



A prevalence study of *Isospora* spp. and *Hammondia heydorni* in dogs in Al-Muthana province

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Abstract:

The aim of this study is to determine the prevalence of *Isospora* spp and *Hammondia heydorni* oocysts in feces of dogs . A total of 177 fecal samples were collected from farm dogs during the period of April -3-2010 to July 7-2011 that their ages ranged between (1-10) years. Fecal samples were collected from dogs and examined by direct method (by using Lugol's iodine) and by flotation method (Seathers solution) to detect of *Isospora* spp and *Hammondia heydorni* oocysts . the overall prevalence percent of *Isospora* spp and *Hammondia heydorni* was 61 (34.46%), out of which 52(29.37%) fecal samples were positive for *Isospora* spp oocysts (*I.canis* 12 (6.77%) and *I. ohoensis* 40 (22.59%) that the its measurement of oocysts were ranged between (25-44 μ m) x (24-39 μ m) and (17-24 μ m) x (16-22 μ m) respectively. the results showed in the age groups (4-7) years old were highest rate was 28.57 % , 9.52 % in infection of *I.ohoensis* and *I.canis* respectively , while were highest rate of infection of *H.heydoni* was 5.95% in the age groups (1-4) years old and the lowest rate was 3.33% in *I.canis* and *H.heydoni* infection and 6.66 % in *I.ohoensis* infection in age groups (7-10) years , there was no significant difference ($P>0.05$). In conclusion, this study has highlighted the prevalence of *Isospora* spp and *Hammondia heydorni* in dogs for the first time in Al-Muthana province.

Keyword: Prevalence, *Isospora* and *Hammondia*, Dogs, AL-Muthana, Province.

دراسة تفشي طفيلي *Isospora* spp و *Hammondia heydorni* بين الكلاب في محافظة المثنى

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الخلاصة:

إن هدف هذه الدراسة هو تحديد انتشار أكياس البيض لطفيلي *Isospora* spp و *Hammondia heydorni* في براز الكلاب ، تم جمع 177 عينة براز من الكلاب التي تعيش في الحقول خلال الفترة من نيسان 2010 ولغاية تموز 2011 حيث تراوحت أعمارها من (1-10) سنوات وقد تم فحص عينات البراز بواسطة الطريقة المباشرة (باستعمال اليودين اللوكيلي) وطريق التطويق (باستعمال محلول شيدرز) لاكتشاف أكياس البيض لطفيلي *Isospora* spp و *Hammondia heydorni* . وجد أن نسبة الإصابة الكلية المختلطة لطفيلي *Isospora* spp و طفيلي *Hammondia heydorni* كانت 61 (34.46%) منها 52 (29.37%) عينة براز كانت نتيجة الفحص فيها موجبة للإصابة بطفيلي *Isospora* spp (*I.canis* 12 (6.77%) and *I. ohoensis* 40 (22.59%)) حيث كانت قياسات أكياس البيض تتراوح بين (25-44 μ m) x (24-39 μ m) , (17-24 μ m) x (16-22 μ m) على التوالي . أظهرت نتائج الدراسة أن أعلى نسبة إصابة بطفيلي

كانت في الفئة العمرية (4-7) سنة كانت أعلى فئة تأثراً بالإصابة ونسبة 9.52 % , 28.57 % على التوالي، بينما أظهرت الدراسة أيضاً إن أعلى نسبة إصابة بطفيلي *H.heydorni* كانت 5.95% في الفئة العمرية (4-1) سنة وأوطأ نسبة للإصابة بطفيلي *I.canis* and *H.heydorni* كانت 3.33%، أما بالنسبة لطفيلي *I. ohoensis* كانت 6.66% في الفئة العمرية (7-10) سنة حيث لم يلاحظ وجود فرق إحصائي معنوي على مستوى $P>0.05$. نستنتج من أن الدراسة الحالية أظهرت انتشار طفيلي *Isospora* spp وطفيلي *H.heydorni* في الكلاب ولأول مرة في محافظة المثنى.

Introduction:

Coccidiosis in the dog is an enteric disease predominately caused by protozoa in the genus *Isospora* and can result in a serious or even fatal colitis (1,2) and enteritis (3). Many coccidian species infect the intestinal tract of dogs. Some *Isospora* spp of dogs can facultatively infect other mammals and produce in various organs an encysted form that is infective for the dog (2). While *Hammondia heydorni* is a heteroxenous intestinal coccidium of canines, with a number of ruminant intermediate hosts (4,5).

First described as the monoxenous coccidium *Isospora bigemina* by Heydorni (4), its heteroxenous life cycle was discovered by (6).

