

First Recording of *Isospora* spp. in dogs and cats in Basra Governorate

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Abstract: *Isospora* spp are protozoa coccidian parasites from the phylum Apicomplexa found in the small intestine in hosts (dogs and cats). The aim of this study was to diagnose the *Isospora* spp infection microscopically in both dogs and cats (stray and housing), using flotation methods by Sheither solution. In the current study, a total of 130 fecal samples of dogs and cats (different in sex and ages) were collected. These animal's samples divided into (109) cats, and (21) dogs, which were obtained from different areas of Basrah city during the period from September 2023 to April 2024. A total of infections with *Isospora* spp were that 9.5% for dogs and 10% for cats. The results depended on the shape, structure, and diameters of isolated oocysts under light microscopy which found oocysts of *Isospora* spp in dogs were distinguished by their large size and measurement. A high infection rate with *Isospora* spp. was observed in the Al-Fayhaa area (13.3). Monthly study analysis showed that the high infection rate occurred in February (23.8%), while September and October showed no recorded infection. In addition, the infection of *Isospora* spp. was high in the rural area of Basra province (13.3%). The current study demonstrated the presence of the different clinical symptoms in infected cats and dogs (dehydration, diarrhoea, fever, abdominal pain, weight loss, and vomiting). There are no significant differences in the statistical study. Through studying this research, I concluded that the parasite spreads due to differences in temperature and lack of care for the animal. Therefore, we advise the breeder to take vaccines for cats and dogs periodically and to conduct veterinary examinations.

Keywords: *Isospora*, Microscopically, protozoa.

1. Introduction

The protozoan parasites *Cystoisospora* spp. (formerly known as *Isospora* spp.) are the only host-specific, global parasites that are members of the coccidian group [1]. *Isospora felis* and *Isospora rivolta* have definite hosts in cats. Cats

consuming tissues from another infected paratenic vertebrate host or sporulated oocysts from the environment [2]. Paratenic hosts like dung, beetles, cockroaches, and flies are consumed sporulated oocysts that become infected [2, 3]. Unsporulated oocysts pass through the small intestine of infected cats

during the enteroepithelial tissue, which follows ingestion. *Isospora felis* and *Isospora rivolta* have respective prepatent periods of 7 to 11 days and 4 to 7 days. The patent periods for *Isospora felis* and *I. rivolta* are 10 to 11 days and 14 or more days, respectively. The numbers of oocysts shed can vary considerably by individual animal [3].

Nemeséri originally described *Isospora canis* in 1959 [4]. There are four species of *Isospora* that are known to infect dogs. Although *I. canis* shares structural similarities with the other three, it can be clearly identified by its larger size ($> 33 \mu\text{m}$) in comparison to the other species of *Isospora* < 30 [5] *I. canis* is a common parasite of dogs [6].

Isospora spp infections are common, especially in young cats and dogs. because of differences in oocyst morphology, host specificity, and intermediate stages, the genus *Isospora* is complex [7, 8]. *Isospora* spp have the ability to cause diarrhoea, steatorrhea, headache, fever, malaise, abdominal discomfort, vomiting, dehydration, and weight loss infection. The Recognition of parasites according to Isosporiasis in dogs and cats can be identified using a case history, clinical symptoms, and microscopic investigation using the direct smear and flotation technique with Sheather's solution. *Isospora* oocytes have two sporocytes with four sporozoites, whereas in

other parasite, such as sporulated *Eimeria* oocytes have four sporocytes with two sporozoites. According to the literature [9].

This study was carried out to diagnose of *Isospora* spp. microscopically as there have not been any studies of *Isospora* spp. Parasites, and as they pose a threat to human and animal health at Basrah province.

2. Materials and Methods

2.1. Study Area and Sample Collection

Field studies were conducted on 130 samples (109 from cats and 21 from dogs) collected from various areas in Basrah Province between September, 2023, and April, 2024. Faecal samples were collected from cats and dogs from six areas of Basrah. Each sample was placed in a separate plastic container with a lid. Collected faeces from cats and dogs (with different sex and age) and the consistency of the faeces was recorded. The samples were then transported in a cool box to the Parasitology Laboratory at the Faculty of Veterinary Medicine, Basrah University, for examination.

2.2. Laboratory Examination of Fecal Samples

Faecal samples from all cats and dogs were examined daily using two methods:

1- By direct smear: a drop of the stool solution diluted in water was taken, a cover slide was

placed on it, and it was examined directly under the microscope, using microscopic lenses, gradually adjusted from the lowest power to the highest.

2- By the flotation method: The stool solution is taken, diluted with water, and placed in a test tube at a rate of a quarter of the total tube volume. Then the tube is filled with the sugar flotation solution until the liquid reaches the highest point in the tube and becomes convex, and then a cover slide is placed on the orifice. The convex shape is necessary to ensure that the stick oocysts to the cover slide after floating. After 30 minutes, the cover slide was removed and placed directly on the slide and examined under a microscope. According to the literature [10].

