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Prevalence of Canine Giardiasis in Khartoum State, Sudan

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ABSTRACT:

The study was extended for two years and covered different seasons of the years 2021 and 2022. The study was aiming at investigating the prevalence of Canine Giardiasis among dogs. A total of 599 dogs from different breeds, ages and different localities of Khartoum State were investigated for the presence of Canine Giardiasis. According to parasitological examination, the prevalence of canine Giardiasis in Khartoum State was 12.5%. Male dogs were more susceptible for Giardiasis with the prevalence of 7.2% and 5.3% respectively. All ages of the dogs had the same chance of infestation. Dogs were more susceptible for Giardiasis in autumn and winter seasons with the prevalence of 19.3% and 11.4% respectively. There was no significant difference (p-value= 0.618) in the season mean infection using ANOVA test. German shepherd and Lulu breeds were more susceptible breeds. The main canine groups showed statistical significant differences (p-value= 0.040) in the prevalence of giardiasis using ANOVA test. Which may indicate breed resistance. The German shepherd breed was the most affected by giardiasis. All cases of Canine Giardiasis cases respond for the treatment trials using Metronidazole.

This is the first study concerning investigation of Canine Giardiasis in Khartoum State. Vaccination and Deworming programs against different diseases are recommended for dogs in Khartoum State.

Key words: Canine; Giardiasis; Khartoum State; Protozoal infestation; Sudan

I. INTRODUCTION:

Giardia is a flagellate protozoan responsible for giardiasis [1, 2]. Clinical manifestations of acute giardiasis include intestinal malabsorption, diarrhea, abdominal pain, and weight loss [3]. However, *G. intestinalis* infection is often asymptomatic and chronic infections are common [4, 5, 6]. *G. intestinalis* is classified into eight assemblages that have different host specificities. Assemblages A and B are found in humans and other mammals, C and D in canids, E in ungulates animals, F in cats, G in rodents, and H in pinnipeds. Assemblages A and B are considered zoonotic [7]. The prevalence of G. intestinalis in dogs ranges from 4 to 36.5% in Europe [8]. The prevalence is higher in young animals (between 9 and 14 weeks of age, 62.4%) compared to puppies between 5 and 8 weeks of age (30.4-32.6%) [9, 10, 11]. The gut microbiota has great diversity and it is well known that any alteration can result in an impact on health [12]. The human and canine gut microbiota are very similar in composition and share similar functions due to a long period of domestication and co-evolution of dogs with human [13, 14]. Canine microbiota is established with aerobic species at birth and evolves very rapidly during the first weeks of age in favor of anaerobes [15]. In adult dogs, the microbiota is stable over the years. The composition of the canine gut microbiota is affected by several factors such as diet [13], body weight [16], geographic location [17], genetics [18], age [19, 20] and infections [15] [21]. Several formulations of benzimidazoles have activity against *Giardia* infections. Albendazole cleared eighteen of twenty dogs that had all been shedding cysts at the beginning of therapy. A similar treatment (25 mg/kg body weight orally twice daily for two days) did not work in cats [22]. Albendazole has been associated with bone marrow aplasia in one cat when used to treat giardia infection [23]. Fenbendazole has been shown to stop beagles from shedding cysts in their feces at the dosage routinely applied for anthelminthic therapy (50 mg/kg body weight orally once a day for three days) [22].

This study was aiming at investigating Canine Giardiasis in Khartoum State, Sudan.

II. MATERIALS AND METHODS:

Area of the study:

The study conducted in Khartoum State during the years 2020, 2021 and 2022.

Samples:

Source of samples:

In this study which lasted for 2 years, 599 dogs of different ages and breeds were investigated for presence of Canine Giardiasis. Faecal samples were collected during this investigation from all animals.

Breeds of dogs:

The investigated dogs were belonged to German shepherd, Local, Lulu, cross, Perro de Presa Canario, Rottweiler, Royal black, Rood dog, Golden Retriever, Malinois, Griffon, Caucasian, Alabi, American bulldog, Saluki, Balboa and Husky breeds of dogs.

Ages of dogs:

The age of the investigated dogs was ranged between 2 to 20 months.