Hammondia heydorni are tissue cyst forming coccidian parasites with a two-host life cycle, their oocysts are similar in size (9–14 mm), Dogs, foxes and coyotes are also regarded as definitive hosts for *H. heydorni* (7). However, recent findings suggest that *Hammondia* isolated from foxes might differ from those observed in dogs (8,9). *Hammondia heydorni* is thought to be a non-pathogenic coccidian parasite of dogs that is an important parasite of cattle and dogs (10). Natural intermediate hosts for *H. heydorni* possibly include ox, sheep, goats, water buffalo, roe deer, moose, reindeer, and the dromedary camel (11, 7).

Canine intestinal coccidiosis is a cause of haemorrhagic diarrhea in young immunocompromised dogs. In coccidiosis, microscopic parasites invade the intestinal mucosal lining, causing watery diarrhea which later becomes bloody and can even be life threatening. Anorexia, vomiting, mental depression and ultimately death may be seen in severely affected animals.

Dogs may be infected with *Isospora*, *hammondia*, *Sarcocystis*, *Cryptosporidium* and *Toxoplasma* forms of coccidia. The most common coccidia of dogs are *isospora*. (12).

In Austria , found Of the 3590 diagnostic samples from Austrian dogs (<2 years old), 8.7% contained *Isospora* oocysts, 78% of which from dogs up to 4 months of age. Non-haemorrhagic and haemorrhagic diarrhoea were significantly more prevalent in *Isospora*-infected animals than in coccidia-negative ones. (13).

In Turkey , recorded the *Isospora* spp in 10 dogs that they were examined 20 dogs , and they found two coccidian species were identified after stool culture: *Isospora canis* in 7 dogs and *I. ohioensis* in 3 dogs (14) .

Faecal samples from owned shepherd and hunting dogs were collected in the Serres Prefecture, Northern Greece and were examined for the presence of intestinal parasites that found *Isospora* (*Cystoisospora*) spp. (3.9%), that the prevalence of *Isospora* (*Cystoisospora*) spp. was significantly higher in young than in adult dogs .(15).

In Iran , (16) determined of the prevalence of *Isospora* infection was based on faecal examination, that stool samples collected from dogs of different ages and gender , The overall prevalence of *Isospora* spp. (5.1%) and he found there was no significant difference in the prevalence between male and female dogs , but there was significantly, greater prevalence of parasites in dogs less than 1 year old.

In Germany , (17) were collected 24,089 faecal samples of dogs were examined

coproscopically in two veterinary laboratories in Germany between March 2001 and October 2004. In 47 dogs, oocysts of 9–14 mm size were found. Their morphology was similar to those of *Hammondia heydorni*, Samples of 28 of these dogs were further examined by inoculation into gerbils: 12(42.85%) samples induced a specific antibody response. This response suggests that the isolates contained *H. heydorni*.

It is common to observe intestinal parasites in canines of all ages, but the prevalence of infection is usually high in puppies, because young dogs have not yet acquired immunity to parasites (18,19). In kittens, it is seen primarily during weaning stress. The clinical signs in severe cases are diarrhoea (haemorrhagic enteritis), weight loss, and dehydration. Usually, coccidiosis is associated with other infectious agents, stress or immunosuppression (2).

Materials and Methods:

2-1. Fecal Examination:

The study was done in Al-Muthana province on the 177 dogs, its aged ranged between 1- 10 year, during the period of April -3-2010 to July 7-2011. Fecal samples were collected from dogs and examined by direct method (by using Lugol's iodine) and by flotation method (Seathers solution) to detect of *Isospora spp* and *Hammondia heydorni* oocysts, the oocysts of feces were measured with a calibrated ocular micrometer using bright-field microscopy. (20). The oocysts with a diameter of (25-44 μm) x (24-39 μm) and (17-24 μm) x (16-22 μm) are exhibiting morphology similar to non-sporulated *Isospora canis* and *Isospora ohioensis*-oocysts were considered to be positive for *Isospora spp*. While the

oocysts with a diameter of (10-13 μm) x (9-12 μm) exhibiting morphology similar to non-sporulated *Hammondia heydorni* was considered to be positive for *Hammondia heydorni* (17). For sporulation of these oocysts, the positive sample was reexamined from feces by a combined sedimentation and flotation procedure according to Schares, then, the number of isolated oocysts were estimated by microscopic examination. The fecal samples containing oocysts were mixed with 2% potassium dichromate in a Petri dish and incubated and aerated by open the petri dish and exposed it to air for 5 minutes twice daily at room temperature for 3-5 days. (17).