3. Results

The results of the parasitological examination showed that the completely mature (sporulated) oocyst of the genus *Isospora* is a spindle-shaped body with two sporocysts, each of which contains four sporozoites. (Figure 1)

In addition, microscopic analysis of faecal smear slides showed the presence of two sporocysts, which indicated the occurrence of *Isospora* sporulation (figure 2)

In this research, 130 faecal samples (109 from cats and 21 from dogs) were randomly collected from various regions of Basrah City/ Iraq and subjected to microscope examination. *Isospora* spp. infections were present in dogs, as indicated by the 9.5% infection rate. Cats had an infection rate of 10% as well. Table 1.



Figure1: Sporulated oocyst to *Isospora* spp. isolated from infected cat by floatation method (40X).



Figure2: Oocyst of *Isospora spp.* isolated from infected cat by floatation method (40X).

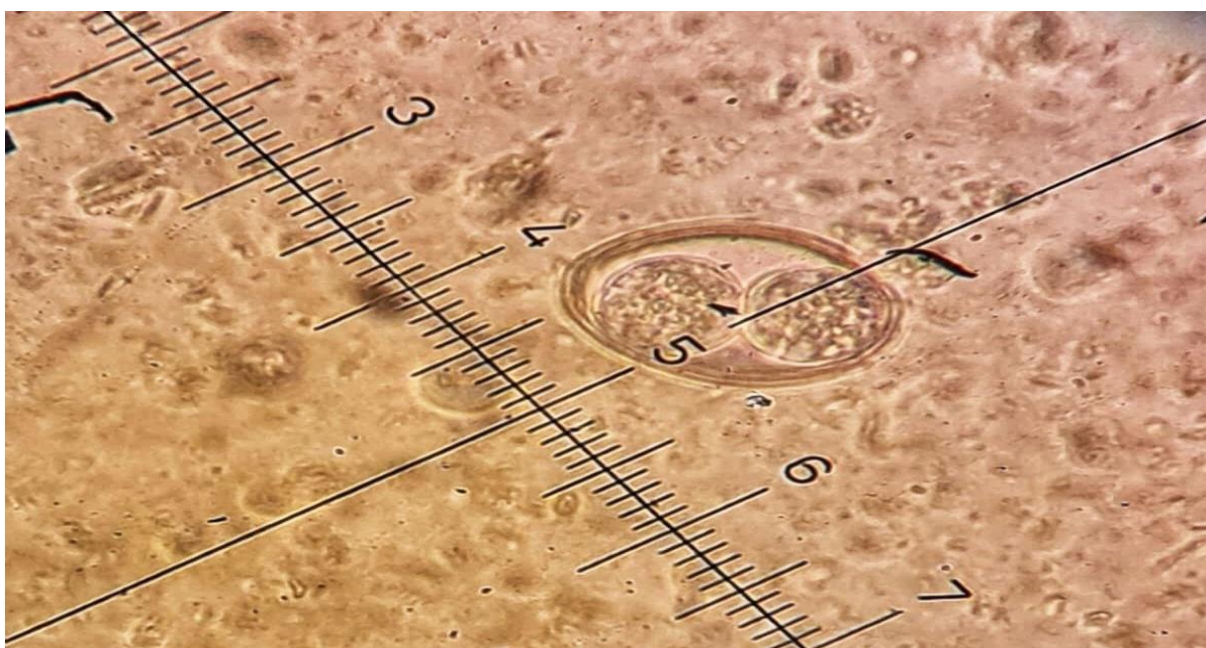


Figure 3: Sporulated oocyst of *Isospora spp.* isolated from infected dogs by floatation method (40X).

Table1 shows the Fecal Samples collected from different region from Basrah province, and the infection rate with *Isospora spp* in cats and dogs based on region, the results showed a

high infection rate in *Isospora spp* in Al-fayhaa 13.3%.

Table1 : Areas where *Isospora* infections were recorded in Basrah Governorate.

Area of Basrah	No. of samples	No. of positive samples	Percentage
Al-Fayhaa	15	2	13.3
Al-mashrak	27	3	11.1
Al-fayruzih	1	0	0
karmat ALI	5	0	9.5
AL-wufud	63	6	10.5
Al-janinah	19	2	
Total	130	13	10%

Table 2 shows collection of fecal samples from cats and dogs in hot months that show the rate

of infection, where there was no infection with *Isospora spp.*

Table 2: Infections with the *Isospora* in hot months.

Hot Months	No. of infections	No. of positive samples	Percentage
September	3	Zero	Zero
October	22	Zero	zero
March	14	3	21.4
Total	39	3	21.4%

Table 3 illustrates the collection of fecal samples from cats during the cold months, the results showed that the rate of infection was

higher in humidity and cold months to be equal to 23.8% with *Isospora spp.*

Table 3: Infection with *Isospora spp.* in cold months.

Cold Months	No. of infections	No. of positive samples	Percentage
November	27	2	7.4
December	19	2	10.5
January	24	1	4.16
Feberuary	21	5	23.8%
Totle	130	13	10%

Table 4 shows percent of infection of *isospora spp* in each dogs and cats, and the higher percent was found in cats (10%).

