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# Epidemiological Study of Zoonotic Gastrointestinal Parasites in Police and House Dogs in Baghdad governorate/ Iraq

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**Abstract**

***Canine intestinal*** protozoan parasites are zoonotic diseases and have importance to the public health. This study intended to determine the intestinal parasites in the police dogs as well as house dogs in Baghdad governorate / Iraq. Totally, 134 fecal samples were collected from 112 and 22 police and house dogs respectively. The fecal samples were examined by direct and different fecal diagnostic techniques. The total prevalence of parasitic infestation was 37 (27.61%) out of 134 fecal samples. The parasitic infestation was more in the house dogs 8/22 (36.36%) than in the police dogs 29/112 (25.89%). The most frequently detected helminthes and protozoal parasites, were the *Toxocara canis* 11 (8.20%), *Isospora spp*. 19 (14.17%), *Cryptosporidium spp*. 5 (3.73%) and *Sarcocystis spp*. 3 (2.23%). The enteric parasites revealed significance prevalence value at ($P \leq 0.05$). Moreover, it revealed significant difference between female 15/46 (32.60%) and male 22/98 (22.44%) dogs at ($p \leq 0.05$). In addition, the dogs less than 1 year old, revealed higher infestation percentage 12/19 (63.15%) with significant difference ($p \leq 0.01$). In conclusion, this study revealed that the police and house dogs considered as a reservoirs for zoonotic intestinal helminthes and protozoan parasites. The authors recommend to consider these parasites as important pathogens to the public health. Therefore, a program should be developed to control the prevalence of intestinal parasites especially between the dog's trainers and owners.

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## Introduction

Human beings have developed very close association with dogs as a pet animal. The intestinal parasites are the most common pathogenic agents and constitute one of the major causes of different lesions of the intestinal tract in dogs. Both protozoa

and helminthes, the intestinal parasites, are one of the main enteropathogens of dogs, especially in newly whelped or neonates (Blagburn *et al.*, 1996). Both owned and stray dogs, play a role in the transmission of the pathogens, even if the particular implication of each population is not established clearly (Eguia-Aguilar *et al.*, 2005).

Most of these endoparasites are potential agents of zoonoses (Ugbomoiko *et al.*, 2008). Dogs may be infected with *Isospora hammondia*, *Sarcocystis*, *Cryptosporidium* and *Toxoplasma* forms of coccidia. However, the most common coccidia of dogs are *isospora* (Nisar *et al.*, 2009).

Toxocariasis is a parasitic zoonosis with worldwide distribution that affects dogs and cats. There is a high prevalence of *T. canis* infections among canids. The contamination of environment by the eggs of *T. canis* may increase the risk of infection for native people (Mirzaei and Fooladi, 2012).

Coccidiosis in the dog is an enteric disease. It is predominately caused by a protozoon that belongs to the genus of *Isospora*. It can result in a serious or even fatal colitis (Dunbar and Foreyt, 1985; Cynthia, 2005) and enteritis (Correa *et al.*, 1983; Mitchell *et al.*, 2007). Many coccidian species infect the intestinal tract of dogs.

The facultative infection of other mammals can be occurred by some dog's *Isospora spp*. and various organs might have an encysted form that acts as infective for the susceptible dogs (Cynthia, 2005). In coccidiosis, the microscopic parasites can cause watery diarrhea, which later becomes bloody and can even be life threatening. In addition, anorexia, vomiting, mental depression and ultimately death may be appeared in the infected dogs. *Cryptosporidium spp*. is a zoonotic protozoan parasite that causes cryptosporidiosis. It is associated with fetal diarrhea in animals and humans. *Cryptosporidium* species are widespread protozoa and are largely detected in environmental samples that infect both humans and animals (Mirzaei, 2012). The transmission occurs through the fecal-oral route, following direct or indirect contact with *Cryptosporidium* oocysts via person-to-person, zoonotic, waterborne and foodborne or airborne contact (Fayer *et al.*, 2000). *Sarcocystis* is an obligatory intercellular protozoan parasite, which can induce infection and clinical signs in carnivorous and herbivorous host (Rahdar and Salehi, 2011). Distribution of parasite is worldwide. It has been reported by many investigators from different parts of the world. The life cycle of the parasite consists of an intermediated host (man and herbivorous animals). The definitive hosts are (man and carnivorous animals). The carnivorous such as canine and feline family, infect the environment by passing 200 million oocyst during infection by feces (Nourollahi *et al.*, 2009; Latif *et al.*, 1999).

So far as, we are aware the studies regarding parasitic infestation in police and house dogs in Iraq are scarce, therefore, this study intended to investigate the parasitic infestation in the police and house dogs in Baghdad governorate.

