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Detection of Internal Parasites in Turkeys in Erbil city

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ABSTRACT

This study was designed to investigate the prevalence of gastrointestinal parasites in domestic turkeys and infection rates of gastrointestinal parasites infesting turkeys and the relationship with their ages. Seventy-one dropping samples were randomly collected from turkeys reared in Erbil city from April 2019 to the end of June 2019. To diagnose the parasites using wet cotton swabs, fifty swab samples were collected from the oral cavity, esophagus, and crop. Coprological examinations of the samples were carried out in the Laboratory of the Parasites/ Veterinary Medicine College / University of Mosul. The results also showed that the total percentage of infection with gastrointestinal parasites was 35.21%. Five nematode species were recorded in Erbil city turkeys, *Heterakis gallinarum* 28%, *Capillaria spp.* 24%, *Trichostrongylus spp*. 16%, *Strongyloides avium* 12% and *Ascaridia galli* 4%. Furthermore, Eimeria *spp.* of intestinal protozoan was diagnosed, with a 48% infection rate. *Strongyloides avium* larvae were detected in the turkeys' oral cavity swabs, with an infection rate of 4.0%. Results showed higher infection in > 8 weeks ago) (40%), 4 weeks age (30.76%), and 8 weeks age (27.77%). While the result of this indicates significant variations in the infection rates between the age of > 8 weeks and each of the ages of 4 weeks and 8 weeks. The study revealed that the majority of infection was single infection (76%), followed by double infection (16%), and mixed infection (8%).

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INTRODUCTION

Poultry is an important income source throughout the world. Poultry production includes different types of birds such as chickens, turkeys, ducks and ostrich. As the world human population is growing, the need for the protein of animal origin as a vital element of nutrients is essential. Poultry reproduction is the most effective and economical mode of meeting this request; due to the relatively small capital required to begin, the facility of feed availability and the quick puberty of the birds **(Udoh *et al.*, 2014; Dauda *et al.*, 2016)**.

Poultry production in Africa and Asia is yet split into trade and rural systems of production, each with its properties for egg and meat production **(Opara *et al.*, 2014; Bahadory *et al.*, 2014)**.

Turkeys are big birds that quickly gain popularity among small farmers due to their rapid replacement rate, higher feed transformation rate and lower land needs. It is said that these fowls can succeed more in dry conditions and resist heat as compared to chickens. The turkeys have a higher meat quality with little-fat content. Toms of turkeys are bigger than the females and their carcasses have a higher protein content than chicken carcass **(Oso *et al.*, 2008; Udoh *et al.*, 2014)**. Consequently, turkey rearing compliments chicken production.The world's economic value of turkeys increased as a major exporter of protein **(Ammar, 2015)**. Its inhabitants were considered to increase in Iraq **(Al-Alousi *et al.*, 1994)**.

Gastrointestinal parasites represent one of the main obstacles limiting poultry production by affecting the growth rate resulting in malnutrition which eventually causes death. Parasites that may pervade the GIT of turkeys are protozoans, cestodes, nematodes and trematodes and may influence health status through loss of appetite, weakness, diarrhea, anemia, reduced egg production, retard growth, therefore, decreasing their economic value **(Hafez, 2011; El-Dakhly *et al.*, 2016).**

The studies about gastrointestinal parasites of turkeys (*Meleagris gallopavo*) in Iraq are few **(Shamsuddin and Jasimm 1981)** isolated *Eimeria spp*.; **(Al-Dulaimi, 2013**) and **(Al-Moussawi, 2016)** reported *Heterakis spp*. and **Flayyih, (2014)** recorded *Histomonas spp*.

Several species of *Eimeria* that can infect turkeys include *Eimeria meleagridis, E. meleagrimitis, E. dispersa, E. gallopavonis, E. adenoids, E. innocua,* and *E. subrotunda*. Infection with *E. adenoids* and *E. meleagrimitis* can cause malabsorption, reduced feed intake, reduced growth, dehydration, poor feed conversion, and high mortality **(Chapman, 2008)**. The gastrointestinal parasites of *Meleagris gallopavo* are few in Iraq with no studies carried out in Erbil city.

