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PREVALENCE OF CANINE INTESTINAL PARASITES IN DUHOK PROVINCE, KURDISTAN REGION, IRAQ

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ABSTRACT

Intestinal parasites in canine can cause malnutrition, weight loss, vomiting, diarrhea, and anemia. Several species of internal parasites that exist in dogs' intestine may lead to zoonotic diseases. In this study, canine fecal samples (n= 48) were collected from public spaces and privet properties in Duhok province to determine the prevalence of gastrointestinal parasites, and to identify the predominant parasitic species and to evaluate the potential risk factors among the animals. All samples were examined for intestinal helminthes and protozoa by direct microscopy, flotation and sedimentation methods. The overall prevalence of gastrointestinal parasites was (54.16%), 52% in males and 56.52% in females. The study revealed the presence of two species of parasites detected included *Toxocara canis* (68%) and *Echinococcus granulosis* (32%). Furthermore canine breed, age, sex and type of food showed an association with varying degrees with prevalence of canine intestinal parasites.

KEYWORDS: Canine, Toxocara canis, Echinococcus granulosis, Duhok

1. INTRODUCTION

The close relationship between human and their pet dogs can lead to transmission of intestinal parasitic diseases between these two species. Several species of internal parasites that exist in dogs' intestine may lead to zoonotic diseases including *Toxocara canis, Taenia multiceps* and *Dipylidium caninum* (Weese *et al* 2011). Moreover, infection of dogs with Taenia species cause livestock infection with formation of cysts in animal tissues that may lead to economic losses, because the infected carcasses are confiscated in slaughter houses (Wondimu *et al* 2011). Therefore diagnosis of internal parasites is very essential to prevent parasitic diseases in both human and animal.

Intestinal parasites are those that live inside the host animal's gastrointestinal tract. These parasites include worms such as roundworms, whipworms, hookworms, tapeworms and protozoa such as giardia and coccidia. Dogs can contract intestinal parasites through various routes. Parasites are usually transmitted when an animal inadvertently ingests parasite eggs or spores in contaminated soil, water, feces or food. In case of tapeworms, they can also be transmitted when a dog eats an infected flea. Puppies, on the other hand, usually get intestinal parasites from their mother (Simon and Richard, 2017). Intestinal parasites can cause malnutrition, weight loss, vomiting, diarrhea, and anemia in affected dogs (Hall, 2011).

Thus, the present study was undertaken to determine the prevalence of gastrointestinal parasites, to identify the predominant parasitic species and to study the potential risk factors among the animals as no survey has yet been performed to study all intestinal parasites of domestic dogs in Duhok province, Kurdistan-region, Iraq.

2. MATERIALS AND METHODS

The present study was carried out at the College of Veterinary Medicine, University of Duhok. A total of 48 fecal samples were collected randomly from dogs for detection of gastrointestinal infection in Duhok province using different techniques including; direct smear method, sedimentation method and flotation

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techniques (Urquhart *et al.*,1996).The samples were collected from dogs of different ages, genders and breeds from July 2019 to February 2020, during the visits to the farms.

2.1. Collection and examination of fecal samples:

Feces intended for parasitological examination and are collected directly from the rectum, using disposable plastic gloves. The sample is collected into the hand of the glove which is turned inside out, air is expressed and glove is tied at the wrist. Freshly expelled feces can also be used for examination as long as it is not contaminated with soil and dirt.

2.2 Direct smear method:

It is possible to demonstrate the presence of parasite stages (eggs or larvae of helminthes, oocyst of Cryptosporidium) by the examination of a thin smear of emulsified feces. A small quantity of feces is placed on a slide, mixed with some droplets of water and a cover slip is placed on the fluid. The slides are investigated under light microscopy using a magnification power of 40X and 100X. This method is effective only where the concentration of parasite stages is high.

2.3. Flotation method:

This method is used for separation of eggs from fecal debris by floating them on a variety of solutions. When feces are emulsified in liquids of high specific gravity and either centrifuged or allowed to stand, the worm eggs and many protozoan cysts float to the top while the heavy coarse debris settle down to the bottom. Concentrated solutions that were used in this technique include sugar solution with density of 1.12 at 15 ˚C (1300 g of sugar dissolved 1000 ml distilled water and 20 ml of formalin 40%).

