Iraqi Journal of Veterinary Sciences

www.vetmedmosul.com

Molecular and serological detection of *Toxoplasma gondii* in three species of wild birds of Babylon province, middle Iraq

A.I. Abdulzahra[1] and B.H. Abdullah[2]

[1]Department of Sciences, College of Basic Education, University of Babylon, Babylon, [2]Department of Biology, College of Education for Pure Sciences, University of Basrah, Basrah, Iraq

Article information

Article history:
Received March 29, 2022
Accepted June 11, 2022
Available online June 12, 2022

Keywords:
Columba livia
Nested PCR
Passer domesticus
Streptopelia senegalensis
Toxoplasma gondii

Correspondence:
B.H. Abdullah
drbasimabdulah@gmail.com

Abstract

Birds are intermediate hosts and important reservoirs that play a significant role in *Toxoplasma gondii* (Apicomplexa, Sarcocystidae) epidemiology and infection transfer to humans by eating their raw or undercooked meat. The aim of this study is to diagnose the *Toxoplasma gondii* infection in three species of wild birds (*Columba livia*, *Streptopelia senegalensis* and *Passer domesticus*) in the province of Babylon from May 2021 to August 2021, using a latex agglutination test and molecular diagnosis with nested PCR for SAG1 gene identification. Results showed that antibodies were detected in 56/144 (38.88%) samples. Furthermore, results of the nested PCR technique for detection of SAG1 gene revealed that 41 (73.21%) of the samples positive for the latex agglutination test were only found in three species of birds. These three species of birds were found infected with *T. gondii* with possible transmission to human beings. For the first time, a *S. senegalensis*, was infected with the *T. gondii* in Iraq.

DOI: 10.33899/ijvs.2022.133394.2219,

Introduction

Toxoplasmosis is very important zoonotic parasitic disease caused by a parasite belonging to the group Coccidia, the class of Sporozoa known as the parasite *Toxoplasma gondii* (1,2). *T. gondii* is a major public health concern because it affects a large number of people around the world (3). *T. gondii* (Apicomplexa, Sarcocystidae) is one of the most common parasitic infections of humans and other warm-blooded animals, including birds (4,5). Sexual reproduction of this parasite develops in the intestines of cats, while asexual reproduction occurs in the tissues of mammals and birds (6). Toxoplasmosis in bird populations can be a substantial concern from the wildlife conservation perspective, as a result of many species are acutely sensitive to *T. gondii* (7). *Toxoplasma* was considered a cause of death for birds of various species (8). The parasite goes through three stages that are contagious: Oocysts, which are introduced into the external environment with the feces of infected cats, which later form spores. Tachyzoite divides rapidly into all host cells and intermediate host cells, sometimes surrounded by an irregularly shaped cyst. The thin layer of the wall is known as the pseudocyst, and the bradyzoite, which reproduces slowly, spreads into a thick wall sac known as the tissue cyst, which forms within various organs of the host's body (9-12). Cats are the only definitive host for the *T. gondii* and thus the only source of infective oocysts, however different mammals and birds can develop tissue cysts (13). Cats can spill millions of oocysts after ingesting just one bradyzoite (14). Ground-feeding birds are essentially important in the epidemiology of *T. gondii* because they act as indicators of soil oocyst contamination and can be deemed important reservoirs of the parasite as they are often eaten by felids (15,16). *T. gondii* oocysts undergoes environmentally- resistant stages that can survive in soil for years. When climatic factors such as humidity and temperature are favorable; they lead to the infection of birds (17,18). Infection of birds with *T. gondii* is a good indicator

of soil contamination by the parasite oocysts (19). Clinical signs of infection in birds are often indefinite and vary in severity depending on the age of the host, dose of the infective agent, species of the host, rate of infection, and virulence of the *Toxoplasma* strain (20). Symptoms in birds include loss of appetite, pallor of the mucous membranes, emaciation, diarrhea, and central nervous system dysfunction. The parasite spreads easily through the vascular system and lymphoid tissues, parasitizing and killing individual cells. The characteristic tissue lesion is severe necrosis surrounded by lymphocytes, macrophages and heterotrophic cells (21). Toxoplasmosis may cause diarrhea in infected birds, and this indication is worth research because it harms the animal's nutrition and thus its growth. A possible explanation may be that *T. gondii*, unknowingly so far, alters the functioning of the enteric nervous system responsible for coordinating intestinal motility (22). The determination of *T. gondii* spread in indigenous birds, as well as other indications for detecting *T. gondii* oocyst in the environment, is of significant interest (23). *T. gondii* serological and molecular diagnosis are critical because microscopic detection is difficult and can be confounded with other species, particularly *Sarcocystis* spp. (24). The use of agglutination latex test for diagnosis of *T. gondii* is common nowadays, because of its ease of use and its reduction of money, time and effort required to perform it (25). Polymerase chain reaction (PCR) technique is used to confirm the results of serological tests because this technique is highly sensitive and specific when used to detect *T. gondii* parasite in different biological samples (26).