So, the present study aimed to determine the prevalence of gastrointestinal parasites of *Meleagris gallopavo* in Erbil, Iraq.

MATERIALS AND METHODS

The present study was conducted in Erbil city, Iraq, from April to the end of June 2019. A total of 71 dropping samples from 71 birds were randomly collected from domestic turkeys (*Meleagris gallopavo*). A total of 50 swab samples were collected from the oral cavity, esophagus, and crop to diagnose the parasites using wet cotton swabs and examined by light microscope as mentioned by **(Anderson *et al.*, 2009; Mirzaei *et al*., 2016)**. The ages ranged from (4 weeks) to (> 8 weeks).

The samples were collected using nylon gloves, placed in plastic bottles and transferred to the Parasite Research Laboratory at the College of Veterinary Medicine at the University of Mosul for coprological examinations to investigate the eggs of worms and intestinal protozoan cysts and oocysts, which included: Direct smears of feces, flotation with sugar solution and sedimentation method (**Tagesu, 2018; Dakheel Kremsh Alasadiy *et al*., 2022)**. Worm eggs and protozoan oocysts were photographed using a digital camera. Description, identification and measurements of the obtained eggs, oocysts and larvae were confirmed as demonstrated by **(Opara *et al.*, 2014 Badparva, 2015; Isakakroudi *et al*., 2018)**.

The results were analyzed statistically using the program of Sigma stat 3.0, where the Chi-square test was used at a significant level ($P<0.05$) **(Verzani, 2004)**.

RESULTS

The current study revealed that turkeys were infected with different species of nematodes. The result showed six genera of parasites were identified in domestic turkeys; five were nematodes including *Heterakis gallinarum* (28%), *Capillaria spp.* (24%), *Trichostrongylus spp.* (16%), *Strongyloides avium* (12%), *Ascaridia galli* (4%). Furthermore, *Eimeria spp.* with 48% infection rate. Table (1) and Fig. (1).

Table 1: The infection rates of nematodes and *Eimeria* spp. in turkeys in dropping samples.

Species of parasite	No. of infected birds	Infection rates%
Heterakis gallinarum	7	28
Capillaria spp.	6	24
Trichostrongylus spp.	4	16
Strongyloides avium	3	12
Ascaridia galli	1	4
Eimeria spp.	12	48