The procedure of flotation method was performed according to (Dryden et al., 2006). Briefly, two grams of fresh feces were added to 10 ml concentrated sugar solution and mixed intensity by means of a spatula in a 100 ml glass beaker to obtain a relatively homogenous mixture. The solution then were diluted to 90 ml with the concentrated sugar solution. The solution were strained through a fine sieve to press out the large particles. Then the solution incubated at room temperature for a few minutes until the air-bubbles have all escaped before a cover glass carefully placed on top of the liquid. Finally, after 30-40 minutes, the cover glass were gently removed before examined under a low power of light microscope.

2.6. Sedimentation method:

In this method, the heavy parasite eggs sink to the bottom of solutions (Zajac and Conboy 2012). Briefly, 10 g fresh feces were intensively mixed with distilled water by means of spatula. Then, the suspension was strained through a fine sieve before strained mixture were transferred to a centrifuge tube. The suspension were centrifuged for 2 minutes at 1500-2000 rpm to obtain the sediment. The supernatant was poured out and a portion of the sediment transferred to a microscope slide before examined under a low power of light microscope.

3. RESULTS

The overall prevalence of gastrointestinal parasites in dogs was 52%. The prevalence in males and females were 52% and 56.52% respectively (Table, 1).

Table (1): Prevalence of gastrointestinal parasites according to sex of dogs.

	No. of samples examined	No. of positive samples	Prevalence rate (%)
Male	25	13	52
Female	23	13	56.52

The predominant gastrointestinal parasites identified in dogs were two different species with varying degrees *Toxocara canis* and *Echinococus granulouses*. It was observed that *Toxocara canis* species showed highest rate (68%), while the *Echinococus granulouses* species showed lowest rate (32%) in collected samples. Moreover, the rate of poly infection, presence of both *Toxocara canis* and *Echinococus granulouses* in one sample was 16% (Table, 2).

Table (2): Prevalence of gastrointestinal parasite species in dogs.

Parasite species	Total No. of infected samples	infected samples with type of parasite	Prevalence rate (%)
T. canis	25	17	68
E. granulosus	25	8	32
Poly infection	25	4	16

In terms of age of dogs, the highest infection rate found in dogs with 1-2 years old (57.14%), whereas dogs older than 2 years showed lowest infection rate (41.66). Table (3) shows the prevalence rate of infection according to age groups in dogs.

Table (3): Prevalence rate of infection according to age groups of dogs.

Age group	no. of samples	No. positive sample	Prevalence (%)
1 – 6 months	25	14	56
6 months – 1 year	4	2	50
1-2 year	7	4	57.14
More than 2 years	12	5	41.66

It was found that the type of food is an important risk factor for parasitic infection in dogs. The dogs feeding on mixed food gave a highest rate (70%) when compared with dogs feeding on pullet feed (33.33%) (Table 4).

Table (4): Percentage of infection according to breeding system of dogs.

Kind of food	No. of samples examined	No. of positive samples	Infection rate (%)
Pullet feed	15	5	33.33
Mixed feed	10	7	70

Although gastrointestinal parasites were detected in most of different breeds of dogs with varying degrees, but the highest rate of infection was found in German shepherd breed (66.66%) (Table, 5).

Table (5): Prevalence of gastrointestinal parasites in dogs according to breeds

Breed	No. of samples examined	No. of positive samples	Infection rate (%)
Husky	14	8	57.14
Pit ball	2	0	0
Kangal	11	4	36.36
German Shepherd	9	6	66.66
Terrier	12	7	58.33

4. DISCUSSION

This study revealed that the infection rate of canine intestinal parasites was comparable to the prevalence that was reported by various other studies in different parts of Iraq (Muhamed and Al-Barwary, 2016; Khawla *et al.*, 2017). The results of this study were agreed with the results of Muhamed and Al-Barwary (2016) who recorded 65.9% in Duhok province and also agree with the results of Khawla *et al.,* (2017) in Basra province, southern Iraq. However, the prevalence results of the present study appeared to be higher than the prevalence report (16.66%) in dogs in Diyala province (Hasson, 2014). In addition, a wide variation of the infestation rate among dogs has been reported in some other countries. In Iran this rate was reported as 66% (Beiromvand *et al.*, 2013), in Mexico it was 85% (Equia-Aquilar *et al.*,2005) and in Argentina 37.9% of dogs have

been recorded to be infected with internal parasites (Soriano *et al*., 2010). This wide variation among different studies could be explained by some factors such as geographical location, type of sample, socio-economic level, usage of anthelmintic or deworming drugs and diagnostic techniques employed (Schar *et al*., 2014).

