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Investigation of Intestinal Parasites in Stray Cats

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Abstract: The study included collecting fecal samples from stray cats in Tikrit / Salah al-Din Governorate for the period from October 2022 until the end of January 2023. The total number of samples taken from fecal samples of stray cats in home gardens and public parks in Tikrit city was 87 samples, including 26 positive samples with an infection rate of 29.88%.

The cystic stages of the animal protozoa Coccidia and Toxoplasma gondii were diagnosed in the feces of some stray cats at percentages of 8.04% and 11.49%, respectively, and at a rate of 6.89% for Toxocara cati, and Ancylstoma eggs at a rate of 3.44%.

Introduction: Cats, like other animals, are infected with internal and external parasites. Some of these parasites are shared with humans, for example, the tapeworm *Dipylidium caninum* and *Toxocara cati* infect both humans and cats (Soulsby, 1982). Gastrointestinal parasitism is a common problem in cats. These parasites can be worm-like or single-celled organisms. They usually cause somewhat non-specific symptoms, such as coughing, vomiting, diarrhea, mucous or bloody stools, loss of appetite, or pale mucous membranes. Vomiting, diarrhea, anemia, and dehydration caused by intestinal parasites can weaken the cat, making it more susceptible to viral and bacterial infections and other diseases. More importantly, shared parasitic diseases are part of the group of diseases that are transmitted between animals and humans (Paniker, 2002). This disease has received significant medical attention in recent years due to its widespread spread around the world and the proven serious effects on humans, especially pregnant women and newborns, as it causes many cases of miscarriage, as it is transmitted to the fetus from the mother during pregnancy. Even if the child is born after the completion of the months of pregnancy, it shows serious symptoms such as mental retardation and epilepsy, and affects the retina and brain, and swelling of the skull with fluids, where the fetus's head is deformed or may be smaller than the normal size. As for the infection of the lymphatic system, it may result in enlargement of the liver and spleen and high temperature (Markell *et al*., 2006). The disease affects slaughterhouse workers and veterinary health personnel and is transmitted through contact with animal tissues and eating infected animal meat or contaminated food, especially vegetables. Laboratory workers may also be infected with the disease, as the disease is transmitted from the mother to her fetus through the placenta transplacental, and also occurs through blood transfusions and organ transplants (Elhence *et al*., 2010). Perhaps the most dangerous infection that humans are exposed to from nematodes in cats and dogs is exposure to the larvae of *Toxocara*. It is known that females of these worms release approximately 200,000 immature eggs daily into the external environment, which need a period of time to mature when the appropriate environmental conditions of humidity and temperature are available (Soulsby, 1982). Gastrointestinal (GI) parasitism is a common problem in cats, with prevalence rates reaching 45% in some populations. These parasites can be worm-like or single-celled organisms. They usually cause somewhat non-specific symptoms, such as a dull coat, coughing, vomiting, diarrhea, mucous or bloody stools, loss of appetite, pale mucous membranes, or a wrinkled appearance. Vomiting, diarrhea, anemia, and dehydration caused by intestinal parasites can weaken a cat, making it more susceptible to viral and bacterial infections and other diseases (Paniker, 2002).

Toxoplasma gondii is a single-celled, crescent-shaped parasite about 5 microns long and 2-3 microns wide with one or both ends pointed or convex. It lives in the lymphatic and nervous systems, and the final hosts of this parasite are cats and wild felines (Frances, 2001).

The parasite reproduces in the intestines of cats and goes through five stages of asexual reproduction followed by sexual reproduction and egg cell formation. The life cycle from the entry of the parasite to the expulsion of the egg cells with the feces takes about (3-5) days and may extend to (20-24) days. The expulsion of the egg cells in the feces continues for (3-15) days, followed by a cessation for several months as a result of the immunity formed in the body. After that, the expulsion of the egg cells begins again as a result of the new infection with the parasite. The egg cells begin to divide and form spores (8) after a day or more, depending on the appropriate temperatures and humidity. Cats play an important role for *T. gondii*, which are the final and intermediate hosts for this parasite, as the sexual and asexual roles occur in the same animal. As for humans and other animals, they are the intermediate hosts in whose intestines the asexual roles occur (Frances, 2001).

Coccidia are parasites that infect the digestive system of cats. They are single-celled organisms. There are many different types of *coccidia*, but the two most common types of *coccidia* in cats are: *Isospora felis, Isospora rivolta*. These parasites live in the cells of the intestines. Coccidia usually affect the feces of an infected cat, and its signs include: diarrhea, pain during defecation, dehydration, vomiting, and lethargy, which makes them more susceptible to viral and bacterial infections and other diseases (Soulsby, 1982). *Isospora* sp. (coccidia) are single-celled microscopic organisms that cause *coccidia*. Almost all cats become infected with *Isospora felis* during their lifetime, usually by ingesting a cyst, a thick-walled stage that is passed in the feces and matures in the soil. Cysts can be infectious within six hours of being excreted in the feces. Cats may also become infected by eating flies or cockroaches that carry *Isospora* cysts. Isospora infection usually does not cause any problems for adult cats, but it can cause serious illness in kittens, where the coccidia may destroy the intestinal lining and cause mucous diarrhea (Paniker, 2002). *Toxocara cati* are worms whose adult worms live in the anterior portion of the small intestine of cats. Cats are the primary definitive host of *T. cati*, while humans and other mammals are occasional hosts (Hendrix & Robinson,2012). The catfish is classified according to (Roberts & Janovy, 2005) into Phylum: Nematoda, Class: Chromadorea, Family: Ascarididae.

