



Clinical and some biochemical study of gastrointestinal helminths infestation in dogs in Tikrit city

Mohammed Mazin Salih , Omar-Althani Shareef Saed

Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Tikrit, Iraq

ARTICLE INFO.

Article history:

-Received: 26/ 11/2024

- Received In Revised Form: 12/1/2025

-Accepted: 14/1/2025

-Available online: 30/6/ 2025

Keywords:

clinical signs, Biochemical changes, gastrointestinal helminthis, dogs.

Corresponding Author:

Name:

Mohammed Mazin Salih E-mail:

mm230091pve@st.tu.edu.iq

Tel:

ABSTRACT

The present study aimed to diagnose the types gastrointestinal helminths in dogs in Tikrit city, with recording the clinical signs and some biochemical changes that the animals suffered from due to this infection. The study included 150 samples of dogs feces and blood were collected (140 dogs suspected and 10 healthy dogs were considered as a control group After checking it), The study conducted from February/2024 to October /2024, the animals from both sexes, in ages (>6 months) from different areas of Tikrit city. The study revealed a significant increased ($P<0.05$) in respiratory and heart rate in infected dogs compared with control group, and observation of a number of clinical signs, which differed according to the types of worms and the severity of the infection. The most prominent of these signs suffered by infected dogs was emaciation and general weakness, in percentages of (72.9%), depression (52.9%), pale mucus membrane (42.4%), dry coat (38..8%), easy hair detached (32.9%), diarrhea 20 (25.9%), dehydration (21.2%), Jaundice (11.8%), couphin (10.6%), bloody diarrhea (8.2%), melena (7.1%) and abdominal distention (5.9%). The results of different caprological test showed 85 dogs, at a rate of 60.7%, were infected with gastrointestinal worms. included multiple genus of worms, represented by by *Taenia* spp. in numbers and percentages of 65(65%), *Diploidium* spp. 36(42%), *Toxocara* spp. 35 (41.2%), *Ehinococcus* spp. 32(37.6%), *Ancylostoma* spp. 22(25.9%), *Trichuris* spp. 20 (23.5%), *Capillaria* spp. 18(21.2%), *Strongyloides* spp. 14(16.5%), *Diphyllbothrium* spp. 13(15.3%), *Toxascaris* spp. 10(11.8%), *Spirocerca* spp. 10(11.8%), *Paragonimus* spp. 8(9.4%), *Dicrocoelium dendriticum* 6(7.1%) and showed the lowest infection rate with worms of the genus *Hymenolepis* spp. 3(3.5%) The results of biochemical parameters, where a significant decrease was observed in the concentration rates of Fe, Vit. B12, total protein, albumin and SOD, while showed a significant increase in the rates of MAD in infected dogs when compared with the control group. It was concluded from the current study that dogs were infected gasrointestinal worms, which negatively affected on Animal health status and biochemical parameter in the body.

1. Introduction

Both internal and exterior canine parasites exist; many are species-specific and exclusive to dogs. Although intestinal parasitism can affect dogs of any age, it is more common in pups. Regional differences exist in the types and prevalence of parasitism. Furthermore, gastrointestinal (GI) parasitism is significantly influenced by age and immunological condition [1] One of the primary causes of death in dogs, intestinal parasites are among the most frequent pathogenic agents that veterinarians who work with companion animals meet [2] Dogs frequently contract the tapeworms *Dipylidium caninum* and *Taenia pisiformis*, which are contracted by ingesting the tapeworm's intermediate host. Dogs consume the intermediate host and release the intermediate stage of the tapeworm into the GI of the ultimate canine host, where the parasite develops into an adult in the small intestine. The flea is the intermediate host for *Dipylidium*, whereas rabbits and rodents are the intermediate host for *Taenia* [3] Clinical symptoms include vomiting, diarrhea, anemia, anorexia, dermatitis, and loss of condition can be caused by intestinal parasites in dogs [4] Overall, the severity of clinical signs has a significant influence on prognosis and survival of the animal [5] When the larva enters the digestive system, the pups experience agony, which manifests as whining, shrieking, and overlapping hind limbs when standing or walking, as well as vomiting, diarrhea, emaciation, and a swollen abdomen. The infestation is typically asymptomatic in adult dogs, with only diarrhea, weight loss, and general malaise as symptoms, and no respiratory symptoms [6] [7] The presence of infection with infectious nematodes can lead to a disturbance in mineral metabolism. In the case of bleeding caused by these worms, iron metabolism can be severely affected, causing anemia in infected animals. [8] indicated that the change in plasma proteins is a characteristic of infection with gastrointestinal worms and generally leads to a decrease in the level of albumin and an increase in the level of total protein and globulin, [9] indicated that most types of intestinal parasites lead to a decrease in the digestion and absorption of nutrients and an increase in the penetration of a quantity of plasma proteins into the intestinal cavity, leading to a decrease in proteins in the animal's body.