In the current study, the infection rate in males and females were 52% and 56.52%, respectively. Similar findings have previously been reported showing that females are more likely to be infected with canine parasitic infection than male dogs (Bridger and Whitney, 2009). In contrast, Senlik *et al*. (2006) showed the infection rate more common in male dogs than females. It seems that some hormonal factors and sex associated behavior could play role in this variation (Kirpatrick, 1988).

Two different types of helminthes were observed in this study, with *T. canis* (68%) as the most commonly encountered parasites and *E.granulosis* (32%) in addition to poly infection (16%). Similar findings have been recorded by previous studies in different countries including Iraq, Turkey and USA (Kalat *et al.,* 2015; Senlik *et al.,* 2006; Nolan and Smith 1995). The high infection rate of *T. canis* among the dogs could indicate the involvement of transplacental and transmammary transmission from mother to new born puppies (Riggio et al., 2013).

In the present investigation, the single infection were more common than poly infection; this observation is similar to the findings of previous studies (Ramirez-Barrioes *et al.,* 2014; Riggio *et al.,* 2013). However, other researchers showed that poly infection were more common than single infection (Alvardo-Esquivele *et al.,* 2015). This variations, could be explained by the differences in the breed of dog, sex, and age, kind of food, climate conditions and environmental factors. The multiple parasitism in our study may be due to the limited veterinary care programs and the lack of awareness of zoonotic diseases among dogs' owners, which increase the risk of disease transmission among dog populations (Khawla *et al*., 2017).

With regard to age group of dogs, the highest infection rate was found in dogs of one to two years old (57.14%) which could be the most common affected age, however, puppies about 3 months old can also be infected. Although young puppies show more predominant clinical picture (Carter and Payne, 2005), dogs of all ages can acquire infection specially toxocara infection (Lee *et al.,* 2010).

The current study found that breed of dogs could be a significant predisposing factor for canine parasitic infection as German shepherd showed highest infected breed (66.66%) among examined breeds. Genetic differences among the difference breeds could be an important factors involved in this variation. It has been found that frequent using of anthelminthic in dogs by their owners could result in more pure breeds of dogs (Oliveria-Sequeria *et al.,* 2002). Moreover, increased health awareness of dogs' owners and improved accessibility to adequate veterinary care could have an important impact.

Feeding type of dogs have also a significant effect on the infection with intestinal parasites. Dogs that were feed on free mixed food showed more susceptibility to infection than those that were feed on pullet type of food. The possible explanation could be the environmental contamination of the ration during handling and management or of the feed containers. Zelalem and Mekonnen (2012), found that uncooked feed might carry many parasites, while cooking of feed can kill or inactivate the infective eggs or cysts of gastrointestinal helminths, which could be transferred to dogs via feeding.

5. CONCLUSION

The results of the present study provide relevant "base line" data for assessing the effectiveness of future control strategies against parasitic infestations in dogs and substantially to reduce the spread of the parasite for potential public health hazard in Duhok province, Kurdistan region-Iraq.

6. REFERENCES

Alvarado-Esquivel, C.; Romero-Salas, D.;Aguilar-Domínguez, M.; Cruz-Romero, A.; Ibarra-Priego, N. and Pérez-de-León,A.Á.(2015).Epidemiological assessment of intestinal parasitic infections in dogs at animal shelter in Veracruz, Mexico.Asian. Pac.J. Trop Biomed. (5):34–39.

Beiromvand, M,; Akhlaghi, L.; Fattahi, H.; Meamar, A.R.; Motevalian, A,; Oormazdi, H. and

Razmjou,E.(2013).Prevalence of zoonotic intestinal parasites in domestic and stray dogs in a rural area of Iran. Prev.Vet. Med. 109:162–167.

Bridger,K.E. and Whitney,H. (2009). Gastrointestinal parasites in dogs from the Island of St. Pierre off the south coast of Newfoundland. Vet. Parasitol. 162:167–170.

Carter, G.R. and Payne,P.A.(2005). A concise guide to infectious and parasitic diseases of dogs and cats. International Veterinary Information Service, Ithaca NY.