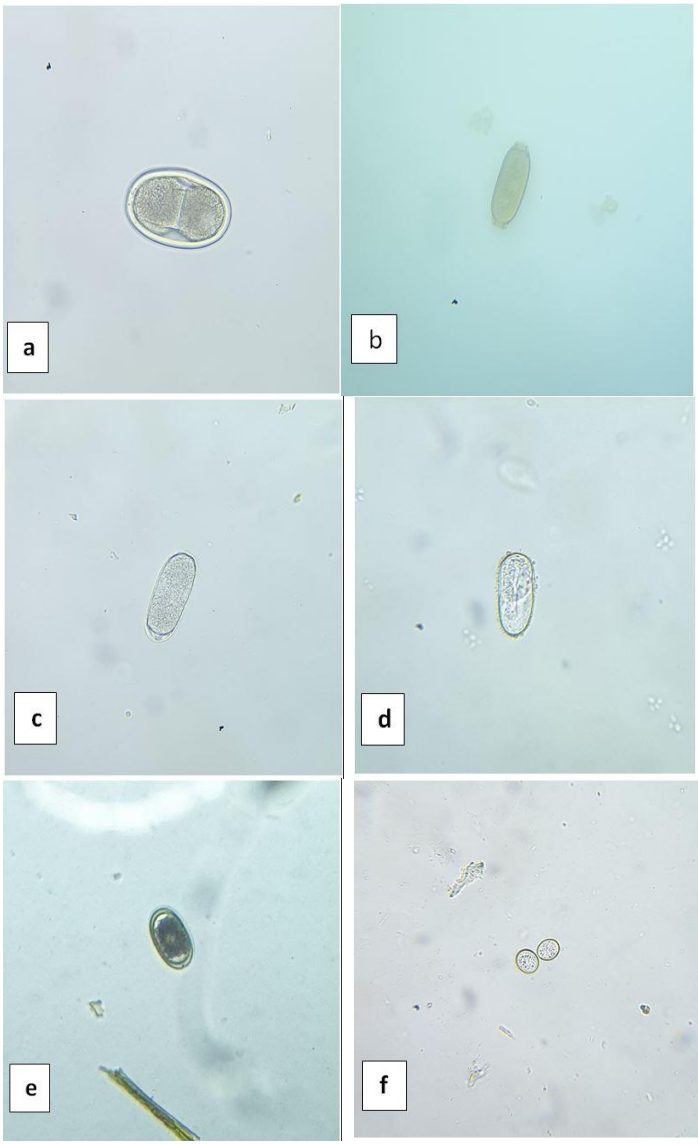

Fig. 1: Eggs of a. *Heterakis gallinarum* 40X, b. *Capillaria spp.* 40X, c. *Trichostrongylus spp.* 40X, d. *Strongyloides avium* 40X, e. *Ascaridia galli* 40X, f. Oocysts of *Eimeria spp.* 40X.

Out of 50 examined samples of oral swabs, *Strongyloides avium* larvae were detected in two of them, with an infection rate of 4%. Fig. (2).

Fig. 2: a. Larva of *Strongyloides avium* 10X, *b.* The anterior end of the larva is 40X, and

Regarding the age, the lowest and the highest infection rates were noticed in the eight weeks (27.77%) and more than eight weeks (40%), respectively, which were significantly different at a level of (P <0.05). The results revealed that the total percentage of infection with nematode helminths and *Eimeria* was 35.21%, shown in table (2).

Table 2: The infection rates and numbers of nematodes and *Eimeria spp*. in turkeys and its relationship with animal age:

Age of turkey	Examined birds	No. of infected birds	Infection rates%
4 weeks	13	4	30.76a
8 weeks	18	5	27.77a
> 8 weeks	40	16	40.00b
Total	71	25	35.21

The different letters mean significant differences at (P <0.05).

For the type of infection, results indicate that the single infection was 76% and the mixed infection with more than two species represented the lowest infection rate of 8%, with significant differences between a single infection with double and mixed infections with more than two species of parasites. Table (3).

Table 3: Types of infections with nematodes and *Eimeria* in turkeys.

Type of infection	No. of infected birds	Infection rates%
Single infection	19	76a
Double infection	4	16b
Mixed infection	2	8b
Total	25	35.21

The different letters mean significant differences at (P <0.05).

DISCUSSION

The current study showed that the inspected turkeys were infected in Erbil city with different species of gastrointestinal nematodes and *Eimeria spp.*, with a 35.21% total infection rate. However, the obtained percentage is lower than those in local and neighboring studies which were 82% **(Al-Alousi *et al.*, 1994)** and 75% **(Bahadory *et al.*, 2014)**, respectively. Our finding agrees with that recorded by **Mohammed *et al.*, (2017)**, who recorded 40% gastrointestinal infection of turkeys in Abuja city in Nigeria. Similarly, a local study mentioned that the total infection of turkeys in Diwaniyah city with nematodes was 46% **(Almayali and Al shabani, 2017)**. The variations in infection rates may be due to the differences in the environmental conditions, climatic, seasonal and meteorological variations the number of animals examined, types of breeding and rearing and the diagnostic methods applied **(Dagnachew *et al.*, 2011)**.

Currently, five species of nematode eggs were detected in turkeys (*Meleagris gallopavo*) in Erbil city with various infection rates. Present study results were inconsistent with that of **Oates *et al.*, (2005)**, who recorded that wild turkeys in Nebraska were infected by different types of nematodes **(Al-Mousawi, 2016)** and found that 11.11% of turkeys were infected with *Heterakis gallinarum* in the Nasiriyah city. The highest Heterakis gallinarum and Ascaridia galli had lower infection rates of 28% and 4%, respectively. The percentage of infection with *Capillaria spp.* **(Bahadory *et al.*, 2014; Dauda *et al.*, 2016; Jegede *et al.*, 2019)**.