## Materials and methods

### A study area

This study was done in the period between December 2013 and June 2014 on the police dogs that raised in the Department of Police Academy and house dogs in Baghdad governorate area in Iraq. Fecal samples were collected from a total of 134 dogs at different ages ranging from less than 1 month to more than 4 years. These dogs were examined for the presence of intestinal parasites, and were classified into 2 groups according to their origin the (police dogs and the housed dogs) as follow:

- **The police dogs**: This group was included 112 exotic (pure) breeds' police dogs. Each animal was housed in a single cage and fed on dry food. All dogs were subjected to regular deworming protocol.
- **The house dogs**: This group was included 22 house dogs of local (mixed) Iraqi and pure exotic breeds. More than one dog were lived per house and fed on uncooked food.

**Fecal samples**

Fresh fecal samples from all dogs were collected and kept at plastic containers at the morning and transferred immediately to the laboratory. Data included the animal's name, sex and age were recorded for each dog. In addition, the fecal samples were collected from both asymptomatic and symptomatic dogs. A formalin (10%) was used as preservative for the samples.

**Examination techniques**

About 2-3 grams of fecal sample were well mixed with 30 ml of water and strained through a tea strainer to remove the coarse fecal material. The filtered samples were examined macroscopically for adult nematodes. Each sample was examined by: direct method centrifugal fecal floatation technique (1500 rpm/ 5 minutes) using different solutions (saturated salt solution and Sheather's solution), and fecal sedimentation technique (Zajac and Conboy, 2012). Iodine solution was used to facilitate protozoan and cyst identification. The modified Ziehl Neelsen (MZN) staining technique is used to detect *cryptosporidium spp*. oocysts in the feces (Henriksen and Pohlenz, 1981). Parasites were identified on the basis of eggs, oocysts or cysts color, shape and contents (Zajac and Conboy, 2012; Soulsby, 1982).

**Statistical analysis**

The Statistical Analysis System- SAS (2012) was used to investigate the effect of different factors in the study parameters. The Chi-square test was used to determine the significance of the percentages between the study groups.

# Results

The prevalence of the enteric parasites in the examined fecal samples of all dogs was 37 (27.61%). The prevalence of the infection were 29 (25.89%) and 8 (36.36%), in the police and house dogs respectively. The results of this study reported also high distribution rate of *Toxocara canis* 11 (8.20%). The frequencies of protozoa species were *Isospora spp*. 19 (14.17%), *Cryptosporidium spp*. 5 (3.73%) and *Sarcocystis spp*. 3 (2.23%) with significant differences ($p \leq 0.05$) (Table1). The results of this study revealed also differences in the distribution of parasites between genders. Out of 98 and 46 examined fecal samples that collected from male and female respectively, were 22 (22.44%) and 15 (32.60%) positive in male and female respectively (Table 2). The prevalence of enteric parasites according to age

group was also appeared between the examined dogs. The results of this study revealed high prevalence rate (63.15%) at< 1years old with significance differences (p≤ 0.01) in compare with the low prevalence rate (14.75%) at > 4 years old (Table 3).

**Table 1:** Shows the prevalence of enteric parasite species in police and house dogs

| parasites | Police dogs (n.=112) No. positive & percentage | House dogs (n.=22) No. positive & percentage | Total (No.=134) |
|---|---|---|---|
| *Toxocara canis* | 10 (8.92) | 1 (4.54) | 11(8.20) |
| *Isospora spp.* | 18 (16.07) | 1 (4.54) | 19(14.17)* |
| *Cryptosporidium spp.* | 0 (0.00) | 5 (22.72) | 5(3.73) |
| *Sarcocystis spp.* | 1 (0.89) | 2 (9.09) | 3(2.23) |
| Total No. | 29 (25.89) | 8(36.36)* | 37(27.61) |

*(p≤ 0.05)

**Table2:** Shows the Prevalence of parasite species in relation to sex in the police and house dogs

| Sex | No. examined fecal samples | No. positive & percentage |
|---|---|---|
| Male | 98 | 22 (22.44)* |
| Female | 46 | 15 (32.60) |
| Total No. | 134 | 37(27.61) |

*(p≤ 0.05)

**Table3:** Shows the prevalence of parasite species in relation to age in police and house dogs

| Age | No. examined fecal samples | No. of positive samples & percentages |
|---|---|---|
| 1 yrs. < | 19 | 12 (63.15)* |
| 1-4 yrs. | 54 | 16 (29.62) |
| >4 yrs. | 61 | 9 (14.75) |
| Total No. | 134 | 37(27.61) |

*(p≤ 0.01)

## Discussion

The parasitic infection especially the intestinal ones, are the most frequent illness of dogs. Furthermore, numerous canine parasites have a zoonotic attention and perform a public health hazard.

The result of this study showed that the total percentages of parasites infection were (27.61%). This result is in agreement with Senlik *et al.*, (2006), however, this researcher recorded higher infection percentage 30.4% than our study. On the other hand, the result of this study is in disagreement with Ahmed *et al.*,, (2014), who

stated that the prevalence of enteric parasites infection by fecal examination was 18.3%. The prevalence percentages reported in this study are also in disagreement with Mirzaei, (2010), who also reported lower prevalence percentage of enteric parasitic infection 13.26%. However, Ortuño & Castellà (2011) recorded prevalence percentage (61.8%) of intestinal parasites in shelter dogs. The differences in the prevalence percentage in this study from previous studies may be due to several factors such as: veterinary attention; number of animals, cage cleanness, use of anthelmintic and antiprotozoal drugs and geographical location.