Sampling Procedure:

A total of 599 Faecal samples were from 599 dogs in different Localities of Khartoum State. Faecal samples were collected directly from rectums of the dogs by using swabs. Faecal samples were transported in iceboxes to the Veterinary Laboratory in college of Veterinary Medicine University of Bahri.

Detection of Giardiasis:

Fecal sample was mixed with a drop of normal saline (0.9%) and iodine on a clean glass slide (75 X 26 mm). A cover glass (22 X 22 mm) was placed carefully on the glass slide and then the slide was examined by light microscopy using (10x) and (40x) objective lenses. Trophozoites or cysts were identified in canine feces. Trophozoites were pear –shape, with flagella and motile. Cysts were oval non motile [24].

Treatment trial for Canine Giardiasis cases:

All cases of Canine Giardiasis cases were subjected for the treatment trials using Metronidazole [5].

III. RESULTS:

Prevalence of Canine Giardiasis in Khartoum State:

Among 599 dogs of different breed, sex and age, 75 (12.5%) were positive for Giardiasis. Male dogs represented 7.2% and females represented 5.3% of the positively tested dogs. The age of the infected dogs ranged in between 2 to 20 months (Table 1 and Figure 1).

Prevalence of Canine Giardiasis in autumn:

The prevalence of Canine Giardiasis during the autumn was 40 (19.3%). Male dogs represented 8.7% and females represented 10.6% of the positively tested dogs (Table 2).

Prevalence of Canine Giardiasis in winter:

The prevalence of Canine Giardiasis during the winter was 23 (11.4%). Male dogs represented 6.4% and females represented 5.0% of the positively tested dogs (Table 3).

Prevalence of canine Giardiasis in summer:

The prevalence of Canine Giardiasis during the summer was 6.9%. Male dogs represented 2.6% and females represented 4.3% of the positively tested dogs (Table 4).

Prevalence of Canine Giardiasis in different dog's breeds:

Among 75 dogs of different breed, the prevalence of Canine Giardiasis was 56.7% in Lulu, 54.7% German shepherd, 17.4% local, 5.3% cross breed and Perro de Presa Canario, 1.3% Golden retriever, Malinois, Saluki and Balboa (Figure 2).

Treatment trial for Canine Giardiasis cases:

All cases of Canine Giardiasis cases respond for the treatment trials using Metronidazole.

Table (1): Prevalence of Canine Giardiasis in Khartoum State.

Breed	Infected Male	Healthy Male	Infected Female	Healthy Female	Total
German shepherd	22	143	19	162	346
Local	9	37	4	41	91
Lulu	1	17	4	23	45
Cross	3	20	1	18	42
Perro de presa Canario	3	7	1	8	19
Rottweiler	0	5	0	6	11

Royal black	0	7	0	1	8
Rood dog	0	0	0	7	7
Golden Retriever	0	1	1	4	6
Malinois	0	4	1	1	6
Griffon	2	2	0	1	5
Caucasian	1	0	1	2	4
Alabi	0	1	0	2	3
American bulldog	0	1	0	1	2
Saluki	1	1	0	0	2
Balboa	1	0	0	0	1
Husky	0	1	0	0	1
Total	43 (7.2%)	247 (41.3%)	32 (5.3%)	277 (46.2%)	599 (100%)

Table (2): Prevalence of Canine Giardiasis in Khartoum State in autumn.

Breed	Infected Male	Healthy Male	Infected Female	Healthy Female	Total
German shepherd	10	55	12	58	135
Local	3	12	1	10	26
Lulu	0	5	4	0	9
Rottweiler	0	4	0	5	9
Saluki	1	0	1	4	6
Cross	0	4	0	2	6
Griffon	2	2	0	0	4
Malinois	0	3	1	0	4
Alabi	0	1	0	2	3
Perro de presa Canario	0	0	2	0	2
Caucasian	1	0	1	0	2
Balboa	1	0	0	0	1
American bulldog	0	0	0	1	1
Total	18 (8.7%)	86 (41.3%)	22 (10.6%)	82 (39.4%)	208 (100%)

Table (3): Prevalence of Canine Giardiasis in Khartoum State in winter.

