Abs. Book; 1994. p. 251.
 24. El-Shabrawy MN, Imam EA. Studies on cestodes of domestic cats in Egypt with particular reference to species belonging to genera *Diplopylidium* and *Joyeuxiella*. *J Egypt Vet Med Assoc*. 1978;38:19-27.
 25. Haralampidis ST. Simbole sti melete ton parasitin tez gatas. *Vet Med Diss Thessaloniki*. 1977. In Calvete C, Lucientes J, Castillo JA, Estrada R, Gracia MJ, Periban~ez MA, Ferrer M. Gastrointestinal helminth parasites in stray cats from the mid-Ebro Valley, Spain. *Vet Parasitol*; 1998. p. 75:235-240.
 26. Lopez Neyra C. Sobre la evolucion de *Joyeuxia chyzeri* v. Ratz infection experimental de las salamanquesas. *Boletin de la Real Sociedad Espanola de Historia Natural*. 1927;27:398-9. In: Calvete C, Lucientes J, Castillo JA, Estrada R, Gracia MJ, Periban~ez MA, Ferrer M. Gastrointestinal helminth parasites in stray cats from the mid-Ebro Valley, Spain. *Vet Parasitol*. 1998; 75: 235-240.
 27. Agrawal RD, Pande BP. Cysticercoide of *Joyeuxiella pasqualei* in the wall-lizard and its experimental development in Kitten. *Indian J Helminth*. 1979;31:75-80.
 28. Georgi JR. Tapeworms. *Vet Clin North Am: Small Anim Pract*. 1987;17:1285-1305