The prevalence of parasites infection in police dogs was (25.89%), which was lower than the percentage in the house dogs (36.36%). These results are in agreement with previous study of Ahmed *et al*., (2014), who recorded the prevalence of parasitic infestation in the police and house dogs, 7.5% and 40% respectively.

The results of this study also showed higher rates of *Isospora spp*. than other species *Toxocara canis*, *Cryptosporidium spp*. and *Sarcocystis spp*. The prevalence infection of Isospora *spp*. was (14.17%) in police dogs and house dogs. This result is in agreement with Bahrami *et al.,* (2011) and Ortuño, and Castellà, (2011), who found that the prevalence of *Isospora spp*. were 15.17% and 16.4% respectively. However, this result is disagree with Coggins, (1998), who recorded that *Isospora* infection was 5.2%. The prevalence of *Toxocara canis* infection was (8.20%). This result is in agreement with Ortuño & Castellà, (2011), who reported that the infection rate was 7.5%. While this result is in disagreement with Bahrami *et al*., (2011), Degefu *et al.*, (2011) and Coggins, (1998), who recorded 25.8%, 36.6% and 21.4% respectively. The percentage of *Cryptosporidium spp*. infection in this study was (3.73%). This result is in agreement with Bahrami *et al.,* (2011) who stated that the *Cryptosporidium spp*. available in dogs and recorded a higher percentage (7.14%) than this study. Meanwhile, Ahmed *et al.*, (2014) and Sargent *et al* (1998) stated also that *Cryptosporidium* had also been detected in police dogs, house dogs and cats, and these animals may represent sources of infection for humans. The prevalence of *Sarcocystis* infection in dogs is related to uncooked meat consumption (Rommel, 2000). In the present study, the prevalence was low (2.23%). This finding agrees with the results reported in Tirana/ Albania (Xhaxhiu *et al.,* 2011), who found that the *Sarcocystis* infection in dogs was (1.8%). However, this result is in disagreement with Olteanu, (2000) who reported a prevalence of 40% in stray dogs in Bucharest, Romania. Several factors approve the prevalence differences that occurred in this study in compare to the previous studies. These factors include: the geographical conditions such as host and environmental factors (atmosphere, diet, immunity, environmental conditions, temperature and humidity) and anti-protozoan therapy in the areas under study. In addition, to factors related to the facilities, such as cage material or floor material, which could play an important role in the maintenance of cysts, oocysts or helminth eggs. The results of the present study revealed the differences in percentage of positive samples according to the sex. However, females showed higher percentage 32.60% than male dogs 22.44% with significant differences ($p \leq 0.05$). The previous study in Alexandria, Egypt indicated that females showed higher prevalence percentage of enteric parasite 33.3% in compare with males (15.7%).

In addition, Davoust *et al.,* (2008) also recorded higher percentage in female than male in Nigeria. In addition, Mirzaei, (2010) stated that the male dogs showed higher percentage 13.3% than the female dogs 13.2%. Morover, Zelalem and Mekonnen, (2012) also found that, prevalence of gastrointestinal helminthes was higher in male dogs (79.2%) than female (76.8%) dogs. In this study, the percentage of prevalence of the enteric parasite in relation to the age groups, were 12 (63.15%) showed in <1 year, which was a higher than the other age groups. The effect of age on the incidence of parasitic infestation is severe. This effect is in agreement with Abere *et al.,* (2013) who mentioned that the parasites prevalence was strongly associated with age. In addition, the same researcher referred that the parasite prevalence was higher in young dogs than adults (Abere *et al.,* 2013). Furthermore, Ahmed *et al.,* (2014) mentioned that the infection in puppies was higher than adults. These results might be due to low immunity in young ages or probably as a consequence of single or repeated exposures (Ramírez-Barrios *et al.,* 2004).

In conclusion, this study approve that the prevalence of intestinal parasites infection is higher in house dogs than police dogs. Some of these infections can play a role for sources of zoonotic diseases in humans and threaten public health. The *Toxocara canis, Isospora spp*., *Cryptosporidium spp*. and *Sarcocystis spp*. were diagnosed in this study. The infection in female was higher than in males, and most dogs enteric parasites infection were recorded in higher percentage in the age group <1 years than other. The sources of canine parasitic helminths and protozoa should be to minimize the transmission of intestinal parasites in order to reduce the risk of infection of both dogs and humans. Precautions must be included and higher level of cleaning should be provide as well. In addition, the best foods should be given to the police and house dogs. Moreover, effective anthelmintic treatment and public health government actions should be settled for the control of intestinal parasites in dogs.

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