The catfish is characterized by the presence of three lips around the mouth equipped with a pair of transverse cervical wings that give a pear-shaped shape to the front of the worm, and the length of the females ranges between 12-4 cm and the males between 6-4 cm, and the papillae around the anus are of diagnostic value for the males, and the latter have a pair of spines that are 2.08-1.63 mm long at the posterior end (Roberts & Janovy, 2005).

Ancylostoma are cylindrical worms, less than half an inch long, that live attached to the lining of the intestinal wall, where they feed on the blood of the host. Due to their small size, they do not usually appear in the feces of infected cats. Adult cats are usually infected with larvae that penetrate their skin or are ingested. Once the larvae enter the host, they migrate to the lungs and then to the intestines, where they develop into adult worms. Mild cases of hookworm infection may cause diarrhea and weight loss. Severe parasitism can cause anemia , When these larvae migrate under the skin, they can cause a skin condition called cutaneous larva migrans, which is characterized by itching and irritation (Hendrix & Robinson,2012).

The study aimed to investigate intestinal parasites in the feces of stray cats, indicating the parasitic species shared between them and humans.

Materials and methods:

1: Places and duration of sample collection: Samples were collected from stray cats in home gardens and public parks in Tikrit city / Salah al-Din Governorate from October 2022 until January 2023.

2: Collection of stool samples: - 87 stool samples were collected randomly, the samples were placed in sterile plastic boxes and laboratory examination was performed as follows:

A- Direct method: The samples were examined using the direct wet swab method, which is used to diagnose the trophozoite stage or the cyst stage of animal protozoa or worm eggs. The examination was done by taking a drop of local iodine solution with 0.1 g of the stool sample and placing it on the glass slide, and they were mixed together until the mixture became homogeneous. After that, they were loaded and then examined under a light microscope with a 100X oil lens to ensure the presence of any parasitic contamination (Hendrix & Robinson,2012).

B- Sedimentation method: 10 grams of each sample were taken and mixed with 100 ml of normal saline solution to isolate the parasitic stages ova, larvae, cyst, oocyt of the parasitic worms and protozoa. After sedimenting the mixture for 24 hours, 5 ml of the sedimentation liquid was taken and transferred to the laboratory and placed in a centrifuge at 3000 rpm/5 minutes. After that, a drop of the sediment was taken by loop and placed on a glass slide and stained with lugal iodine dye to distinguish the protozoan cysts and parasitic worm eggs. Then the glass slide was loaded and then the slides were examined under a light microscope under a magnification of 100x, 40x, The parasitic stages were identified according to (Yamaguti, 1961; Soulsby, 1982).

C- Flatalion method – Techoe: Eggs and larvae of worms and cysts of protozoa depend on the difference in the specific gravity of some solutions and eggs of worms and their larvae and cysts of protozoa.

Mix 10 grams of the sample with 50 ml of distilled water, and the mixture was filtered using gauze after that the sediment was separated by a centrifuge for 300 min/5 min and the clear was poured and 2 ml of D.W was added and washed and separated again until the sediment became clear, and 4 ml of zinc sulphate was added to the sediment that was poured after that and another amount of zinc sulphate was added until the tube was filled to the brim, and the cover of the glass slide was placed over the mouth of the tube that is placed in the centrifuge at the same speed above. Sometimes the cover may be replaced by taking the upper drops by loop after the device stabilizes and the glass cover was lifted and fixed on the glass slide with a drop of iodine solution for laboratory examination (Roberts & Janovy, 2005).

Results and discussion: Samples were collected from stray cats in Tikrit / Salah al-Din Governorate for the period from October 2022 to January 2023, and the total number of samples taken from fecal samples of stray cats in home gardens and public parks in Tikrit was 87 samples, including 26 positive samples with an infection rate of 29.88% (Table 1).

The cystic stages of the animal protozoa Coccidia and *Toxoplasma gondii* were diagnosed in the feces of some stray cats at percentages of 8.04% and 11.49%, respectively, and at a rate of 6.89% for *Toxocara cati*, and hookworm eggs at a rate of 3.44% (Table 2).

The results of the study are consistent with study of (Ab-Dulwahab & Al- Talib, 2024)), which recorded the infection of stray cats in Malysia with animal protozoa at a rate of 73.1% infected with *T. gondii, Isospora felis, Trichomonas faetus,Entamoeba histolytica*. The researchers (Al-Tae & Al-Rubaie, 2018) recorded *Cryptosporidium* spp., *C. parvum*, *C. muris*, *Emeria cati*, *Isospora* spp., *Entamoba* spp.

These percentages of infection may be due to the increase in the number of mice as a result of the lack of continuous control methods and the increase in the number of stray cats and dogs with the cats' reliance on feeding on different types of insects that are widespread in homes and gardens such as beetles and cockroaches with the availability of mice. In addition to the factor of temporal accumulation in the accumulation of infectious parasitic stages in the intestines of infected cats (Soulsby, 1982).

We conclude from the study that some stray cats are infected with the animal protozoa *Coccidia* and *Toxoplasma gondii* with percentages of 8.04% and 11.49% respectively, and with a percentage of 6.89% for *Toxoplasma cati*, and hookworm eggs with a percentage of 3.44%.

Table (1): Percentage of stray cats infected with intestinal parasitic stages

Months	Number of examined samples	Number of positive samples	%
October	16	3	18.75
November2022	27	11	40.74
December	25	7	28
January 2023	19	5	26.31
Total	87	26	29.88

Table (2): Percentage of the prevalence of the parasitic stages diagnosed in the feces of stray cats under study

Parasite	Number of examined samples	Number of positive samples	%
Coccidia	87	7	8.04
T. gondii	87	10	11.49
T. cati	87	6	6.89
Ancylstoma	87	3	3.44
total	87	26	29.88

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