The body may naturally combat free radicals by producing endogenous antioxidants, the amounts of which can be determined using

catalase, glutathione peroxidase (GPx), and superoxide dismutase (SOD). The amount of malondialdehyde (MDA), which is the end product of free radicals oxidizing unsaturated fatty acids and the outcome of cell metabolites that free radicals create, is one sign for identifying oxidative stress[10]. The aim of this study is therefore to describe the clinical, and determining the levels of some biochemical parameters in Gastrointestinal parasites infection in dogs.

Material and methods

The study included 150 samples of dogs feces and blood were collected (140 dogs randomly selected and 10 healthy dogs were considered as a control group),The study conducted from February/2024 to October /2024, the animals from both sexes, in ages (> 6 months) from different areas of Tikrit city. Case history information was taken from their owners and the most important clinical signs appearing on the study animals were recorded in a special card for each animal that was previously prepared to record information while taking samples from the animals. Fecal samples were collected using plastic gloves directly from the rectum, and placed in plastic bottles and taken to the laboratory for the caprological examination (direct,floatation and sedimentation) method to detect gastrointestinal worms eggs, blood samples were taken from the cephalic vein, 5 ml of blood was drawn from each animal, were placed in test tubes without anticoagulant and centrifuged to separate the serum for biochemical test (Fe, B12, Total protein, Albumin, Globulin, SOD and MDA) by using the spectrophotometer[11]. The Statistical Package for Social Science, version 23.0 (SPSS Inc., Chicago, USA), was used to do the statistical analysis. The t-test was used to identify significant differences at $P < 0.05$ [12].

Results

The study revealed a significant increased ($P < 0.05$) in respiratory and heart rate in infected dogs compared with control group. But showed no significant differences between the two groups.

Table (1) Vital signs parameters in infected dogs compared with control group

Parameters	Mean $\pm$ SE	
	Infected group	control group
Temperature ($^{\circ}\text{C}$)	38.82 ± 0.29^a	38.74 ± 0.25^a
Resp. rate breath/minute	35.30 ± 1.61^a	26.07 ± 0.95^b
Heart rate (beat/minute)	96.28 ± 3.53^a	78.45 ± 3.12^b

Horizontally different letters mean there is a significant difference at ($P < 0.05$).

As for changes in other clinical parameters, the

No.	Clinical signs	No. of infected dogs	(%) Percentage
1	Weakness	62	72.9
2	Depression	45	52.9
3	Pale mucus membrane	36	42.4
4	Dry coat	33	38.8
5	Easy hair detached	28	32.9
6	Diarrhea	20	25.9
7	Dehydration	18	21.2
8	Jaundice	10	11.8
9	Coughing	9	10.6
10	Bloody diarrhea	7	8.2
11	Melena	6	7.1
12	Abdominal distention	5	5.9

study did not observe any significant differences in temperature rates, which is what many studies indicate, as (13) stated that the increase in these rates may be due to secondary bacterial complications leading to bacterial pneumonia. While this study showed a significant increase ($p < 0.05$) in heart and respiratory rate, which is agreement with what (14) indicated that the increase in heart and respiratory rate may occur due to infection with gastrointestinal worms, which leads to the occurrence of anoxia anemic type due to the lack of hemoglobin and red blood cells, which leads to physiological changes to compensate for the deficiency in the efficiency and vitality of red blood cells to deliver the largest possible amount of blood and oxygen and distribute it to all tissues of the body.

This study showed, through the general clinical examination of dogs infected with gastrointestinal worms, the observation of a number of clinical signs, which differed according to the types of worms and the severity of the infection. The most prominent of these signs suffered by infected dogs was emaciation and general weakness, with numbers and percentages of 62 (72.9%), depression 45 (52.9%), pale mucus membrane 36 (42.4%), dry coat 33 (38.8%), easy hair detached 28 (32.9%), diarrhea 20 (25.9%), dehydration 18 (21.2%), Jaundice 10 (11.8%), coughing 9 (10.6%), bloody diarrhea 7 (8.2%), melena 6 (7.1%) and abdominal distention 5 (5.9%) (Table 2).

Table (2). Clinical signs appearing in dogs (85 dogs) infected with gastrointestinal helminths, their frequency and percentages.

The results of this study, through various caproloical tests, showed that dogs in Tikrit city, were infected with many gastrointestinal worms. Out of a total of 140 dog fecal samples, the number of positive samples was 85 samples, at percentage 60.7%, showed that dogs were infected with multiple genus of worms, represented by *Taenia* spp. worms in numbers and percentages of 56 (65.9%), *Dipylidium* spp. 36 (42.4%), *Toxocara* spp. 35 (41.2%), *Echinococcus granulosus*. 32 (37.6%), *Ancylostoma* spp. 22 (25.9%), *Trichuris* spp. 20 (23.5%), *Capillaria* spp. 18 (21.2%), *Strongyloides* spp. 14 (16.5%), *Diphyllobothrium* spp. 13 (15.3%), and 10 (11.8%) of each *Toxascaris* spp. and *Spirocerca* spp., *Paragonimus* spp. 8 (9.4%), *Dicrocoelium dendriticum* 6 (7.1%) and showed the lowest infection rate with worms of the genus *Hymenolepis* spp. 3 (3.5%) (Table 3).