The infection rate with *Trichostrongylus spp.* in this study was 16%. Nevertheless, this result was lower than **(Hon *et al.*, 1975)**, who reported a 33% infection rate with these worms.

The study indicated that turkeys were infected with *Strongyloides avium* worms at a rate of 12%. On the other hand, some researchers indicated that turkeys were infected with this species of worms, up to 48%, 2.5% and 32% **(Hon *et al.*, 1975**; **Dauda *et al.*, 2016** and **Jegede *et al.*, 2019)**, respectively. The difference could partially be due to the type of breeding (domestic and wild), environmental conditions, and the number of examined samples. Also, the study records intestinal protozoa of *Eimeria spp.* with an infection rate of 48%. The detected result agreed with **Ola-Fadunsin *et al.*, (2019)**.

The source of infection is possibly either directly via prehension and contact of the larvae by the mouth of the host or through penetrating the skin. The study documented the presence of Strongyloides avium larvae in the oral swabs at a rate of 4%. Later, the larvae migrated to the bronchi, trachea, and esophagus. The ultimate arrival occurs at the small intestine and cecum, where the adult worms settle down **(Ye *et al.*, 2022)**.

Regarding the age, it was found significant differences at ($P < 0.05$) between the age groups, with a higher prevalence rate seen among the (>8 weeks) group (40%). It is proposed that younger turkeys had little resistance due to their limited exposure with subsequent lower immunity compared with the prolonged exposure of the older turkeys and the completion of their immune system. **(Ozougwu *et al.*, 2021)**.

Infection with single gastrointestinal parasites in turkeys was popular in this study (76%), compared with the mixed infection (8%), with significant differences between a single infection with both double and mixed infection with three species or more at ($P <0.05$). Single or mixed worm infection might be due to the feeding behavior of turkeys, Appropriate environmental conditions, and environmental contamination with the helminth eggs **(Udoh *et al.*, 2014)**.

CONCLUSION

We conclude that turkeys are susceptible to infection with different species of intestinal nematodes and protozoa parasites, which negatively affect the production and growth of the turkeys. *Strongyloides avium* larvae were found in the oral swabs; the source of infection is possibly either directly via the mouth of the host or through penetrating the skin.

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REFERENCES

AL-ALOUSI T. I., DAOUD M. S., and AL-BAYATI M. M., 1994. A study of endoparasites of turkeys in Mosul-Iraq. Iraqi J. Vet. Med. 7, 123-129.

AL-DULAIMI, F. H. A. 2013. Prevalence of Parasitic Nematodes and Cestodes in Domestic Chickens and Turkeys Birds, Babylon province. Journal of Babylon University/ Pure and Applied Sciences 21(5), 1613-21.

ALMAYALI, H. M., and AL SHABANI, H. A., 2017. Diagnostic and Identical study of Turkey (*Meleagris gallopavo*) Parasites in AL-Diwaniyah province. Al-Qadisiyah Journal of Pure Science, 22(4), 162-172.

AL-MOUSSAWI, A. A. 2016. Nematodes of the Turkey *Meleagris gallopavo* (Galliformes: Phasianidae) from Al-Nasiriyah, Iraq. Journal of Biodiversity and Environmental Sciences, 8(4), 126-131.

AMMAR, K. N. A. W. 2015. Ultrastructural Study of Two Parasites Infecting Domesticated Turkey Meleagris Gallopavo Linnaeus, 1758 (Galliformes: Meleagridinae) Qena, Egypt. Journal of the Egyptian Society of Parasitology, 45(2), 331-343.

