Investigation of the distribution of some Gastrointestinal Helminths and protozoa in free-ranging dogs in Karbala province

Islam alkhafaji

Department of internal &preventive medicine College of Veterinary medicine, University of Kerbala, Kerbala, Iraq.
***Corresponding author e-mail: islam.j@uokerbala.edu.iq**
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Abstract

This study aimed to determine the prevalence of intestinal parasites in stray dogs in urban and rural areas**.** From October 2022 to March 2023 80 fecal samples, which examined by using simple zinc sulfate flotation and Lugol's solution staining then examined by macroscopically and microscopically for the presence of worm eggs and protozoal oocysts. The overall prevalence of infected dogs in this study is to identify the gastrointestinal parasites and Protozoa in stray dogs. The current study includes seven genera of intestinal helminths and protozoa as follows: three cestodes (*Taenia sp*. 12%), four nematodes (Toxocara *canis* 56%, *Toxoascara canis*. 16%) and two protozoa (*Giardia sp*. 20% and *Cryptosporidium sp*. 8%) from all fecal samples of dogs were collected from different regions of Kerbala. The results of high rates of infection were during winter months. The high prevalence of intestinal helminths in the dog's population suggests the need for more efficient control measures. The high predominance of *T. canis*, and Giardia spp. suggested that dogs could play an active role in the transmission of zoonotic parasites in this area of Iraq. Educating the dog hunters and increasing their health awareness should be considered in the control program.

The results of the present study provide relevant ''baseline'' data for assessing the effectiveness of future control strategies against canine parasitic infections.

Keywords: free-ranging dogs, gastrointestinal helminths, protozoa.

Introduction

A free-ranging dog or stray dog is a dog that is not confined to a yard or house [1]. Free-ranging dogs include street dogs, village dogs, stray dogs, feral dogs, etc., and may be owned or unowned[2]. Dogs can harbor a wide range of intestinal parasites, some of which have a zoonotic potential, such as *Toxocara canis*, *Dipylidium caninum* and *Taenia multiceps* [3]. Human parasitic infections typically occur following ingestion of infective eggs from contaminated water or soil, ingestion of infected meat from the cattle or ingestion of inadequately washed or cooked fruits and vegetables [4]. Public concern over canine parasitic diseases has been aggravated by

the high and uncontrolled number of stray dogs in urban areas that shed parasite eggs and oocysts, representing a source of infection for humans [5]. Furthermore, dogs infected with *Taenia* species, can also infect livestock leading to the development of cysts in their tissues and being the cause of monetary losses due to the confiscation of infected carcasses in abattoirs [6].

The clinical signs of stray dogs infected with parasites are based on the age of the animals, the severity of infection, location, and developmental stage of the worms; some infected dogs will lead to asymptomatic [7].

Actually, nearly all in protozoa infect dogs sub clinically, which poses serious concerns for the general population as well as the economy in a variety in around the globe. [8], especially in rural areas where dogs are raised with domestic animals [9] and in developing countries where many people live in poor sanitary conditions [10]. Therefore, due to the closer contact between these dogs and humans [11], gastrointestinal parasites in dogs can pose a threat to human health [12] and have a threat to the host too for instance reduced resistance, growth retardation, and reduced feeding efficiency [13].

Material and Method

The study had been carried out within the Iraqi region the city of Kerbala. From October 2022 to march 2023 collected 80 fecal samples were collected randomly (urban and rural areas) from free-ranging dogs to investigate gastrointestinal parasites and protozoa in Kerbala. Straight across the abdomen, specimens of stool have been gathered. The samples were put in plastic bags, designated, kept at 4 ºC and delivered to the laboratory in Veterinary Medicine College's/University of Kerbala's to analysis in order to identify and detection parasites the intestinal tract parasites

Direct wet film each fecal sample was first separated with a needle, checked grossly for visible adult helminths and proglottids of cestodes, and then screened under dissecting microscope as well for the detection of tapeworm segments and adult forms of nematodes [14]. Helminths were detected in intestines and feces, however some tapeworms were not detected in faeces but they were detected in the intestine, for this reason eggs per gram (EPG) are not presented and protozoa were identified in stool. Morphological identification of adult parasites, eggs and oocysts were performed as described by [15]. finally, the samples were preserved in 5% formalin due to [16] examination of eggs and oocysts by zinc sulfate flotation technique (specific gravity 1.250), and lugol’s iodine was added to help in the identification of protozoan cysts and coccidial oocysts [17]

Different magnification lens powers (4X to 40X of microscope) were used for viewing and screening the parasites' egg, cysts, oocyst, trophozoites, nematode larvae and tape worm proglottids. A dog was considered positive if at least one parasite was present in its fecal sample, and infections with more than one species of the parasite was referred to as mixed or concurrent infection [18].