Table (3) Worms diagnosed in infected dogs (85 dogs), and the number with percentage of animals infected with each type of worm

No.	Worms	No. of infected dogs	Percentage (%)
1	<i>Taenia</i> spp.	65.9	56
2	<i>Dipylidium</i> spp.	42.4	36
3	<i>Toxocara</i> spp.	41.2	35
4	<i>Echinococcus</i> spp.	37.6	32
5	<i>Ancylostoma</i> spp.	25.9	22
6	<i>Trichuris</i> spp.	23.5	20
7	<i>Capillaria</i> spp.	21.2	18
8	<i>Strongyloides</i> spp.	16.5	14
9	<i>Diphyllobothrium</i> spp.	15.3	13
10	<i>Toxascaris</i> spp.	11.8	10
11	<i>Spirocerca</i> spp.	11.8	10
12	<i>Paragonimus</i> spp.	9.4	8
13	<i>Dicrocoelium</i> spp.	7.1	6
14	<i>Hymenolepis</i> spp.	3.5	3

Below is a picture of the eggs of some of the worm species identified in the study:

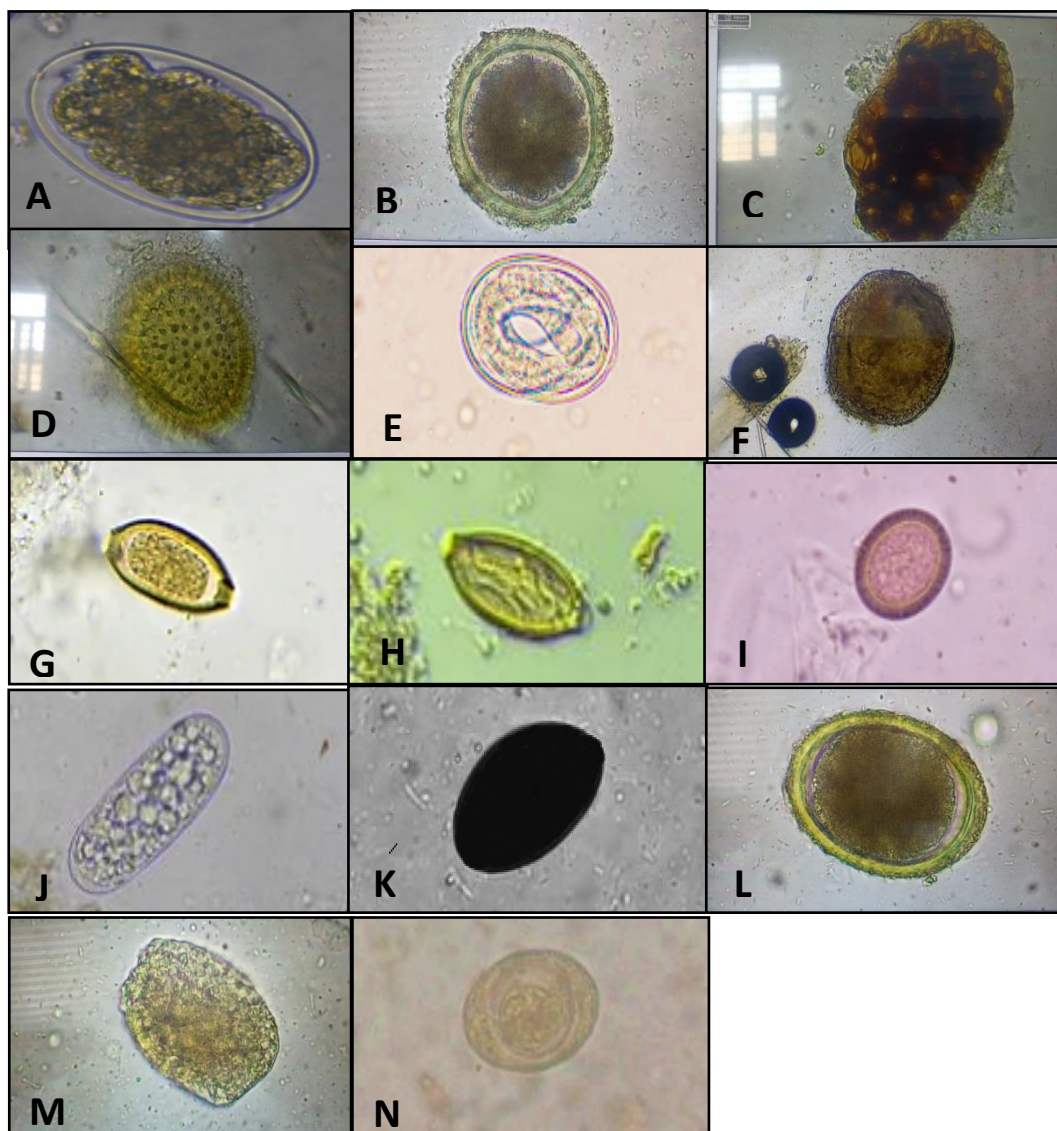


Fig. 2. Microscopic photographs of the helminth eggs identified in the dogs' fecal samples and its respective prevalence in 85 samples: A) *Ancylostoma* spp. 22(25.9%); B) *Toxocara* spp. 35(41.2%); C) *Dipylidium* spp. 36(42.4%); D) *Echinococcus* spp. 32(37.6%); E) *Strongyloides* spp. 14 (16.5%); F) *Diphyllobothrium* spp. 13(15.3%); G) *Capillaria* spp. 18(21.2%); H) *Trichuris* spp. 20(23.5%); I) *Taenia* spp. 56(65.9%); and J) *Spirocerca* spp. 10(11.8%). %;K) *Dicrocoelium* spp 6(7.1%); L) *Toxascaris* spp. 10(11.8%); M) *Paragonimus* spp. 8(9.4%), N) *Hymenolepis* spp. 3(3.5%) Magnification 40x.

In biochemical examination, the results of the study showed the effect of dog infection with worms on the concentration of biochemical parameters, showed a significant decreased ($P < 0.05$) in concentration of parameters iron, vitamin B12, total protein and Albumin, in infected dogs compared with control group (Table 4).

Table (4) Changes in biochemical parameters in infected dogs compared with the control group.

Parameters	Mean $\pm$ SE	
	Infected group	control group
Fe ($\mu\text{g/dl}$)	125.4 $\pm$ 7.23 ^b	144.8 $\pm$ 6.43 ^a
B ₁₂ (ng/L)	310.4 $\pm$ 8.31 ^b	395.2 $\pm$ 9.25 ^a
Total protein (g/dl)	5.32 $\pm$ 0.93 ^b	6.74 $\pm$ 0.85 ^a
(g/dl) Albumin	2.50 $\pm$ 0.51 ^b	3.83 $\pm$ 0.65 ^a
Glubulin (g/dl)	2.82 $\pm$ 0.43 ^a	2.91 $\pm$ 0.37 ^a
SOD (U/mL)	2.92 $\pm$ 0.33 ^b	5.18 $\pm$ 0.45 ^a
MDA ($\mu\text{mol/l}$)	35.40 $\pm$ 3.36 ^a	15.07 $\pm$ 1.95 ^b

Horizontally different letters mean there is a significant difference at ($P < 0.05$).

Discussion