ANDERSON, N. L., GRAHN, R. A., VAN HOOSIER, K., and BONDURANT, R. H., 2009. Studies of trichomonad protozoa in free-ranging songbirds: prevalence of Trichomonas gallinae in house finches (*Carpodacus mexicanus*) and corvids and a novel trichomonad in mockingbirds (Mimus polyglottos). Vet Parasitol, 161(3-4), 178-186. https://doi.org/10.1016/j.vetpar.2009.01.023

BADPARVA, E., EZATPOUR, B., AZAMI, M., and BADPARVA, M., 2015. First report of birds infection by intestinal parasites in Khorramabad, west Iran. Journal of parasitic diseases, 39(4), 720-724. https://doi.org/10.1007/s12639-014-0427-5

BAHADORY S. R., RAD N. H., RAMEZANI A., BABAZADEH D., FALAH S., and GHAVAMI S., 2014. Evaluation of gastrointestinal helminths of native turkeys in Amol, Iran. J. World's Poult. Res., 4(4): 86–88. http://jwpr.science-line.com

CHAPMAN, H. D. 2008. Coccidiosis in the turkey, Avian Pathology, 37:3, 205-223, DOI: 10.1080/03079450802050689

DAGNACHEW, S., AMAMUTE, A., and TEMESGEN, W., 2011. Epidemiology of gastrointestinal helminthiasis of small ruminants in selected sites of North Gondar zone, Northwest Ethiopia. Ethiopian Veterinary Journal, 15 (2), 57-68. **DOI:** 10.4314/evj.v15i2.67694

DAKHEEL KREMSH ALASADIY, Y., MUKDAD MAHMOOD, R., and NAJI ALHASNAWI, A., 2022. A Comparative Study of Parasitic Infections in Domestic and Wild Pigeons in Iraq. Archives of Razi Institute, 77(2), 709-715. DOI: 10.22092/ARI.2022.357105.1976.

DAUDA, J., LAWAL, J. R., BELLO, A. M., MUSTAPHA, M., NDAHI, J. J., BIU, A. A., anad LAWAL, J. R., 2016. Survey on the prevalence of gastrointestinal nematodes and associated risk factors in domestic turkeys (*Meleagris Gallopavo*) slaughtered in poultry markets in Bukuru–Jos, Plateau State, Nigeria. Int J Innovative Agric Bio Res, 4(4), 27-36. www.seahipaj.org

EL-DAKHLY, M. K., MAHROUS, L. N., and MABROUK, G. A., 2016. Distribution pattern of intestinal helminths in domestic pigeons (*Columba livia domestica*) and turkeys (*Meleagris gallopavo*) in Beni-Suef province, Egypt. Journal of veterinary medical research, 23(1), 85-93.

FLAYYIH, M. M. 2014. Isolation and Identification of some Ectoparasites, Haemoprotozoa, Histomonas sp in Turkey (*Meleagris gallopavo*) in Nigeria city. M.Sc. thesis, University of Baghdad, College of Veterinary Medicine: 76p.

HAFEZ, H. M. 2011. Enteric diseases of poultry with special attention to *Clostridium perfringens*. Pak. Vet. J., 31(3): 175–184.

HON, L. T., FORRESTER, D. J., and WILLIAMS JR, L. E., 1975. Helminths of wild turkeys in Florida. Proceedings of the Helminthological Society of Washington, 42, 119-127.

ISAKAKROUDI, N., TALEB, A., ALLYMEHR, M., and TAVASSOLI, M., 2018. Effects of essential oils combination on sporulation of turkey (*Meleagris gallopavo*) Eimeria oocysts. Archives of Razi Institute, 73(2), 113-120. 10.22092/ARI.2017.109255.1102

JEGEDE, O. C., ADETIBA, R. O., KAWE, S. M., OPARA, M. N., MOHAMMED, B. R., OBETA, S. S., and OLAYEMI, O. D., 2019. Gastrointestinal Parasites of Local and Exotic Breeds of Turkeys [*Meleagris gallopavo*] In Gwagwalada Area Council, Abuja, Federal Capital Territory, Nigeria. Journal of Veterinary and Biomedical Sciences, 2 (1), 247-256.

