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### Short Communication

## Epidemiological Study of Gastrointestinal Helminthes of Canids in Chaharmahal and Bakhtiari Province of Iran

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#### **Abstract**

**Background:** The present study was carried out to describe the epidemiological aspects of gastrointestinal helminthic infections of canids in Chaharmahal and Bakhtiari Province, the central western part of Iran.

**Methods:** Forty nine canid species including, dogs, jackals, foxes and wolves were included in this study. The contents of their alimentary canal were inspected in order to isolate and identify the parasitic helminthes of this system. To identify the worms, the Soulsbey and Anderson identification key and light microscopy were used.

**Results:** Based on necropsy findings, 35 (71.4%) of examined animals were infected with at least one helminth. The prevalence of identified worms was as follows: *Mesocestoides lineatus* (55.1%), *Joyeuxiella echinorinchoides* (26.5%), *Taenia hydatigena* (12.2%), *T. multiceps* (8.2%), *T. ovis* (2%), *Dipylidium caninum* (2%) and *Spiruru* spp. (2%). No significant difference was noticed between the sampling areas, age and helminth infection. Only a significant difference was observed for prevalence of *T. multiceps* in wolf (25%), dog (21.4%), jackal and fox (0%) respectively ( $P < 0.05$ ).

**Conclusion:** The canids in Chaharmahal and Bakhtiari harbor several parasites that some kind of them have zoonotic importance and may pose a threat to community health specially in rural areas.

## Introduction

Among the all kinds of carnivores living in Iran four species of canids namely stray dog (*Canis lupus familiaris*), fox (*Vulpes vulpes*), jackal (*Canis aureus*) and wolf (*Canis lupus pallipes*) are the most abundant species with the ability to adopt a variety of habitats and human proximity (1).

Chaharmahal and Bakhtiari Province is located in the central western part of Iran in Zagros Mountains region with considerable canine population. Close contact between nomadic/rural humans and domestic/wild canids is a

common phenomenon. The canids could be a potential source for producing parasitic infections in other animals and human particularly, in rural areas (2). Therefore, the importance of recognition of wildlife as a potential reservoir is increasing. However, there are some studies on the helminthes infection of dogs, foxes and jackals in Iran (Table 1), but none of them was conducted in the central western part of country.

The present study describes the epidemiological aspects of gastrointestinal parasitic infections of canids in the area.

**Table 1:** Previous studies of gastrointestinal helminthes of canids in various regions of Iran

Place	Reference	Host	Collected parasites
Sarab, Azarbayejan	2	Fox	<i>M. lineatus</i> , <i>U. stenocephala</i> , <i>T. canis</i> , <i>Toxascaris</i> sp., <i>Rictolaria</i> spp. <i>Taenia</i> spp. <i>M. hirudinaceus</i>
Garmsar, Semnan	3	Stray dogs	<i>T. hydatigena</i> , <i>T. multiceps</i> , <i>M. lineatus</i> , <i>T. canis</i> , <i>D. caninum</i> , <i>E. granulosus</i> ,
Northern parts of Iran	4	Jackal	<i>S. stercoralis</i> , <i>Physaloptera</i> spp, <i>T. pisiformis</i> , <i>Phagicola sinoecum</i> , <i>Echinocasmus schwartzzi</i> , <i>Euparyphium</i> sp., <i>Plagiorchis</i> sp., <i>Spirometra erinacei</i> , <i>Spirometra boughtoni</i>
		Stray dogs	<i>Rictularia affinis</i> , <i>Phagicola sinoecum</i> and <i>A. alata</i>
Moghan, Northwestern Iran	5	Dog and Fox	<i>Mesocestoides</i> sp., <i>Rictolaria</i> spp., <i>Macranthorbynchus hirudinaceus</i> , <i>Toxascaris</i> spp., <i>Joyeuxiella</i> sp., <i>Taenia</i> spp., <i>Alaria</i> spp., <i>Dipylidium caninum</i>
Ilam	6	Stray dogs	<i>E. granulosus</i> , <i>T. hydatigena</i> , <i>T. multiceps</i> , <i>M. lineatus</i> , <i>D. caninum</i> , <i>T. ovis</i>
Khuzestan	10	Dog, Jackal And Fox	<i>E. granulosus</i> , <i>D. immitis</i> , <i>U. stenocephala</i> , <i>Spirometra</i> sp., <i>T. hydatigena</i> , <i>T. canis</i> , <i>A. caninum</i> , <i>Rictolaria</i> spp, <i>Physaloptera</i> sp.
Western of Iran	19	Jackal	<i>T. canis</i> , <i>T. leonina</i> , <i>R. affinis</i> , <i>T. hydatigena</i> , <i>D. caninum</i> , <i>M. lineatus</i> , <i>J. pasgalei</i> , <i>Alaria canis</i> , <i>M. hirudinaceus</i> , <i>Macracanthorhynchus</i> sp.