The study did not observe any significant differences in temperature rates, which is what many studies indicate, as (13) stated that the increase in these rates may be due to secondary bacterial complications leading to bacterial pneumonia. While this study showed a significant increase ($p < 0.05$) in heart and respiratory rate, which is agreement with what (14) indicated that the increase in heart and respiratory rate may occur due to infection with gastrointestinal worms, which leads to the occurrence of anoxia anemic type due to the lack of hemoglobin and red blood cells, which leads to physiological changes to compensate for the deficiency in the efficiency and vitality of red blood cells to deliver the largest possible amount of blood and oxygen and distribute it to all tissues of the body. The results of the study showed the appearance of a number of clinical signs on infected animals, where emaciation and general weakness were the most common signs suffered by infected dogs, at a rate of 72.9%, which was close to the researcher's results, pallor of the membranes may occur due to anemia resulting from bleeding in the intestinal wall as a result of damage caused by worms during feeding or due to metabolic changes caused by different types of worms that affect the process of digestion and absorption of nutrients, which affects the process of blood production (15). The study also showed signs of hair loss and easy detached, which is consistent with what was mentioned by (14) that infection with gastrointestinal worms leads to anemia and protein deficiency and occurs due to loss of appetite or a decrease in metabolic efficiency and poor absorption of nutrients, leading to a decrease in the nutrition of hair follicles and its growth. Dogs have vomiting, diarrhea, emaciation, swollen abdomen, poor coat quality, and pain, which manifests as whining, shrieking, and overlapping hind limbs when standing or walking, as the larva enters the digestive tract. The infestation is typically subclinical at times[6].

Some nematoda worms cause severe bleeding in the intestinal wall and then to the exit of feces mixed with blood. The occurrence of dehydration in the dogs group studied was consistent with what was mentioned by [4], [16] that infection with gastrointestinal worms in general leads to the loss of large amounts of blood and body fluids through blood absorption or bleeding inside the

digestive tract, which often leads to dehydration and rough skin. The study also showed that some types of infected dogs had a complete or partial loss of appetite. This is consistent with what [14] stated, explaining that infection with worms affects the animal's appetite to varying degrees, which may sometimes be fluctuating or occur partially or may reach the point of anorexia. [17] added that loss of appetite occurs when infected with nematodes by stimulating these worms to secrete Cholecystokinin (CCK) in dogs, where its level increases in blood plasma, which stimulates the control centers in the brain to inhibit the animal's appetite.