Breed	Infected Male	Healthy Male	Infected Female	Healthy Female	Total
German shepherd	8	57	6	62	133
Local	3	14	3	8	28
Cross	1	8	0	8	17
Lulu	1	3	1	5	10
Rood dog	0	0	0	6	6
Perro de presa Canario	0	0	0	2	2
Caucasian	0	0	0	2	2
Saluki	0	1	0	0	1
Griffon	0	0	0	1	1
Golden Retriever	0	1	0	0	1
Malinois	0	1	0	0	1
Total	13 (6.4%)	85 (42.1%)	10 (5.0%)	94 (46.5%)	202 (100%)

Table (4): Prevalence of Canine Giardiasis in Khartoum State in summer.

Breed	Infected Male	Healthy Male	Infected Female	Healthy Female	Total
German shepherd	4	31	1	42	78
Lulu	0	9	3	14	26
Cross	2	8	1	8	19
Perro de presa Canario	3	6	1	4	14
Royal black	7	0	0	1	8
Golden Retriever	0	0	1	5	6

Local	0	3	0	0	3
Rottweiler	0	1	0	1	2
American bulldog	0	2	0	0	2
Rood dog	0	0	0	1	1
Malinois	0	0	0	1	1
Husky	1	0	0	0	1
Total	17 (10.6%)	60 (37.3%)	7 (4.3%)	77 (47.8%)	161 (100%)

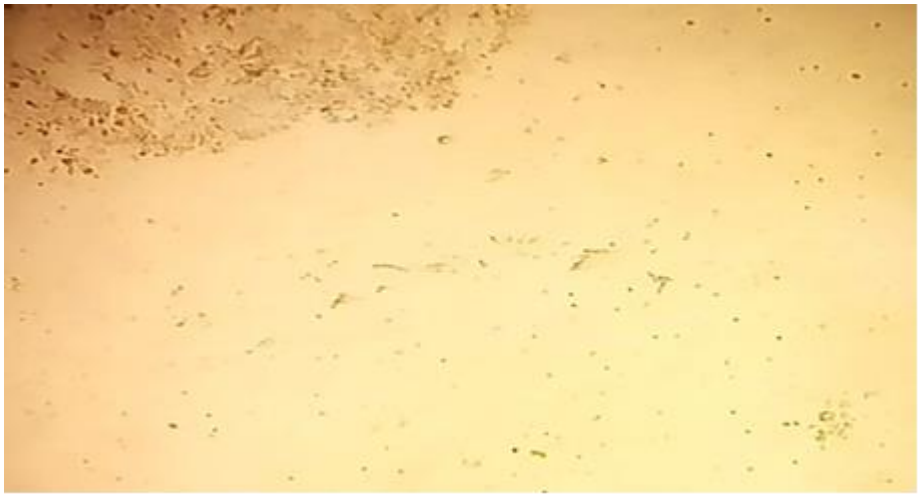

Fig. (1): Canine Giardiasis under microscopy.