## Materials and Methods

### Study area

Chaharmahal and Bakhtiari Province is located in the central western part of Iran with moderate mountainous climate and proper status for farming and stockbreeding. It covers an area of approximately 16332 km<sup>2</sup>. The study was undertaken in four counties of the province (Table 2).

### Samples

The study that was accomplished during a research project for canine visceral leishmania-

sis from April to September 2009 , consisted of forty nine canid species including 14 dogs, 18 jackals, 13 foxes and 4 wolves (For the collection of wild canid samples, we got a permission from the province Department of Environment). After the subjects were hunted bloods sampling, and necropsy was accomplished immediately. The age of the animals was determined according to dental formula method. Briefly, the gastrointestinal contents of the animals were sieved using sieve No. 100 and the separated helminthes washed and preserved in a mixture of Alcohol 70% and Glyc-

erin 5% until examination. Before the microscopic examination of the samples, the helminthes were removed from the preservative and washed several times with 0.85% normal saline solution. Thereafter, the nematodes were subjected to the clearing agent, Lacto-

phenol solution and the tapeworms were stained using the Acetocarmine staining method.

The identification of the helminthes was done according to Soulsbey (7) and Anderson (8).

**Table 2:** Number of examined canids in different areas of Chaharmahal va Bakhtiari province.

Location	Number of examined animals				
	Stray Dog	Fox	Jackal	Wolf	Total
<i>Shabrekord</i>	2	3	3	1	9
<i>Ardal</i>	2	2	4	1	9
<i>Koobrang</i>	9	7	9	2	27
<i>Lordegan</i>	1	1	2	-	4
Total	14	13	18	4	49

### Statistical analyses

The data were analyzed using Pearson’s Chi-square test. All statistical analyses were performed using SPSS statistical software (IBM® PASW/SPSS® Statistics 18.0 – 2009).

### Results

Based on necropsy findings 35 (71.4%) of examined animals were infected with at least one helminth. The prevalence of the identified worms were, *Mesocestoides lineatus* (55.1%), *Joyeuxiella echinorinchoides* (26.5%), *T. hydatigena*

(12.2%), *T. multiceps* (8.2%), *T. ovis* (2%), *D. caninum* (2%) and *Spirura* spp. (2%), respectively (Table 3). The prevalence of helminthes based on sampling location and age of animals are summarized in Tables 4 and 5, respectively. The study showed a significant correlation between the prevalence of *T. multiceps* among the canids, wolves (25%), dogs (21.4%), jackal and fox (0%) respectively ( $P < 0.05$ ). However, there was no significant correlation between the variables, age, sampling location and the mentioned helminthic infections.

**Table 3:** Relative frequency of helminthic infections in canids of Chaharmahal va Bakhtiari province

Helminth	Dog		Fox		Jackal		Wolf	
	No.	%	No.	%	No.	%	No.	%
<i>M. lineatus</i>	6	42.9	9	69.2	11	61.1	1	25
<i>J. echinorinchoides</i>	2	14.3	6	46.2	5	27.8	0	0.0
<i>T. hydatigena</i>	4	28.6	0	0.0	1	5.6	1	25
<i>T. multiceps</i>	3	21.4	0	0.0	0	0.0	1	25
<i>T. ovis</i>	0	0.0	0	0.0	1	5.6	0	0.0
<i>D. caninum</i>	1	7.2	0	0.0	0	0.0	0	0.0
<i>Spirura</i> spp	0	0.0	1	7.7	0	0.0	0	0.0

**Table 4:** Relative frequency of helminthic infections of canids in different areas of Chaharmahal va Bakhtiari province

Helminth	Shahrekord		Ardal		Kohrang		Lordegan	
	No.	%	No.	%	No.	%	No.	%
<i>M. lineatus</i>	5	55.6	3	33.3	17	63	2	50
<i>J. echinorinchooides</i>	3	33.3	1	11.1	9	33.3	0	0.0
<i>T. hydatigena</i>	3	33.3	1	11.1	2	7.4	0	0.0
<i>T. multiceps</i>	2	22.2	1	11.1	1	3.7	0	0.0
<i>T. ovis</i>	0	0.0	0	0.0	1	3.7	0	0.0
<i>D. caninum</i>	0	0.0	0	0.0	0	0.0	1	25
<i>Spirura spp</i>	0	0.0	1	11.1	0	0.0	0	0.0