Results and Discussion

Out of 80 samples which collected randomly from stray dogs in kerbala city during October 2022 to March 2023, the total percentage of infections with gastrointestinal parasites were 100% which appear according to fecal direct smear and flotation test were egg of Taenia *spp*. Appear in 16 fecal samples where the percent of infection was 20% compare with *Cryptosporidium spp* oocyst were in 4 samples with the 5% infected percent.

The heavy parasitic infection in stray dogs was 45% protozoal infection caused by *Giardia spp* due to 36 fecal samples have contained cysts of these protozoa, while the Toxocara *canis* infection was 30 % in 24 fecal samples. all these results are showed by (Table: 1)

Table (1): frequency of protozoa and parasites from the intestinal tract across eighty wandering dog feces specimens.

No	Species of parasites	Direct smear & flotation test	Number of sample	Ratio of parasitic infection
1	*Taenia spp.*	Egg	16	20 %
2	*Toxocara canis*	Egg	24	30 %
3	*Giardia spp.*	Cyst	36	45%
4	*Cryptosporidium spp*	oocyst	4	5%
Total			80	100%

Dogs harbor many pathogens, including intestinal helminths and parasites [10]. One stray dog can harbor 10,000 worms [11]. The current study revealed a high incidence of intestinal helminths of 86.6%, including the genera Toxocara canis and *Toxascara spp*. (Figures 1 and 2); Both of them were registered for the first time in Iraq under numbers [19 ,20]. This high infection rate does not correspond to [21], which recorded a low rate of 2% in the city of Kalar in Sulaymaniyah Governorate. The difference may be due to the difference in temperature and humidity between Karbala and Sulaymaniyah. Toxocara canis (Figure 2) was recorded in Iraq in 1957 [22]. However, this study recorded a high rate of 67.5%, which means that the infection is still an animal epidemic and can be transmitted to humans, especially children. As a recent serological survey (commercial ELISA test) showed, the infection rate of toxemia in sick children was 30.8% and in healthy children was 12% in Mosul Governorate [25].

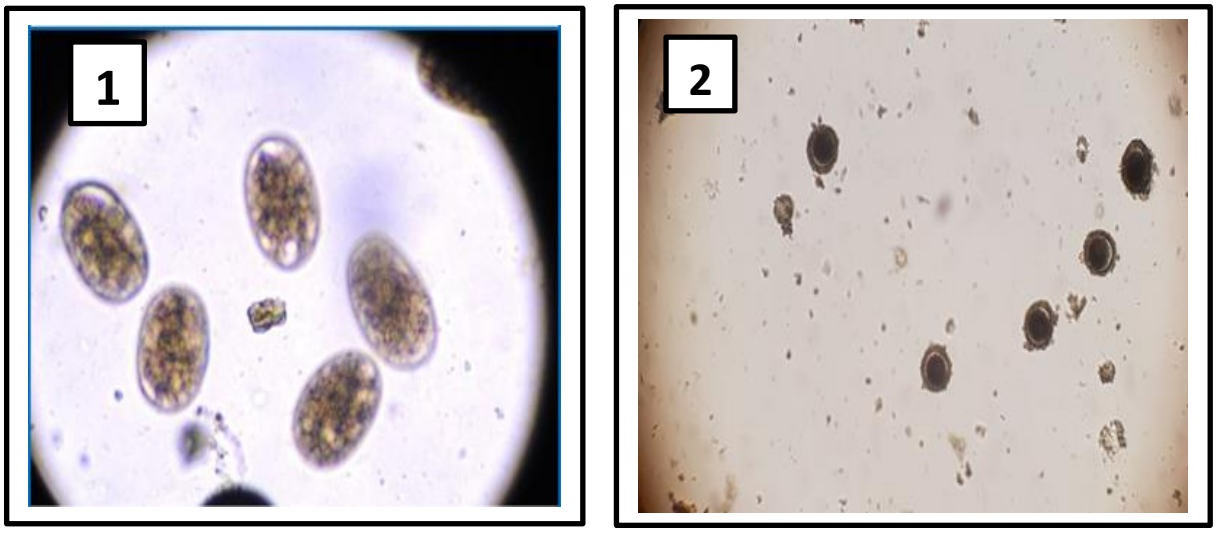


Figure (1 and 2) : *Ancylostoma spp* and *Toxocara canis* egg in stray dogs.