2-2. Statistical Analysis:

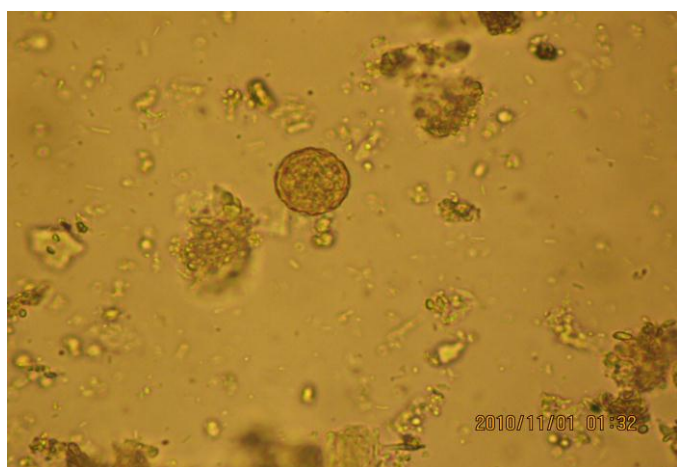
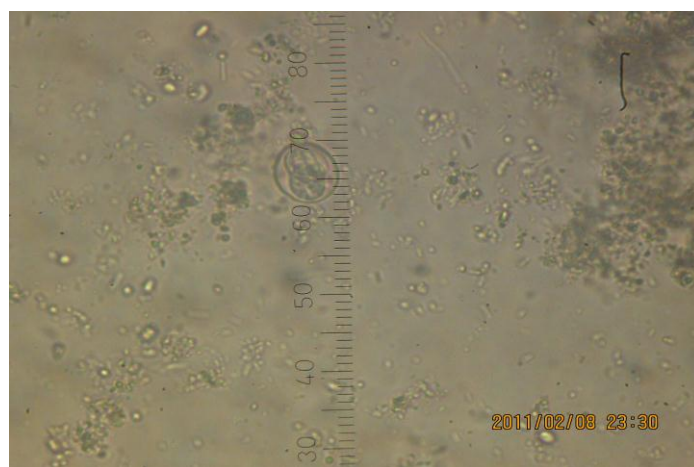
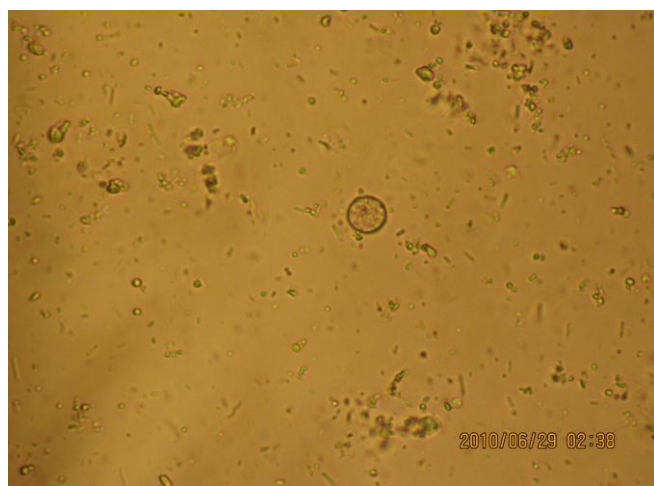
Statistical analysis was conducted to determine the statistical differences among different groups using differences among different groups using ready-made statistical design statistical package for social science. Probabilities of ($P \leq 0.05$) were considered statistically significant (SPSS version 13).

Results :

In the present study, a total of 177 fecal samples of dogs were examined by direct and flotation methods, the overall prevalence percent of *Isospora spp* and *Hammondia heydorni* was 61 (34.46%), out of which 52(29.37%) fecal samples were positive for *Isospora spp* oocysts (*I. canis* 12 (6.77%) and *I. ohioensis* 40 (22.59%) while the percent *Hammondia heydorni* was 9(5.08%) that the its measurement of oocysts were ranged between (25-44 μm) x (24-39 μm), (17-24 μm) x (16-22 μm) and (10-13 μm) x (9-12 μm) respectively. (Table 1), (Figure 1,2,3,4,5,6).

Table 1: Total numbers and Percentage of infected dogs with *Isospora spp* and *Hammondia heydorni*.