While, Table 5, shows the collection of the fecal samples from cats and dogs from rural

area and urban area and shows the rate of infection in this area, the highest infection rates were found in rural areas and the lowest in urban areas.

Table 4: Percent of infection with *Isospora.spp* in dogs.

Host	No. of samples	No. of positive samples	No. of samples males	No. of samples females	Percentage
Dog	21	2	2	Zero	9.5
Cat	109	11	5	6	10
Total	130	13	7	6	10

Table 5: The rate of infection with *Isospora.spp* in rural and urban areas.

Areas (rural)	Infection percentage	Areas (urban)	Infection percentage
Al-fayhaa	13.3	Al-mashrak	11.1
Karma ali	0	Al.wufud	9.5
phayrozia	0	Al-janinah	10.5

Table6 illustrates the highest percentage of dogs showed no clinical symptoms, while cats had the highest percentage of severe diarrhea and vomiting reaching 30% for both.

Table 6: The rate of infections with *Isospora.spp* in rural and urban area.

Host	No. of samples	Percentage	Clinical signs	Percent
Dog	21	9.5	Do not found symptoms	50
			Fever	10
			diarrhea	23.8
			abdominal Pain	9.5
			dehydration	23.8
			weight loss	19
			depression	4.7
Cat	109	11%	Without clinical signs	1
			abdominal Pain	30
			vomiting	10
			weight loss	30
			dehydration	19

Total	130	10%
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4. Discussion

The current study recorded a wide range of infections with *I spp.* in cats (10%) in Basra city, indicates it is a public health threat [11, 12]. In the cold month (February), the percent was higher at 23.8%, which agrees with the literature [13], in Iran, where *Isospora felis* was recorded in 38% and *Isospora rivolta* was recorded in 25%. While in Kashan Iran [14], *Isospora rivolta* was recorded in 5.3%, and *Isospora felis* 5.3%. This disagrees with results of this research due to environmental differences and the development of the immune system in cats and their adaptation to the cold climates and constant humidity found in those countries.

In Baghdad, Iraq, the rate of infection was higher (45.4%) in February [12]. this disagrees with the results of this study, as a higher rate of infection (23.8%) was found in Basrah, Iraq. The cold weather and rain in the capital, Baghdad, and the northern regions are colder and the rain is heavy. This helps the parasite to be exposed to parasitic infections quickly and frequently. Also, the number of samples collected in this month may be more. The percent of *isospora spp* in stray and house cats was observed to be (6.61%) agreeing with this

study [12], which observed in stay and house cats a high percent of 10%.

In dogs, the infection with *Isospora canis* was found to be 9.5%, which agree with the results obtained by [4]. proved *isospora canis* cause diarrhea that agree with this study result 23.8%. Also agree with that confirmed *isospora canis* as pathogenic. Mitchell *et al.*, [13] found stage of structural and substructural study of the parasites that infect human's *cystoisospora* when immunity is low, as well as those that infect dogs *cystoisospora canis* that they have a similar to the extra-intestinal stage that causes watery diarrhea and weight loss. This agrees with our result which indicated that dogs have experienced from a watery diarrhea (23.8%).

In Iran, Khademvatan *et al.* [15], reported a 21% infection rate among stray cats. However, this study found a lower rate of 10%, which differs because the reported rate includes both house cats and stray cats, not just stray cats. This suggests that house cats are better controlled in terms of health, availability of treatments, regular vaccinations, and also in terms of adding water for drinking and eating, unlike street cats.

In Kirkuk, Iraq, *isospora* infection rate was reported to be 10% ([16], which agrees with the results of this research.

Seven parasite species were detected in cats from the suburban area in Kraków city, Poland, whereas six were detected from the urban habitats. The prevalence of each parasite was greater in suburban areas 62% compared to urban areas [17], This disagrees with the result of this research, which indicated that urban areas in Basrah have a higher rate compared to suburban areas (31.1%), because the focus of our study revolved around one type of endoparasite that infected cats; the number of samples collected also plays a role in determining the percentage; moreover, the lack of veterinary supervision and Some merchants exploit cats commercially without providing means of controlling them, such as vaccines and treatments, and there is also a large number of cats. It takes shelter from the streets and waste. Consequently, cats eat rodents, which are a vector for the parasite and thus pose a great danger to human health.

In addition, the lack of shelters that provide a safe and clean environment and under are veterinary supervision prevents the animal from wandering in the streets.

5. Conclusion

This study highlights the prevalence and distribution of *Isospora* spp. infections among dogs and cats in Basrah Province. The whole infection rate was 10% of *Isospora* spp., and it was found to be more prevalent in cold and humid months, particularly in February, and in rural areas compared to urban settings. The clinical symptoms observed—such as diarrhea, dehydration, and vomiting—underscore the pathogenic nature of these protozoan parasites and their impact on animal health. Our findings align with global and regional studies, demonstrating that environmental factors, host-specific behaviors, and veterinary care significantly influence the infection rates. However, discrepancies with some international data, particularly regarding seasonal and geographical variations, indicate a need for localized management strategies.

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