**Table 5:** Relative frequency of helminthic infections of canids from Chaharmahal va Bakhtiari province by the age group

Helminth	0-12 month		13-24 month		25-36 month		>37 month	
	No.	%	No.	%	No.	%	No.	%
<i>M. lineatus</i>	1	33.3	11	57.9	9	60	6	50
<i>J. echinorinchooides</i>	1	33.3	6	31.6	5	33.3	1	8.3
<i>T. hydatigena</i>	0	0.0	2	10.5	1	6.7	3	25
<i>T. multiceps</i>	0	0.0	2	10.5	0	0.0	2	16.7
<i>T. ovis</i>	0	0.0	0	0.0	1	6.7	0	0.0
<i>D. caninum</i>	0	0.0	0	0.0	1	6.7	0	0.0
<i>Spirura spp</i>	0	0.0	1	5.3	0	0.0	0	0.0

## Discussion

Most of the intestinal parasites detected in present study have a worldwide distribution in canids. The overall relative frequency of detected parasites (71.4%) in this region of Iran is somewhat different from other parts of the country such as Northwestern of Iran (96.4%) (5), Ilam (83%) (6), Sarab (78.9%) (2), Garm-sar (80%) (3) and Kermanshah (82.5%) (9). It is likely that these variations may depend on differences in climatic and geographic situations of the regions, distribution of intermediate hosts, the animal groups surveyed and a number of other factors which are well unknown. On the other hand, our findings also indicate a high prevalence of helminthic infections among canids in this area Iran. In this study, *Mesocostoides lineatus* (55.1%) was the most common helminth. Many researchers from Iran and other countries have also reported this cestode as the most common hel-

minthe found in carnivores (3-6, 10-13), as the prevalence of this parasite has been documented in other parts of Iran including Moghan plain, 84.7% (5), Sarab, 71.9% (2) and Khuzestan, 67.5% (10). The higher prevalence of *Mesocostoides* spp. compared with the other helminthes may be due to different kinds of intermediate hosts which are simply available for canids. In the present study, *J. echinorinchooides* and *D. caninum* have been found in 26.5% and 2% of animals, respectively. As seen in this study and most of previous reports, the prevalence of *Joyeuxiella* spp. in foxes is higher than the other canids (13-16). It might be due to food habits of foxes for consuming the intermediate hosts of *Joyeuxiella* spp. In this study, *D. caninum* has been found in 2% of animals. This rate was not very different with previous studies from Moghan plain, 1.2% (5) and Northwest of Iran, 0.5% (17).

Because of some difficulties in precise identification of species in *Taenia* genus, there are few specific descriptions of *Taenia* spp. in Iranian literatures. However, the specific identification of *Taenia* spp. was accomplished based on the morphology and morphometry of the hooks contained rostellum. In this study, the relative frequency of *T. hydatigena* (12.2%) infection among the carnivores was approximately similar to Mirzayans *et al.* (18), Dalimi *et al.* (19) and Eslami *et al.* (3), who reported *T. hydatigena* as the most common *Taenia* species of carnivores in Iran. Moreover, the frequency of *T. multiceps* infection in this study (8.2%) was somewhat similar to other regions of the Iran (3, 6). The larval stage of *T. multiceps* (*Coenurus cerebralis*) may cause a specific central nervous system infection in sheep. There were also a few human cases of such infections in Iran (9). Therefore, high relative frequency of *T. multiceps* infections may be important as a human health threat. The present study showed that the prevalence of *T. ovis* was in lowest level (2%). This result is in contrast with results reported from Ilam, (32% in stray dogs) (6). *T. ovis* and *T. hydatigena* cannot transmit to humans but they have economic and veterinary importance (20). We found *Spirura* sp. in one fox. This is the second report of this parasite in foxes from Iran, after Eslami who had been reported the species in 16.5% of red foxes (14). There are few studies or reports indicating parasitic infections of wolves in Iran. The study also showed that the helminthes found in this animal were not different from other canids.

We could not find any significant differences in prevalence of helminthic infections in different areas of Chaharmahal and Bakhtiari province. This might be due to similar environmental conditions around the province.

## Conclusion

Dog, fox, jackal and wolf in Chaharmahal and Bakhtiari harbor several helminthes which

some kind of them have zoonotic importance and may pose a threat to community health, particularly in rural areas.

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