Total No. of Dogs	No. and percent of infected dogs with <i>I.canis</i> .		No. and percent of infected dogs with <i>I.ohoensis</i> .		No. and percent of infected dogs with <i>Hammondia heydorni</i> .	
177	No	%	No	%	No	%
	12	6.77	40	22.59	9	5.08

**Figure 1:**Unsporulated Oocyst of *H.heydorni* (60x). (Lugol's iodine)**Figure 2:**Sporulated Oocyst of *H.heydorni* (Seathers solution)**Figure 3:**Unsporulated oocyst of *I.ohoensis* (20x). (Lugol's iodine)**Figure 4:**Sporulated oocyst of (Lugol's iodine)



**Figure 5 :Unsporulated oocyst of *I. canis* (40x)
I.canis (20x).**

(Lugol's iodine)

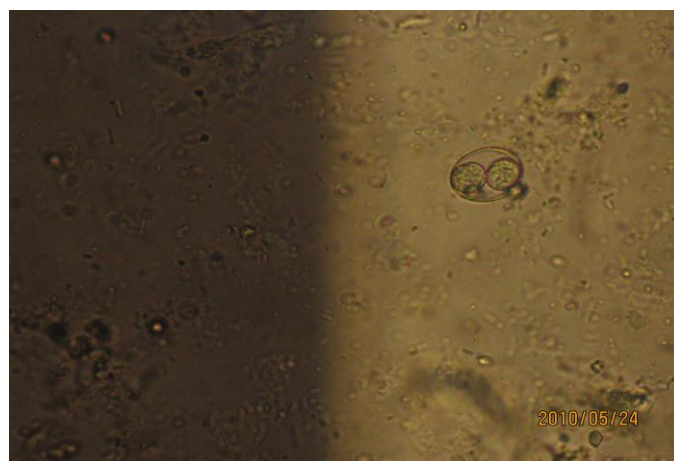


Figure 6:Sporulated oocyst of

(Lugol's iodine)

In table 2, the results showed in the age groups (4-7) years old were highest rate was 28.57 % , 9.52 % in infection of *I.ohoensis* and *I.canis* respectively , while were highest rate of infection of

H.heydoni was 5.95% in the age groups (1-4) years old and the lowest rate was 3.33% in *H.heydoni* infection and 6.66 % in *I.ohoensis* infection in age groups (7-10) years , there was no significant difference ($P>0.05$) between dog ages.

Table 2: Relative between age and infection with *Isospora spp* and *H.heydorni*

Age (years)	No. of examined dogs	<i>I.canis</i>		<i>I.ohoensis</i>		<i>H.heydoni</i>	
		No	%	No	%	No	%
1-4	84	4	4.76	20	23.80	5	5.95
4-7	63	6	9.52	18	28.57	3	4.76
7-10	30	2	6.66	2	6.66	1	3.33
Total	177	12	6.77	40	22.59	9	5.08

Significant differences $P>0.05$.

Discussion :

Isosporosis is a serious threatening for domestic animal health, causing important losses, especially in young puppies, kittens, in running dry period. Critical evolutions can be encountered/occur in animals maintained in inadequate hygienic conditions (21).

Hammondia heydorni is thought to be a non-pathogenic coccidian parasite of dogs that is an important parasite of cattle and dogs(10). Natural intermediate hosts for *H. heydorni* possibly include ox, sheep, goats,

water buffalo, roe deer, moose, reindeer, and the dromedary camel (11,7) .

In the present study the overall prevalence rate of *Isospora spp* and *Hammondia heydorni* was 61 (34.46%) , while overall prevalence rate of *Isospora spp* 52 (29.37 %) ,this results greater than that reported by Buehl *et al.* (13) in In Austria (8.7%) and by Papazahariadou *et al* (15) in Northern Greece (3.9 %), while prevalence rate of *Hammondia heydorni* was 5.08 % , this results lower than that

reported by (17) in Germany that was 42.85%, the variation in the percentage of prevalence in our area and other countries may be due to different climatic and geographical conditions or may be due to differences in number of collected fecal samples (22).

The results showed that the measurement of oocysts of *I.canis* , *I. ohoensis* and *Hammondia heydorni* were ranged between (25-44 μ m) x (24-39 μ m) , (17-24 μ m) x (16-22 μ m) (10-13 μ m) x (9-12 μ m) respectively, this results is agreement with (23, 24, 25).

Also the result of study showed an association between serological status and dogs age that the highest rate of infection in the age groups (4-7) years old was 28.57 % , 9.52 % in infection of *I.ohoensis* and *I.canis* respectively and this results is disagreement with (18) that he found highest rate of infection in puppies . while ifection in *H.heydorni* was 5.95% in the age groups (1-4) years this results is agreement with Bowman (1999) that he found highest rate of infection in young dogs that this may because young dogs have not yet acquired immunity to parasites .

The present study showed lowest percent was 3.33% in *I.canis* and *H.heydoni* infection and 6.66 % in *I.ohoensis* infection in age groups (7-10) years , there was no significant difference ($P>0.05$) this may be to acquired immunity to parasites and resistance of the host .

In conclusion, this study showed the prevalence of *Isospora spp* and *Hammondia heydorni* in dogs for the first time in Al-Muthana province .

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