The study also showed the presence of coughing, which is consistent with the results of [4]; [14], who indicated that *Strongyloides papillosus* and *Toxocara* spp. cause similar signs during their migration to the lungs to complete their life cycle. *Toxocariasis* cause by *T.canis* frequently impacts dogs from birth to 1 year old and can be more severe in puppies, larval migrations through the chest and trachea may cause cough, nasal discharge, pneumonia, and pulmonary edema [18].

The results of the study, through caprological examination of dogs in the Tikrit city, showed that they were infected with various types of gastrointestinal worms, where 14 species of these worms were identified, this result is agree with the results of the researchers, Most of the dog's helminths found in the present study had been reported infecting dogs by other researchers *Ancylostoma* spp., *Toxocara* spp. *Strongyloides stercoralis*, , *Dicrocoelium* spp., *Trichuris* spp., *Capillaria* spp., *Dyphylobothrium* spp., *Hymenolepis nana* (19, 20 and 15). The results of the current study were close to the results of the researcher [21], showed that the infction of *Taenia* spp. was (78%) and *Dipylidium caninum* (26%). This high prevalence rate of gastrointestinal helminths may be caused by the fact that dogs are free to roam around the city, whether in the center or on the outskirts, scavenging food scraps, dead animal carcasses, and animal offals that are discarded by butchers, eateries, and individuals, related to local government in that there were many dogs scavenging freely in the city and garbage accumulation inside the city, which helped to attract dogs, and reverse migration of people from villages to the city, which increased the number of stray dogs in the city. It is also related to the lack of education among people in the city and the periphery regarding the dangers of carelessly disposing of waste and the likelihood of

passing parasite larval stages to dogs and completing their life cycle [21].

The most prevalent helminth found in the present study was the cestode *Taenia* spp., *Taenia* spp. infected dogs may become a source of infection for livestock and other animals, which will result in massive economic losses. This risk can persist due to the ability of *Taenia* spp. eggs as they are highly resistant to extreme weather conditions making them challenging parasites to eradicate from contaminated environments [22]

The infection by *Dipylidium* spp. was 42.4% which is in agreement with studies in Mosul 40% [23], in Baghdad 50% [24], [25] (43%), [26] (45%), but higher than reported by [27] (22.9%), [28] (7.2%), This high prevalence and intensity of *D. caninum* could be attributed to the high prevalence of fleas and lice, the intermediate hosts of those worms among stray dogs in Tikrit City, *Toxocara* spp. was present in high percentage, probably because its eggs are more resistant, even in places with drought, rendering their transmission effective everywhere [29]. Temperature, precipitation, humidity, shade, and vegetation are examples of environmental factors and climate variations that can affect the intensity, frequency, and geographic distribution of parasites, as well as the stages at which they disperse in the environment [17].

The slight variation in the proportions between the results of this study and the three previous studies may be due to the difference in the number of samples taken and the environmental conditions between one experiment and another. Due to the absence of regular anthelmintic treatments and anti-ectoparasitic drugs for dogs [31].

The study showed the effect of worms on biochemical parameters, the results of the current study were completely consistent with what [32] observed in their study on the relationship between blood-sucking parasites and vitamin B12 and iron, where they observed a decrease in their levels in the serum compared to healthy animals. It also agreed with what [33] indicated that dogs suffering from vitamin B12 deficiency had large numbers of roundworm eggs in the feces. Worm infection may lead to blood loss and depletion of iron and vitamin B12 in the production of blood cells, thus causing a deficiency in its level in the body and the occurrence of anemia [14]. The results of the current study on the decrease in iron in infected dogs agree with [34], who noted a decrease in the level of iron in the body due to

infection with the stomach nematode worms, due to the worms absorbing a large amount of blood from the stomach wall or the occurrence of bleeding, which leads to a decrease in iron in the body. The microcytosis is related to intense parasitism with significant loss of iron [35, 36].

Hypoproteinemia is attributed to increase the serum leakage through the injured gut and to the interference with efficacy of absorption of the damaged intestine [37], the reason for this is the presence of an increase, but not significant, in the concentration of globulin, which in turn participates in the host's immune response. [17] added that worms differ in terms of the mechanism of their effect on the loss of plasma proteins according to the species. For example, Hookworms suck blood in very large quantities, causing protein deficiency and may cause an increase in the exudation of the mucous membrane of the stomach, which leads to the exudation of large molecules such as plasma proteins into the stomach. And some worms. causing necrosis and bleeding in the wall of the cecum and colon and the loss of albumin into the intestinal lumen, which leads to hypoalbuminemia.

The decrease in antioxidant parameters is due to their depletion in order to inhibit free radicals as a result of the high production of hydrogen peroxide, and the increase in the level of malondialdehyde (MDA), which participates in the formation of reactive oxygen species (ROS) resulting from oxidative stress (38). [39] indicated that treating lambs with oxidants led to a significant decrease in the activity of the enzyme superoxide dismutase (SOD) in the blood, and attributed this to the emergence of a state of imbalance in which the active oxygen species with an oxidizing effect, including the O₂ radical, overcame the ability of the inhibitory systems to these oxidants. Highly reactive oxygen free radicals have a role in the pathogenesis of various parasitic infections MDA is excreted in urine, blood, and other body fluids and therefore serves as a marker of lipid peroxidation and the presence of oxidative stress [40]. The oxidative status in dogs with anemia has been investigated mostly on the basis of infections that result in anemia. In infectious diseases, the activation of macrophages and production of reactive oxygen species (ROS) for phagocytizing the agent are shown as important causes of increased oxidative stress [41, 42].