The current study aims at evaluating the incidence rates of *T. gondii* in three species of birds in the province of Babylon to detect antibodies (Abs) of the parasite in the birds' sera using Latex Agglutination Test (LAT) as a primary test, and to confirm the presence of the parasite *T. gonodii* through a polymerase chain reaction technique (nested PCR) by confirming the presence of the parasite's SAG1 gene in tissue samples due to the economic importance of birds and their proximity to humans, specifically *Columba livia*, *Streptopelia senegalensi*s and *Passer domesticus* that act as intermediate hosts for the parasite.

Materials and Methods

Ethical approve

The approval was given to conduct this scientific work by the University of Basra, College of Education for Pure Sciences in their book No. 3/7/3061 on 14/12/2020.

Collection of bird specimens

A total of 144 birds (*Columba livia*, *Streptopelia senegalensis* and *Passer domesticus*) were hunted at different locations of the province of Babylon.

Collection of blood samples and serum isolated

Blood samples were collected from the brachial vein. Serum was isolated by centrifuging blood samples for 5-10 minutes at 3500 rpm. Then the serum was transferred to Eppendorf tubes that were kept frozen until the day of the experiment.

Latex agglutination test (LAT)

The latex agglutination test (Toxo-latex, spinreact, Spain) was performed according to the method described by Campbell (27). On the day of the latex agglutination test experiment, the serum was left at room temperature, and then 50 µl of serum was used, mixed with 25 µl of reagent and left for 5 min with good mixing by plastic sticks supplied with the test kit. Positive samples for the latex agglutination test showed clear agglutination, while negative samples did not adhere to the reagent. Avian tissues (liver, heart, and brain) positive for the latex test were kept frozen for use for molecular purposes.

DNA isolation and Nested PCR amplification of *T. gondii*

The AddPrep Genomic DNA Extraction kit (Addbio, Korea) was used to extract genomic DNA from tissue samples from 56 wild birds that tested positive for the latex test. This was carried out in accordance with the protocol described by the manufacturer's instructions. Until the extracted DNA was analyzed, it was stored at -20°C. Molecular diagnosis was performed by the nested PCR method using primers targeting the SAG1 gene for *T. gondii* (First round: SAG1ExF (5-GTTCTAACCACGCACCCTGAG-3), SAG1ExR (5-AAGAGTGGGAGGCTCTGTGA-3) 430 bp, second round: SAG1InF (5-CAATGTGCACCTGTAGGAAGC-3), SAG1InR (5-GTGGTTCTCCGTCGGTGTGAG-3) 390 bp) described by Grigg *et al*. (28) and Lass *et al*. (29) to detect possible infection with *T. gondii* and determination of the results of doubling on agarose gel. The positive samples fourteen were deposited in the NCBI database that provided us with the accession numbers explained in (Table 1).

Results

LAT and Nested PCR

Results showed that antibodies were detected in 56/144 (*Columba livia* 37.5%, *Streptopelia senegalensis* 28.57% and *Passer domesticus* 33.92%) samples three species, while the nested PCR technique for detecting the SAG1 gene revealed that 41 (*C. livia* 36.58%, *S. senegalensis* 29.26% and *P. domesticus* 34.14%) of the samples positive for the latex test from the three birds were only discovered to be positive. Furthermore, the SAG1 gene has a 390bp molecular weight (Figure 1). The results also showed significant differences in the infection with *T. gondii* parasite between males and females, where the infection in males 55.35% was higher than it was in females 44.64% using the latex

agglutination test, while the infection was in females 51.21%, which was higher than that of males 48.78% using the nested polymerase chain reaction technique.

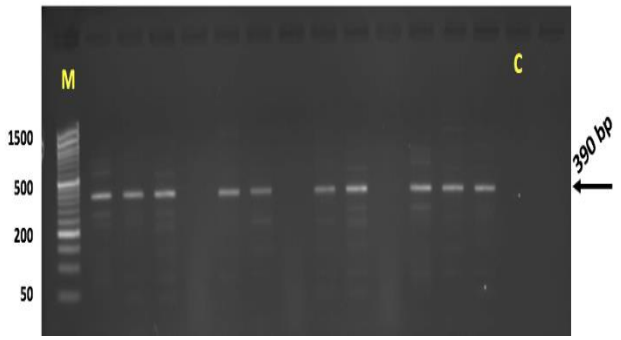

Figure 1: Gel electrophoresis image (2%) shows the second round amplicons of SAG1 gene of *T. gondii* in positive samples (size= 390 bp). M is molecular marker (genedirex, Korea). C is control negative in which H_2O was added instead of DNA.

The sequences

From matching the sequences of the *Toxoplasma* parasite recorded in the current study with the sequences of the same parasite registered in the NCBI Gene bank, it was observed that there was a congruence of (97.41-99.71) between the parasite samples isolated in the current study with the species registered in the National Center for Biotechnology Information (NCBI) (Table 1). Importantly enough, three strains were closely related to the strains from Poland and Australia, including: OK138619, OK138624, OK138626.

