

Research Article

Prevalence of Intestinal Parasites in the Intestine of Dogs (Sheep-Keeper, Owned, Pet and Stray) in Duhok Province, Kurdistan Region

Teroj Abdulrehman Muhamed¹ and Lokman T Omer Al-barwary^{2*}

¹Department of Medicine and Surgery, College of Veterinary Medicine, University of Duhok, Iraq ²Department of Pathology and Microbiology, College of Veterinary Medicine, University of Duhok, Iraq

Abstract

This survey was done to investigate the prevalence of internal parasites in the intestine of dogs in Duhok province from February to October 2015. A total of 270 sheep-keepers, owned, pet and stray dogs' fecal samples from most areas in Duhok province were collected and examined by flotation technique, sedimentation technique and direct smear. During this study *Spirocerca lupi* (0.7%) and *Uncernia stenocephala* (2%) were recorded for the first time in Kurdistan region; while *Diplydium caninum* (16.7%), *Strongyloides* spp. (1.9%), *Ancylostoma caninum* (2.2%), *Isosporaspp* (9.3%), cyst of *Giardia* (5.2%), *Hymenolepis nana* (1.9%), *Eimeria oocyst* (3.7%), *Taenia* spp. (13.7%) and trematode eggs (1.9%) were recorded for the first time in dogs of Duhok province. The overall percentage of intestinal parasites in dogs was 65.9%.

Keywords: Internal parasite; Dogs; Duhok province; Kurdistan region

Introduction

There have been no recent surveys to determine the prevalence of intestinal parasites in dogs in Duhok province, Kurdistan region. Dogs are frequently infected by internal parasites. However, several of these parasites are zoonotic and are considered important to human health. Although dogs are often considered family members by their owners, it is important to seriously note that they may be transmitter of intestinal parasites. Most of these intestinal parasites have an oralfecal transmission cycle; and a major component for the spread of these parasites is the shedding of eggs or oocysts into the environment [1]. The transmission of zoonotic agents could be through direct and indirect contact with animal and animal secretions and excretion [2]. Dogs are the main zoonotic disease source through which parasites, in particular helminthosis, can raise serious public health concerns worldwide [3].

Many canine gastrointestinal parasites eliminate their scuttle elements (egg, larvae and oocyst) through the faecal route [3]. Several intestinal helminths of dogs including *Toxocara canis, Ancylostoma braziliense* and *Ancylostoma caninum* are important causes of zoonotic diseases, including cutaneous, visceral, ocular larva migrans and eosinophilic enteritis [4,5].

The aim of this investigation was to determine the prevalence of internal parasites infections in stray, owned, sheep-keeper and pet dogs in Duhok province, Kurdistan region.

Materials and Methods

Faecal samples

In this study, 270 fecal samples were collected from dogs of both sexes and different ages from three months to 13 years old, as shown in Table 1.

Collection of fecal samples

The practical work was carried out from the beginning of September 2014 to end of June 2015 in different rural and urban areas of Duhok governorate in Kurdistan region to determine the prevalence of intestinal helminths. Faecal sample was collected directly from the rectum of each dogs by using plastic lop spatula in small dogs, plastic gloves in adult dogs [6], or collection from the ground after defecation directly or some days old feces, but not more than 5 to 7 days [7]. Samples were then put in plastic containers and labeled; after that they were kept in a cool box and brought to the research laboratory at the College of Veterinary Medicine for coprological examination.

Study area

The area studied in this research is Duhok governorate, Kurdistan region in the north of Iraq, and five districts around it, namely Duhok, Summel, Zakho, Amedi and Shikhan/Qesrok, as shown in Figure 1. The animal population in this area is more than 750,000, including sheep, goats and cattle, and each year more than 650,000 animals are vaccinated.

Macroscopic examination

The fresh fecal sample was examined by naked eyes for consistency, texture, color and for the presence of any helminths, mucus and blood.

Coprological examination

All fecal samples were examined microscopically by flotation concentration method and formalin-ether sedimentation.

Flotation concentration method (modified Sheathers solution): The flotation solution must have a higher specific gravity than oocysts or parasite egg. The modified Sheather solution was prepared by using the methods of Dryden et al. [8] and Dryden et al. [9] (Figure 2).