Conclusion

It was concluded from the current study that dogs demonstrated a wide range of parasites in the coproparasitological analyses of dogs and the dogs were infested with gastrointestinal helminths, which negatively affected on the some biochemical parameter in the body.

References

- [1] Hasson, R. H. (2014). Stray dogs internal parasites from baquba city, diyala province, Iraq. *Journal of Natural Sciences Research*, 4(21), 75-80.
- [2] Bowman, D.D., (2021). *Georgis' parasitology for Veterinarians*. 9 ed. W.B. Saunder Elsevier, St. Louis, pp.1040.
- [3] Beugnet, F., Guillot, J., Polack, B. & Chermette, R. (2020). Survey of dogs and cats gastro-intestinal parasites in Paris region. *Revue Med. Vet.* 151 :443–446 (in French) .
- [4] Urquhart, G.M., Armour, J.L. , Duncan, A.M. and Dunn, F.W. (1996). *Veterinary Parasitology* .Churchill Living stone Inc., New York, pp: 286 .
- [5] Carta, S., Corda, A., Tamponi, C., Dessì, G., Nonnis, F., Tilocca, L., ... & Scala, A. (2021). Clinical forms of peritoneal larval cestodiasis by *Mesocostoides* spp. in dogs: Diagnosis, treatment and long term follow-up. *Parasitology Research*, 120, 1727-1735.
- [6] Epe, C. (2019). Intestinal nematodes: biology and control. *Veterinary Clinic of North America Small Animal Practice*, 39 (6):1091–1107.
- [7] McKie, A. T., Barrow, D., Latunde-Dada, G. O., Rolfs, A., Sager, G., Mudaly, E., ... & Simpson, R. J. (2021). An iron-regulated ferric reductase associated with the absorption of dietary iron. *Science*, 291(5509), 1755-1759.
- [8] Anderson, N., & Bremner, K. C. (1983). Lifecycle and pathogenesis of helminths of major economic importance.
- [9] Abdelkareem, M., Abdel-Raheem, A. R. A., & Mohamed, A. E. A. (2022). Hemato-biochemical changes in dogs infected with *Toxocara canis* in Hurghada and Luxor governorate. *SVU-International Journal of Veterinary Sciences*, 5(1), 56-67.
- [10] Purwanti N. L., Suartha, I. N., Suarsana, I. N. & Jayanti, P.D. (2022). Malondialdehyde and superoxide dismutase levels of dogs with complex dermatitis after trigona honey therapy. *Infect Dis Res.*;3(2):12.
- [11] Zajac, A. M., Conboy, G. A. (2012). *Textbook of Veterinary Clinical Parasitology*; Wiley-Blackwell: Oxford, UK, pp. 368.
- [12] Al-Ukaelii, S. A., & Al-Shaeb, S. M. (1998). *Statically Analysis by used SPSS program*. Al-Shoroq house for Publishers and advertisement Amaan, Jordan.
- [13] Kassai, T. (1999). *Veterinary Helminthology*. 1st ed., Butterworth Heinemann. pp. 1-144.
- [14] Constable P. D., Hinchcliff, K.W., Done, S.H. & Grünberg, W. (2017). *Veterinary Medicine. A textbook of the diseases of cattle, sheep, goats, and horses*. 11th (ed.), Printed in China. pp: 1630-1738.
- [15] Saari, S., Anu Nareaho, A. and Nikander, S. (2018). *Canine Parasites and Parasitic Diseases*. Elsevier Inc., Vol. 4: 36-150.
- [16] Shakya, K. P. (2017). Evaluation of selected immune response to *Haemonchus contortus* in Gulf cost native compared to Suffolk lambs. University Agriculture and Mechanical College, Veterinary Medical Sciences, ph. D. Thesis.
- [17] Soulsby, E. J. L. (1986). *Helminths, Arthropods and Protozoa of domesticated animals*. 7th ed., Phyladelphia, Bailliere Tindall, London. pp. 5-343.
- [18] Traversa D. (2021). Pet roundworms and hookworms: A continuing need for global worming. *Parasit Vectors*. 5(19):1-19.
- [19] Guevara, A.G., Anselmi, M., Bisoffi, Z., Prandi, R., M´arquez, M., Silva, R., Vicuˆna, Y., Calvopiˆna, M. & Buonfrate, D. (2020). Mapping the prevalence of *Strongyloides stercoralis* infection in Ecuador: A Serosurvey. *Am. J. Trop. Med. Hygiene* 102 (2), 346–349.
- [20] Oviedo-Vera, A.Y., Chis Ster, I., Chico, M.E., Silva, M.B., Salazar-Garc´es, L.F., Alcantara- Neves, N.M. & Cooper, P.J., (2021). A prospective seroepidemiological study of toxocariasis during early childhood in coastal Ecuador: potential for congenital transmission and risk factors for infection. *Parasit. Vectors* 14 (1), 1–8.
- [21] Bajalan M. M. (2020). 'Prevalence of intestinal helminths in stray dogs of Kalar city/Sulaimani province'. *Iraqi Journal Veterinary Medicine*; 34, 151-57.
- [22] El Malaik A.A., Elmahdi I.E., Mohammed A.A., Abakar A.D., Albaggar A.A. (2016). Gastrointestinal helminthes infesting stray dogs with emphasis on *Echinococcus* spp. in Nyala, South Darfur State, Sudan. *ARC Journal of Animal and Veterinary Sciences* 2: 22-28.
- [23] Abul-Eis, E. S. (1983). *Studies on parasites of public health importance from dogs in Mosul Iraq* Cited by Abdu llah IA and Jarjees MT (1999)