The canine intestinal whipworm, *Trichuris vulpis* is the most common and well known in veterinary practice, due to their morphological features of the eggs; the first recorded of Taenia spp. in Iraq [22] and there are no other records in Iraq in current study. Taenia spp. appeared 51.6% that high rate as compared with [24] who recorded 25.7% in Kuala Lumpur City, Malaysia. The difference between rates is due to the different of temperatures and moisture between the studied regions.

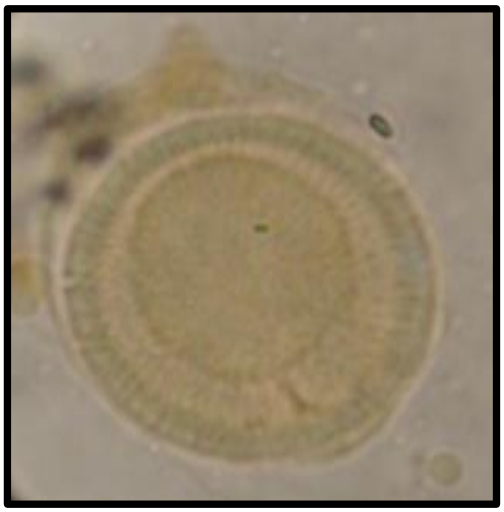


Figure (3): *Taenia* spp. egg in stray dogs

The dogs are a reservoir for many species of *Taenia* (Figure 3), so the rates of infection may be different between the provinces. The presence of *Taenia spp.* transmitted by dogs is important for public health. Larval stages of *Taenia serialis* and *T. multiceps* [23] can form unilocular cysts in the central nervous system, eye, subcutaneous tissue and muscle tissue. The current study revealed 29.1% while

[21] recorded high rate 78%. *Strongyloides spp*. (Figure 4) was 5% in current study which is similar to [20].

The risk of infection by contamination of food or water supplies with *Taenia spp*. eggs carried by dogs. For example, infection with *Taenia spp*. transmitted by dogs can lead to the development of cysts in tissues of the cattle and being the cause of organs, meat or carcass confiscation or condemnation during sanitary inspection at abattoirs, causing monetary losses to producers[7].

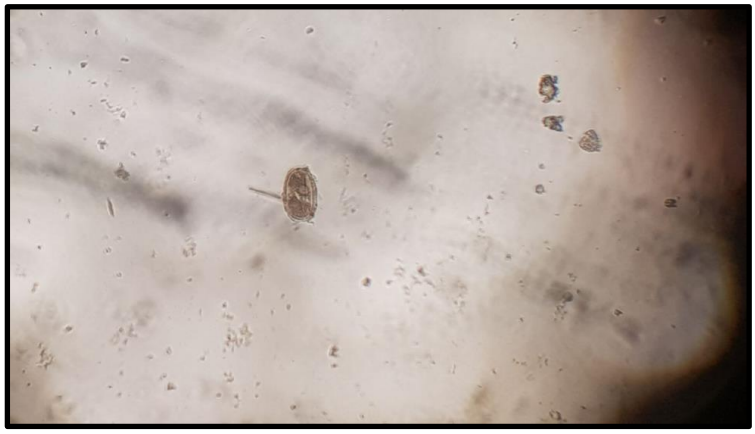
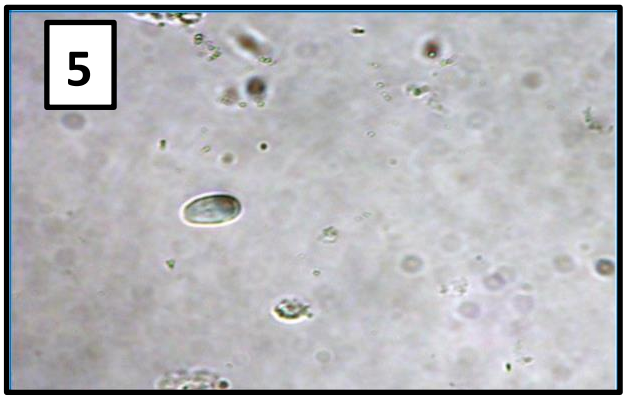


Figure (4): *Strongyloides* sp. egg in stray dogs

The results showed two species of protozoa first *Giardia spp*. (Fig. 6) 24% which is similar to [26], second *Cryptosporidium spp*. (Fig. 5) 20.8% that is less than that by authors [27] who recorded 42% in Mosul province. That difference may be due to the ages of the animals examined that *Cryptosporidium* increased more in young animals than in old due to less immunity in puppies. This parasite does not represent a zoonotic risk but it is important for dogs because it can damage the intestinal epithelium, causing liquid diarrhea with or without blood, dehydration, weight loss, vomiting, lethargy, and anorexia [27].