Formalin-ether sedimentation: Faecal samples were concentrated by formal-ether concentration technique. The formalin-ether sedimentation

*Corresponding author: Lokman T Omer Al-Barwary, Department of Pathology and Microbiology, College of Veterinary Medicine, University of Duhok, Duhok 00964, Iraq, Tel: 009647504504789; Tel: 009647824504789; E-mail: lugman ommar@uod.ac

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	Sex		Age		Type of dogs				Faecal collection	
Faecal examination	Female	Male	Young	Adult	Pet	Owned	Sheep keeper	Stary	Rectum	Ground
270	38	232	64	206	21	24	180	45	172	98

Table 1: Details of samples which were collected from dogs.



was prepared by using the method of Allen and Ridley [10] and Zajac and Conboy [11]. Formalin 10% (1 volume of 40% formaldehyde diluted with 9 volume distilled water) and ether 99% (Figure 3).

Results

The following results were obtained from examination of fecal samples with methods of examination and each fecal sample was examined two times by Sheather concentration method and three times by formalin-ether sedimentation; and different ova of intestinal parasites were detected by these methods.

Out a total of 270 fecal samples examined, 65.9% were infected with ova of different intestinal parasites, while only 34.1% were free from ova of parasites, as shown in Table 2.

Table 3 shows ova of different intestinal parasites recorded by copro-parasitolgical examination methods. Ova of two parasites were detected for the first time in Kurdistan region, and these parasites were *Uncinaria stenocephala* and *Spicocera lupi* (Table 4).

Prevalence of intestinal parasites among 232 males examined recorded high infection rate of *T. canis* (22.84%) and low infection rate of *S. lupi* (0.86%); while the prevalence of intestinal parasites among 38 female dogs examined recorded high infection rate of *T. canis* (26.31%) and low infection rate of *H. nana* (2.63%).

Table 5 shows the percentages of single and mixed infection. Single infection had high frequency. As shown in Table 6, high prevalence of infection were found in stray and sheep keeper dogs with percentages of 73.3 and 70.5 respectively; while the lowest infection rate was in pet dogs (19.04%).

Discussion

Dog (*Canis familiaris*) is a domestic animal that has contact with man and other animals, any lack in the diagnosis or treatment of a certain disease may lead to the transmission of a zoonotic disease.

A total of 270 fecal samples were obtained for copro-parasitological examination, 178/270 (65.9%) were found to harbor at least one species of parasites, some had two to three species of parasites but only two samples harbored four species of parasites. The high prevalence of these helminthes in dogs is an indication of the degree of environmental contamination and poor hygienic level; also it indicates the lack of knowledge of dog owners in the role of dog in disease transmission and the importance of veterinary care.

Toxocariasis is one of the zoonotic diseases distributed worldwide by dogs. It is caused by *Toxocara canis*. Humans act as accidental host



Figure 3: Formalin-ether sedimentation technique.

No. of dogs examined	Free from microsc	n parasite copically	Infected w	Infected with the parasite		
070	Negative	%	Positive	%		
270	92	34.1	178	65.9		

Table 2: Overall percentage of intestinal parasites in dogs.

Name of parasite	No. of positive	%	
Tremaode	5	1.9	
Ancylostoma caninum	6	2.2	
Ascaris spp.	11	4.1	
Dipylidium caninum	45	16.7	
Eimeria spp.	10	3.7	
Cyst of Giardia	14	5.2	
Hymenolepis nana	5	1.9	
Isospora canis	25	9.3	
Larvae of Toxocara canis	1	0.4	
Rhabditiform larvae	6	2.2	
Sarcocyst spp.	13	4.8	
Strongyloides spp.	5	1.9	
Spicocerca lupi	2	0.7	
Taenia spp.	37	13.7	
Toxocara canis	63	23.3	
Toxascaris leonina	14	5.2	
Uncinaria stenocephala	5	1.9	

 Table 3: Types of parasite ova, oocyst, cyst and larvae present in faecal samples examined by concentration technique with their infection rate.

and are infected accidentally through ingestion of the thick-shelled embryonated eggs, causing serious health problems [12,13]. The highest prevalence rate was found in *T. canis* eggs at 63/270 (23.3%) of the examined samples. This high prevalence rate of the infection is close to other results recorded in Iraq and Kurdistan region. Prevalence of 36% of 50 stray dogs examined in Sulaimani province, Kalar city was recorded by Bajalan [14]; the prevalence in cats was 30% in Mosul as obtained by Al-Obaidi [15] and 26.5% in Basrah according to Awad and Al-Aziz [16]. Dog sex had no effect on the copro-prevalence of the family Ascaridiodea and the same result was recorded by Dishow [17].