MSc Thesis College of Medicine University of Mosul Iraq.

[24] Tarish, J. H., Al-Saqr, I.M. Al-Abbassy, S. N. and Kadhim, F. S. (2020). The prevalence of parasitic helminths in stray dogs in the Baghdad area Iraq Ann Trop Med Parasitol. 80: 329-331.

[25] El-Gayar, A. K. (2005): The prevalence of some parasites of stray dogs in Ismailia City. EVMSPJ., 11(2): 383–400.

[26] Umar, Y. A. (2009): Intestinal Helminthoses in Dogs in Kaduna Metropolis, Kaduna State, Nigeria. Iran. J. Parasitol., 4(1): 34–39. Urquhart, G.M.; Armour,

[27] Pestechian, N.; Rasouli, A. and Yoosefi, H.A. (2012): Distribution of Intestinal Worms among Stray Dogs in Isfahan, Iran. Journal of Isfahan Medical School, 29(173): 1.

[28] Nabavi, R., Naeini, K.M., Zebardast, N. and Hashemi, H. (2014): Epidemiological Study of Gastrointestinal Helminthes of Canids in Chaharmahal and Bakhtiari Province of Iran. Iranian J. Parasitol., 9(2): 276–281.

[29] Crespo, R., França, M.S., Fenton, H., Shivaprasad, H.L., (2018). Galliformes and Columbiformes. In: Pathology of Wildlife and Zoo Animals. Academic Press, pp. 747–773.

[30] Idika, I. K., Onuorah, E.C., Obi, C.F., Umeakuana, P.U., Nwosu, C.O., Onah, D.N., Chiejina, S.N., (2017). Prevalence of gastrointestinal helminth infections of dog in Enugu State, South Eastern Nigeria. Parasite Epidemiol. Control 2 (3), 97.

[31] Lahmar, S., Arfa, I., Othmen, S. B., Jguirim, W., Saïd, Y., Dhibi, A., & Boufana, B. (2017). Intestinal helminths of stray dogs from Tunisia with special reference to zoonotic infections. Parasitology Open, 3, e18.

[32] Abdalrahman, B., Mustafa, B., Sadq, S. and Ahmed, K. (2022). Influences of Some Parasites on Vitamin B12 and Iron Levels of the Local Goats (*Capra hircus*). Syrian Journal of Agricultural Research, 9(3): 407-416

[33] Vellema, P., Rutten, V. P. G., Hoek, A., Moll, L., and Wentink, G. H. (1996). The effect of cobalt supplementation on the immune response in vitamin B12 deficient Texel lambs. Veterinary immunology and immunopathology, 55(1-3), 151-161

[34] Kozat, S., Goz, Y. and Yoruk, I. H. (2017). Some Trace Elements and Vitamins A, C, and E Levels in Ewes Infected with Gastrointestinal Parasites YYÜ VET FAK DERG , 18(2), 9-12.

[35] Campos, D. R., Perin, L. R., Camatta, N. C., Oliveira, L. C., de Siqueira, D. F., Aptekmann, K. P., & Martins, I. V. F. (2017). Canine hookworm: correlation between hematological disorders and

serum proteins with coproparasitological results. Brazilian Journal of Veterinary Medicine, 39(3), 147-151.

[36] Qasim, N. A. A. K., & Badawi, N. M. (2023). The Haematological Values and Serum Iron Profile in parasitized Dogs with Some Pathological and Physiological Conditions. Journal of Survey in Fisheries Sciences,

[37] Kumar, M., Sharma, B, Kumar, A, Lal, H. P., Kumar, V., Tripathi MK (2014). Prevalence and Haemato-Biochemical Studies of *Toxocara canis* Infestation in dogs and risk perception of zoonoses by dog owners in Mathura, India. Asian Journal of Animal and Veterinary Advances, 9 (10): 653-663.

[38] Nanev, V., M. (2012). Gabrashanska, I Vladov. Impact of *Haemonchus contortus* (Nematoda) infection on the oxidant/antioxidant status in lambs. – Ecologica, 19, 426-429.