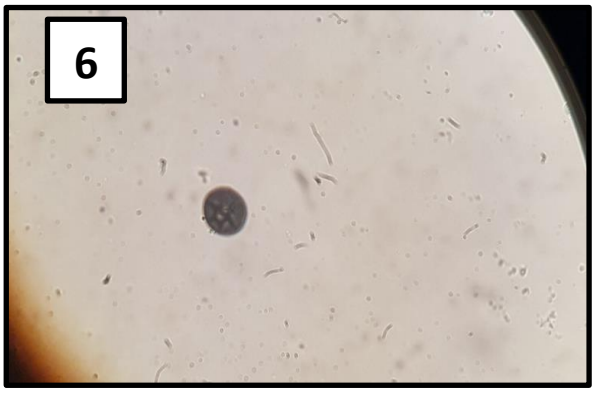


Figure (5 and 6): *Cryptosporidium* spp. and Giardia spp. oocyst in stray dogs.

All studied months appeared presence of intestinal parasites. However, October and March appeared the high rates of infection that is similar to [26] who also recorded a high percentage infection during winter months.

Most intestinal parasites detected in this study, have a worldwide distribution. Although, incidence and prevalence of each parasite, in the larval and adult stages, respectively, in humans and animals is different in various regions based on knowledge, cultural practices, climatic conditions, and diagnostic possibilities[25].

- The detection of protozoa and parasites of the intestines in animals(dog) that are allowed to roam freely.
- The results have been showed highly rate of infection occurred during rainy months.

Finally, to control and reduce the problem of zoonotic intestinal parasitic infections both public and veterinary health services should work together, and animal ownership laws should be implemented in Karbala with severe fines for people who do not comply with them, in order to reduce the problem of stray dogs and intestinal parasitic zoonosis

References

1) Slater, M. R. (2001). The role of veterinary epidemiology in the study of free-roaming dogs and cats. *Preventive Veterinary Medicine*, 48(4), 273–286[1]

2) Gompper, M. E. (2013). The dog–human–wildlife interface: assessing the scope of the problem. In M. E. Gompper (Ed.), *Free-Ranging Dogs and Wildlife Conservation* (pp. 9–54). Oxford University Press[2]

3) Weese, J. S., Peregrine, A. S., Anderson, M. E. C., & Fulford, M. B. (2011). Parasitic diseases. In J. S. Weese & M. B. Fulford (Eds.), *Companion Animal Zoonosis* (1st ed., pp. 1–5). Blackwell Science.

4) Lee, A. C., Schantz, P. M., Kazacos, K. R., Montgomery, S. P., & Bowman, D. D. (2010). Epidemiologic and zoonotic aspects of ascarid infections in dogs and cats. *Trends in Parasitology*, 23, 155–161[3]

5) Swadi, H. A. (2000). Epidemiological study on giardiasis in dogs in Baghdad province. MSc. thesis. College of Veterinary Medicine, University of Baghdad.

6) Wondimu, A., Abera, D., & Hailu, Y. (2011). A study on the prevalence, distribution, and economic importance of *Cysticercus tenuicollis* in visceral organs of small ruminants slaughtered at an abattoir in Ethiopia. *Veterinary Medicine and Animal Health*, 3, 67–74.

7) Cociancic, P., Deferrari, G., Zonta, M. L., & Navone, G. T. (2020). Intestinal parasites in canine feces contaminating urban and recreational areas in Ushuaia (Argentina). *Veterinary Parasitology: Regional Studies and Reports*, 21, 1–5.

8) Milad, C. (2002). Echinococcosis—an emerging parasite in the immigrant population. *American Family Physician*, 66(5), 817–820.