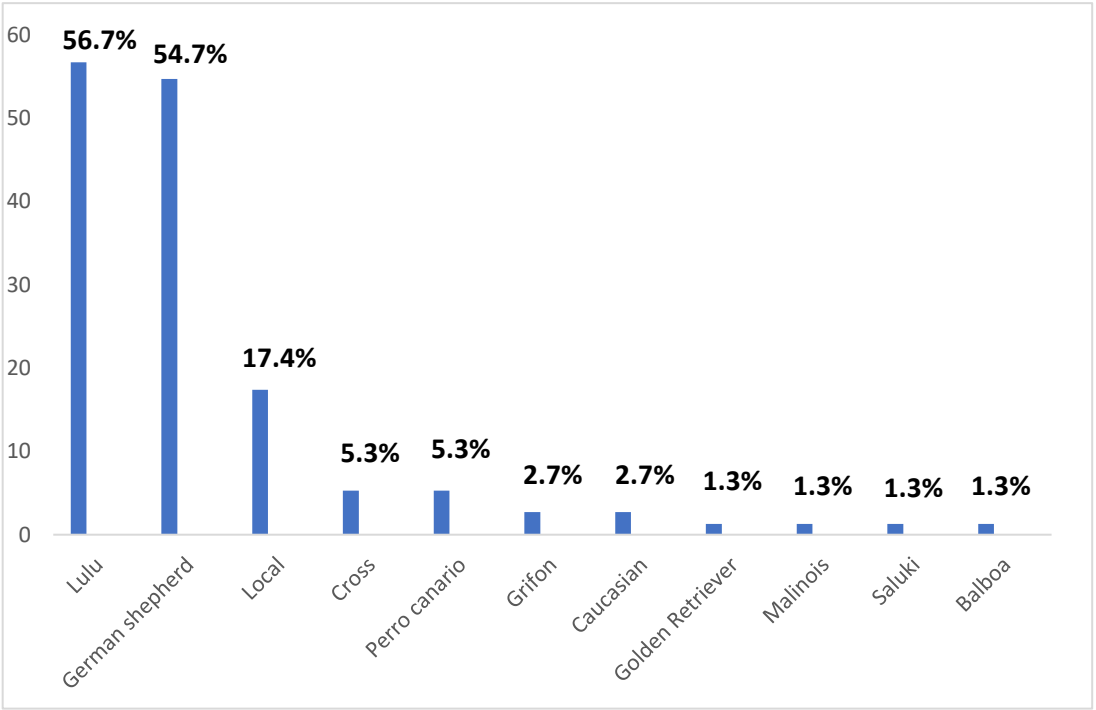

Fig. (2): Prevalence of Canine Giardiasis in different dog's breeds.

IV. DISCUSSION:

Giardiasis is a parasitic disease caused by *Giardia duodenalis* (also known as *G. lamblia* and *G. intestinalis*). Infected individuals who experience symptoms (about 10% have no symptoms) may have diarrhea, abdominal pain, and weight loss. In this study the prevalence of Canine Giardiasis in Khartoum State was 12.5%. In Thailand, Wichit Rojeekittikhun *et al.* [25] and Ketsarin Kamyingkird *et al.* [26] reported higher prevalence (13.9%) of Canine Giardiasis. Also Khine *et al.* [27] and Tangtrongsub *et al.* [28] reported that the prevalence levels of *G. duodenalis* in animals in Thailand varies between 3.0–25.2 % in dogs. This may be explained by the fact that *G. duodenalis* (synonym: *G. intestinalis* or *G. lamblia*) is considered to be a complex

species that can infect people, dogs and cats. In USA Carlin *et al.* [29] reported *Giardia* prevalence of 15.6% among tested dogs. In UK Maha *et al.* [30] reported that pooled prevalence rates were 15.2% for dogs. In Iraq Nadia *et al.* [31] reported that the prevalence of Giardia in dogs was 32.22% which far away from our findings. In the present study the prevalence of Canine Giardiasis in male dogs was 7.2% and 5.3% in females. In the opposite side in Thailand Pipia *et al.* [32] and in China Yang *et al.* [33] reported that female dogs were more prone to infection than male ones. In the present study the age of the infected dogs ranged in between 2 and 20 months. We were in agreement with Pipia *et al.* [32] in Thailand and Yang *et al.* [33] in China findings that young ages were more susceptible for the disease. In the present study the prevalence of Canine Giardiasis in autumn was 19.3%, in winter 11.4% and in summer was 6.9%. There was no significant difference (p-value= 0.618) in the season mean infection using ANOVA. We are in agreement with Sahatchai Tangtrongsup *et al.* [34] findings that Giardia increases during wet and cold seasons. In the present study the prevalence of Canine Giardiasis was 56.7% in Lulu, 54.7% German shepherd, 17.4% local, 5.3% cross breed and Perro de Presa Canario, 1.3% Golden retriever, Malinois, Saluki and Balboa. The main canine groups showed statistical significant differences (p-value= 0.040) in the prevalence of giardiasis using ANOVA. Which may indicate breed resistance. The German shepherd breed was the most affected by giardiasis. We didn't find similar studies at breed levels to compare with. In this study the survival rate was 100% among treated dogs and according to Peter *et al.* [35] the treatment of Giardiasis is now very effective.

V. CONCLUSION AND RECOMMENDATIONS:

The prevalence of canine Giardiasis in Khartoum State was 12.5%. Male dogs were more susceptible for the infestation. All the ages had the same chance for the infestation. Dogs were more susceptible for the infestation in autumn and winter seasons. German shepherd and Lulu breeds were more susceptible for the disease. All cases were treatable. **Diseased dogs must be treated early for good prognosis. Diseased dogs must be separated from healthy dogs to prevent spread of infection. Hygiene during infection and sanitizing of fomite, food and water dishes must be done.**

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