MIRZAEI, M., GHASHGHAEI, O., and KHEDRI, J., 2016. First report of an outbreak of trichomoniasis in turkey in Sistan, Iran. Journal of Parasitic Diseases, 40(1), 61-64. https://doi.org/10.1007/s12639-014-0445-3

MOHAMMED, B. R., ADETIBA, R. O., JEGEDE O. C., KAWE, S. M., OPARA, M. N., AGBED, E., and SHEHU, R., 2017. Gastrointestinal parasites of turkeys (*Meleagris gallopavo*) in Gwagwalada Area Council, Abuja, Nigeria. 6th Annual Bacteriology and Parasitology Meeting, J Bacteriol Parasitol, 8:5 p:24 (Suppl) DOI: 10.4172/2155-9597-C1-037.

OATES, D. W., WALLNER-PENDLETON, E. A., KANEV, I., STERNER, M. C., CERNY, H. E., COLLINS, M., BISCHOF. R., and BOYD, E. D., 2005. A Survey of Infectious Diseases and Parasites in Wild Turkeys from Nebraska. Transactions of the Nebraska Academy of Sciences, 30: 25 – 31. https://digitalcommons.unl.edu/tnas

OLA-FADUNSIN, S. D., GANIYU, I. A., RABIU, M., HUSSAIN, K., SANDA, I. M., MUSA, S. A., and FURO, N. A., 2019. Gastrointestinal parasites of different avian species in Ilorin, North Central Nigeria. Journal of advanced veterinary and animal research, 6(1), 108. doi: 10.5455/javar.2019.f320

OPARA, M. N., OSOWA, D. K., and MAXWELL, J. A., 2014. Blood and Gastrointestinal Parasites of Chickens and Turkeys Reared in the Tropical Rainforest Zone of Southeastern Nigeria. Open Journal of Veterinary Medicine, 4, 308-313. 10.4236/ojvm.2014.412037

OSO, A. O., FAFIOLU, A. O., SOBAYO, R. A., JEGEDE, A. V., DELE, P. E., ALAKA, K. O., ONI, A. O. and AMOSUN, A. Y., 2008. A survey of backyard indigenous and exotic Turkey production in Abeokuta Metropolis. In Proceedings on the 13th Annual Conference of the ASAN, 709-710. Repositioning Animal agriculture for the Realization of national Vision 2020.

OZOUGWU, J. C., IMAKWU, C. A., EZIUZOR, S. C., EKELEME, J. E., OKEKE, O. P., AMANA, G. U., and OGBODO, J. C., 2021. Prevalence of Intestinal Helminthes with Respect to Age, Sex and Breeds of Chicken Slaughtered at Eke Awka Market, Awka, Anambra State, Nigeria. Asian Journal of Biology, 11(1): 1-7 DOI: 10.9734/AJOB/2021/v11i130129

SHAMSUDDIN, M., and JASIM, M. K., 1981. Coccidia of some birds and mammals from Iraq. Bulletin of the Natural History Research Center, 7(4), 81-109.

TAGS A., 2018. Examination of feces. Int J Vet Sci Res s1: 045-050. DOI: http://dx.doi.org/10.17352/ijvsr.s1.106

UDOH, N. A., LUKA, S. A., and PATRICK A. A., 2014. Prevalence of Gastrointestinal Parasites of Domestic Turkey (*Meleagris Gallopavo*) Linnaeus, (1758) Slaughtered in Kaduna Metropolis, Kaduna State, Nigeria. Journal of Natural Sciences Research, 4(17): 105 – 109.

VERZANI, J. 2004. Using R for introductory statistics. Chapman and Hall/CRC. Publishing.pp.114.

YE, L., TAYLOR, G. P., and ROSADAS, C., 2022. Human T-Cell Lymphotropic Virus Type 1 and Strongyloides stercoralis Co-infection: A Systematic Review and Meta-Analysis. Frontiers in medicine, 9, 832430. https://doi.org/10.3389/fmed.2022.832430

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