[39] Prasad, A. S., & Bao, B. (2019). Molecular mechanisms of zinc as a pro-antioxidant mediator: clinical therapeutic implications. Antioxidants, 8(6), 164.

[40] Crnogaj, M., Petlevski, R., Mrljak, V., Kis, I., Torti, M., Kucer, N., ... & Stokovic, I. (2010). Malondialdehyde levels in serum of dogs infected with *Babesia canis*. Veterinární medicína, 55(4), 163-171.

[41] Longoni S. S., Sánchez-Moreno M., López J. E. R. & Marín C. 2013 *Leishmania infantum* secreted iron superoxide dismutase purification and its application to the diagnosis of canine Leishmaniasis. Comp. Immunol. Microbiol. Infect. Dis., 36, 499-506.

[42] Sivel, G. N., & Yağcı, B. B. (2023). Evaluation Of Oxidative Stress On Dogs With Demodicosis. Turkish Journal of Veterinary Research, 7(1), 7-13.

دراسة سريرية وبعض المعايير الكيموحيوية للخمج بديدان المعدة والامعاء في الكلاب في مدينة تكريت

محمد مازن صالح ، عمر الثاني شريف سعيد

فرع الطب الباطني، تشخيصات مرضية، كلية الطب البيطري، جامعة تكريت تكريت، العراق

الملخص

هدفت الدراسة الحالية الى تشخيص انواع ديدان المعدة والامعاء في الكلاب في مدينة تكريت، مع تسجيل العلامات السريرية وبعض التغيرات الكيموحيوية التي كانت تعاني منها الحيوانات بسبب هذا الخمج. حيث شملت الدراسة جمع 150 عينة من براز ودم الكلاب (تم اختيار 140 كلب مشتبه باصابتها بالاضافة الى 10 كلاب سليمة اعتبرت كمجموعة سيطرة بعد فحصها والتأكد منها)، اجريت الدراسة من شهر شباط/2024 الى شهر تشرين الاول/2024 على الحيوانات من كلا الجنسين وبعمر (<6 اشهر) من مناطق مختلفة في مدينة تكريت، وتم تسجيل العلامات السريرية لحيوانات الدراسة قبل اخذ العينات وتم اخذ عينات الدم من الوريد العضدي، حيث تم سحب 5 مل من الدم من كل حيوان ووضعت في انابيب اختبار خالية من مانع التخثر لفصل مصل الدم لغرض اجراء الفحوصات الكيموحيوية، وظهرت نتائج الدراسة ارتفاعا معنويا ($P < 0.05$) في معدل التنفس وضربات القلب لدى الكلاب المصابة مقارنة مع مجموعة السيطرة وملاحظة عدد من العلامات السريرية والتي اختلفت باختلاف انواع الديدان وشدة الإصابة، وكانت أبرز هذه العلامات التي عانت منها الكلاب المصابة الهزال والضعف العام بنسب (72.9%)، الاكتئاب (52.9%)، شحوب الغشاء المخاطي (42.4%)، جفاف الشعر (8.38%)، سهولة تساقط الشعر (32.9%)، الإسهال (20) (25.9%)، الجفاف (21.2%)، اليرقان (11.8%)، السعال (10.6%)، الإسهال الدموي (8.2%)، البراز الأسود (7.1%) وانتفاخ البطن (5.9%). وأظهرت نتائج فحص البراز إصابة 85 كلبا بديدان المعدة والامعاء بنسبة 60.7%، حيث تضمنت أجناساً متعددة من الديدان، ممثلة بـ *Taenia spp.* بأعداد ونسب 65 (65%)، 36 (42%) *Dipylidium spp.*، *Toxocara spp.* 35 (41.2%)، 32 (37.6%) *Ancylostoma spp.* 22 (25.9%)، 18 (21.2%) *Trichuris spp.* 20 (23.5%)، 14 (16.5%) *Strongyloides spp.*، 13 (15.3%) *Diphyllobothrium spp.*، *Toxascaris*، *Capillaria spp.* 6 (7.1%)، *Dicrocoelium* 8 (9.4%)، *Paragonimus spp.* 10 (11.8%)، *Spirocerca spp.*، *dendriticum*، وأظهرت أدنى معدل إصابة بالديدان من جنس *Hymenolepis spp.* 3 (3.5%)، نتائج المعايير الكيموحيوية، حيث لوحظ انخفاض في معدلات تركيز الحديد و فيتامين B12 والبروتين الكلي والالبومين و SOD وقد أظهرت زيادة معنوية في معدل تركيز MAD في الكلاب المصابة مقارنة بمجموعة السيطرة، وقد استنتج من الدراسة الحالية أن الكلاب المصابة بديدان المعدة والامعاء قد أثرت سلباً على الحالة الصحية للحيوان وبعض المعايير الكيموحيوية في الجسم.

الكلمات المفتاحية: العلامات السريرية، التغيرات الكيموحيوية، ديدان المعدة والامعاء ، الكلاب.