Diplidiasis is another zoonotic disease caused by dog tapeworm Diplyidium caninum. Human diplidiasis reported by Narasimham et al. [18] showed a prevalence of 45 (16.7%); this prevalence was Page 3 of 4

The prevalence of *Taenia* spp. in our work was 37/270 (13.7%); and the same result was recorded by Hasson [19] as 14.2%.

Hookworm was also observed in this work and the prevalence recorded was 2.2% (6/270) and 1.9% (5/270) for *Ancylostoma caninum* and *Uncinaria stenocephala*, respectively. The prevalence of *A. caninum* in Sulaimani is the same as in Duhok province, which was 2%. *U. stenocephala* had not been reported before this time in Kurdistan region and the prevalence was less than recorded in Albania which was 64.9% from a total of 111 dogs examined by Xhaxhiu et al. [20]; it was also less than recorded in Argentina by Dopchiz et al. [21] at 14.29%.

Trematode egg recovered from the fecal sample had prevalence of 1.9% (5/270); but in Basrah it was 67.1% from a total of 70 dogs examined by Awad et al. [22]. Low prevalence of trematode in Duhok province was due to little contact of the dog with water and the characteristic dry hot weather of this area.

As in the present work, for the first time *Spirocera lupi* was recorded in Kurdistan region, Duhok province and the prevalence was 0.7%

	Male d	og	Female dog		
Parasite species	No. of infected dogs	Infection rate %	No. of infected dogs	Infection rate %	
T. canis	53	22.84	10	26.31	
D. caninum	37	15.94	2	5.26	
Taenia spp.	32	13.79	5	13.15	
Isospora spp.	20	8.62	5	13.15	
T. leonina	12	5.17	2	5.26	
Ascaris spp.	11	4.74			
Sarcocystis	9	3.87	4	10.52	
Giardia spp.	8	3.44	6	15.78	
Eimeria spp.	7	3.01	3	7.89	
A. caninum	6	2.5			
Strongyloides spp.	5	2.15			
U. stenocephala	5	2.15			
H. nana	4	1.72	1	2.63	
Rhabditiform larvae	4	1.72	2	5.26	
Trematode	3	1.29	2	5.26	
S. lupi	2	0.86			
Larvae of T. canis	1	0.43			

 Table 4: Prevalence of intestinal parasites ova among 232 male and 38 female dogs examined.

No. of infection	No. of dogs infected	Infection rate (%)
0	92	34.07
1	113	41.85
2	49	18.14
3	14	5.18
4	2	0.74

Table 5: Frequency of single and mixed intestinal parasites infection in dogs.

Dog categories	No. of dog examined	No. of dog infected	Infection rate (%)
Stray dog	45	33	73.3
Owned dog	24	14	58.3
Sheep keeper	180	127	70.5
Pet dog	21	4	19.04
Total	270	178	65.9

 Table 6: Prevalence of intestinal parasites in dogs of different functional categories.

(2/270); unfortunately, there is no available result in Iraq to compare the prevalence with. However, in neighbouring countries like Iran, the parasite was recorded and prevalence was 19.04% from a total of 105 dogs examined by Oryan et al. [23].

Other parasites were also recorded, but with low prevalence rate. Those parasites include *Strongyloides* spp. with prevalence of 1.9% (5/270) in fecal samples and this rate was less than recorded in Diyala province 7.1% by Hasson [19]; and *Hymenolepis nana* with observed prevalence rate of 1.9% (5/270).

Beside the presence of intestinal helminths in dogs of Duhok province, dog intestinal protozoa was present and the prevalence of cyst of *Giardia* was 5.2% (14/270), while the prevalence of *Eimeria* spp. and *Isospora* spp. were 3.7% (10/270) and 9.3% (25/70), respectively. Most of the infection rates were shown by dogs less than six months and this may be due to contact of puppies with feces of infected mother. High prevalence rate was also recorded in Baghdad and Diyala by Khalaf et al. [24] and Hasson [19] and the prevalence were 14.7 and 21.4%, respectively.

Sarcocystis spp. is one of the intestinal protozoa widely spread among sheep and goats in Duhok province and high prevalence of microcytic *Sarcocystis* spp. was recorded in sheep and goats; and the infection rate was 96.5% (220/228) of sheep and goats inspected in Duhok slaughter house by Hussein [25]. In the current study, it was found that the prevalence of the *Sarcocystis* spp. in the final host was 4.8% (13/270). This rate was more than recorded by Katagiri in Brazil with prevalence of 2.7% of a total of 254 dogs examined [26,27].

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