Dryden MW, Payne PA, Ridley R, Smith V (2006) Gastrointestinal Parasites, the practice guide to accurate diagnosis and treatment. Compendium on continuing education for the practicing veterinarian 28: 3-3.

Eguia-Aguilar, P.; Cruz-Reyes, A. and Martinez-Maya, J.J. (2005). Ecological analysis and description of the intestinal helminthes present in dogs in Mexico City. Vet. Parasitol. 127:139–146.

Hall, E. J. (2011). Antibiotic response diarrheain smallanimals.J. Vet. Clin. Small Animals. (41): 273-286.

Hasson, R.H. (2014). Stray Dogs Internal Parasites from Baquba City , Diyala Province,Iraq. J. Nat. Sci. Res. 4 (21): 75-80.

Khalaf, J.M.;Majeed,S.A, and Khalil,N.K.(2015).Epidemiological study of zoonotic gastrointestinal parasites in police and house dogs in Baghdad governorate/Iraq.MRVSA.(4) :18–26.

Kirkpatrick, C.E. (1988). Epizootiology of endoparasitic infections in pet dogs and cats presented to a veterinary teaching hospital. Vet. Parasitol. 29:339–348.

Lee, C.Y.; Schantz, P.M.; Kazacos, K.R.; Montgomery, S.P. and Bowman, D.D. (2010). Epidemiologic and zoonotic aspects of ascarid infections in dogs and cats. Trends Parasitol. 26: 155–161.

Muhamed, T.A. and Al-Barwary, L.T. (2016). Prevalence of intestinal parasites in the intestine of Dogs (Sheep-Keeper,Owned, Pet and Stray) in Duhok Province, Kurdistan Region. J. Vet. Sci. Technol. 7 (6), SSN: 2157-7579.

Nolan, T.J. and Smith, G. (1995). Time series analysis of the prevalence of endoparasitic infections in cats and dogs presented to a veterinary teaching hospital. Vet. Parasitol. 59:87–96.

Oliveira-Sequeria, P.A.M.; Amarante. A.F.T.; Ferrari, T.B. and Nunes, L.C. (2002). Prevalence of intestinal parasites in dogs from Sao Paulo State, Brazil. Vet. Parasitol. 103:19–27.

Ramirez-Barrioes, R.A.; Barboza-Mena, G.; Munoz, J.; Angulo-Cubillian, F.; Hernandez, E.; Gonzalez, F. and Escalona, F. (2004). Prevalence of intestinal parasites in dogs under veterinary care in Maracaibo, Venezuela. Vet. Parasitol. 121:11–20.

Riggio, F.; Mannella, R.;Ariti, G. and Perrucci, S. (2013). Intestinal and lung parasites in owned dogs and cats from central Italy. Vet. Parasitol. 193:78–84.

Schär, F.; Inpankaew, T. and Traub,R.J. (2014).The prevalence and diversity of intestinal parasitic infections in humans and domestic animals in a rural Cambodian village. Parasitol. Int. 63:597–603.

Senlik, B.; Cirak,V.Y. and Karabacak A.(2006). Intestinal nematode infections in Turkish military dogs with special reference to *Toxocaracanis*. J. Helminthol. 80:99–303.

Simone, G. and Richard, S. B. (2017). A survey of intestinal parasites of domestic dogs in central Queensland. Trop. Med. Infect. Dis. 2(60):1-10.

Soriano,S.V.; Pierangeli, N.B. and Roccia, I. (2010). A wide diversity of zoonotic intestinal parasites infects urban and rural dogs in Neuquén, Patagonia, Argentina. Vet. Parasitol. 167:81–85.

Urquhart, G.M.; Armour, J.L.; Duncan, A.M. and Dunn, F.W. (1996). Vet. Parasitol..Churchill Living stone Inc., New York, pp: 286.

Weese JS, Peregrine AS, Anderson MEC, Fulford MB. 2011. Parisitic diseases. In: Weese JS, Fulford MB. Companion Animal Zoonoses. 1st ed. Blackwell Science, Iowa, USA.

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. Vet Med Anim Heal 3, 67-74.

Zajac AM, Conboy GA (2012) Veterinary Clinical Parasitology. 8th edn. John & Wiley Sons, Inc., pp: 40-88.

Zelalem, G. and Mekonnen,A.(2012).Prevalence of gastrointestinal helminthes among dogs in Bahir Dar town,Ethiopia.World Appl Sci J.(19):595–601.