9) Satyal, R. C., Manandhar, S., Dhakal, S., Mahato, B. R., Chaulagain, S., Ghimire, L., & Pandeya, Y. R. (2013). Prevalence of gastrointestinal zoonotic helminths in dogs of Kathmandu, Nepal. *International Journal of Infectious Microbiology*, 2, 91–94.

10) Traub, R. J., Robertson, I. D., Irwin, P., Mencke, N., & Andrew Thompson, R. C. (2002). The role of dogs in transmission of gastrointestinal parasites in a remote tea-growing community in northeastern India. *American Journal of Medical Hygiene*, 2(5), 539–545.

11) Dai, R. S., Li, Z. Y., Li, F., Liu, D. X., Liu, W., Liu, G. H., He, S. W., Tan, M. Y., Lin, R. Q., Liu, Y., & Zhu, X. Q. (2009). Severe infection of adult dogs with helminths in Hunan Province, China poses significant public health concerns. *Veterinary Parasitology*, 160(3–4), 348–350.

12) Souls, E. J. L. (2021). Helminths, arthropods, and protozoa of domesticated animals (7th ed.). Baillie Tindall, London, pp. 763–792.

13) El-Shehabi, F. S., Abdel-Hafez, S. K., & Kamhawi, S. A. (1999). Prevalence of intestinal helminths of dogs and foxes from Jordan. *Springer-Verlag Journal of Parasitology Research*, 85, 928–934.

14) Zajac, A. M., Conboy, G. A., Greiner, E. C., Smith, S. A., & Snowden, K. F. (2012). Fecal examination for the diagnosis of parasitism. In Veterinary Clinical Parasitology (8th ed., pp. 4–8). Wiley-Blackwell, West Sussex, UK.

15) Barger, A. M., & MacNeill, A. L. (1996). Clinical pathology and laboratory techniques for veterinary technicians. John Wiley and Sons, Inc., pp. 199–207.

16) Bowman, D. D. (2012). *Georgis' Parasitology for Veterinarians* (10th ed.). Saunders Elsevier, UK, pp. 39, 92–102, 136–148, 207, 224, 326–354.

17) Zajac, A. M., & Conboy, G. A. (2012). *Veterinary Clinical Parasitology* (8th ed.). Wiley-Blackwell, West Sussex, UK: John Wiley & Sons Inc., pp. 4–8.

18) Blagburn, B. (2014). Internal parasites of dogs and cats: Diagnostic manual. College of Veterinary Medicine, Auburn University, pp. 17–84.

19) Al-Alousi, T. I., Al-Janabi, B. M., & Hayatee, Z. G. (1980). A study of some parasites of the dogs in Mosul (Iraq) with special reference to *Mesoces-toides lineatus*. *Journal of College of Veterinary Medicine (Mosul)*, 1, 5–16.

20) Abul-Eis, E. S. (1983). Studies on parasites of public health importance from Mosul, Iraq. *M.Sc. Thesis, College of Medicine, University of Mosul*. Mosul, Iraq. Pp: 142.

21) Bajalan, M. M. (2010). Prevalence of intestinal helminths in stray dogs of Kalar city/Suleiman province. *Iraqi Journal of Veterinary Medicine*, 34(1), 151.

22) King, C. H. (2005). Cestodes (tapeworms). In L. Mundell, J. E. Bennett, & R. Dolin (Eds.), *Principles and Practice of Infectious Diseases* (7th ed., pp. 3290–3293). Churchill Livingstone, Philadelphia, USA.

23) Leiper, J. W. (1957). Report to the government of Iraq on animal parasites and their control. FAO report. No. 610 Rome. In (Ed.)

24) Hasso, S. A. (2007). A review of confirmed pathogens of dogs and cats in Iraq. *Basrah Journal of Veterinary Research*, 6(2), 156–160.

25) Al-Saeed, W. M., Al-Dabbagh, N. Y., & Mahmood, H. J. (2014). Serological study of Toxocariasis in children in Mosul Province. *Medical Journal of Babylon*, 6, 4.

26) Awad, A. H. H. (2005). Epidemiological study of *Toxocara canis* in Basrah city. MSc. thesis. College of Veterinary Medicine of Basrah.

27) Hadi, E. D., Suleiman, E. G., Al-Obadi, Q. T., & Arslan, S. H. (2014). Diagnostic study of *Cryptosporidium* sp. and *Giardia* sp. in stray dogs and cats in Mosul city, Iraq. *Iraqi Journal of Veterinary Medicine, Mosul*, 28(1), 19–24.