Phylogenetic tree

After reading the sequences of the SAG1 gene of the *T. gondii* parasite isolated in this current study, which was described as the red circles and deposited at the NCBI GenBank website, a phylogenetic tree analysis was drawn using Clustal Omega software (Figure 2). These are aligned and compared with other global strains indicated by the yellow circles.

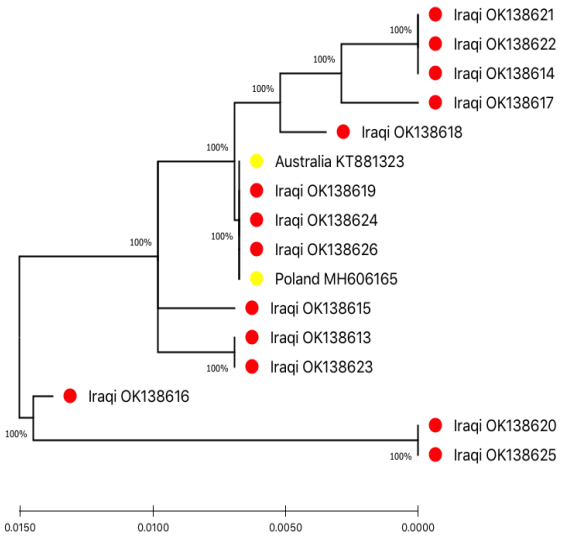

Figure 2: Phylogenetic tree analysis of currently identified sequences of *T. gondii*.

Table 1: The NCBI-BLAST Homology sequence identity (%) between local *T. gondii* of bird's tissue isolates deposited in the NCBI under the accession numbers shown in the table below

Toxoplasma gondii sequence No.1	Accession number	NCBI-BLAST Homology sequence identity (%)			
		Identical to	GenBank Accession number	Country	Identity (%)
1	OK138613	*Toxoplasma gondii*	MH606165	Poland	99.43
2	OK138614	*Toxoplasma gondii*	KT881323	Australia	99.43
3	OK138615	*Toxoplasma gondii*	DQ872517	India	99.14
4	OK138616	*Toxoplasma gondii*	MN958072	Italy	98.57
5	OK138617	*Toxoplasma gondii*	LC414528	Iran	98.85
6	OK138618	*Toxoplasma gondii*	LN714498	Saudi Arabia	99.71
7	OK138619	*Toxoplasma gondii*	KT881352	Australia	99.70
8	OK138620	*Toxoplasma gondii*	MG588014	Italy	98.28
9	OK138621	*Toxoplasma gondii*	KY618706	China	99.68
10	OK138622	*Toxoplasma gondii*	MH606164	Poland	97.90
11	OK138623	*Toxoplasma gondii*	MH704654	Iran	97.41
12	OK138624	*Toxoplasma gondii*	LC414529	Iran	99.71
13	OK138625	*Toxoplasma gondii*	MG588013	Italy	98.28
14	OK138626	*Toxoplasma gondii*	MH606155	Poland	99.43

Discussion

The nested PCR technique has been used to corroborate the results of serological tests represented by the latex agglutination test as a diagnostic method, being a more sensitive tool allowing specific amplification product to be extracted from an abundance of non-specific products. Even if PCR primers amplify non-specific sequences; making it impossible to identify the desired product, a second PCR, using nested primers, is designed to amplify an inner region of the original amplified product (30).

The results of immunological detection, using latex agglutination test and molecular detection, using nested PCR technique to search for the SAG1 gene showed that the incidence of *T. gondii* in *Columba livia* is higher than the percentage that was recorded by Alaraji *et al*. (31) in Babylon Province using the latex agglutination test which is 20% and in some other governorates of Iraq, including Hamza and Dakhel (32) in Al-Qadisiyah governorate using latex agglutination assay and Al-Abodi (33) in Al-Qadisiyah governorate using latex agglutination assay and PCR technique to search for B1 gene, which are 32.3%, 13.74 (5% and 5%) respectively.

Also, the incidence of infection was higher in percentage than what was recorded in several studies in the world, including Valian and Ebrahimi (34) in Iran using direct agglutination test (DAT), and Waap *et al*. (35), in Portugal using direct agglutination test (DAT), Alvarado-Esquivel *et al*. (36) in Mexico using modified agglutination test (MAT), and Khademvatan *et al*. (37) in southwestern Iran using PCR-RFLP technology to search for the GRA6 gene, which were: 2.8, 4.6, 1.3, and 6.9%, respectively. The number of positive cases in the current study was lower than the percentage reported by Tayyub *et al.* (38) in Pakistan using PCR technique which is 38.3%.

The percentage of positive cases recorded in the current study of *Streptopelia senegalensis* is higher than the percentage recorded by Valian and Ebrahimi (34) in Iran using direct agglutination test (DAT), which is 5.1%. As for the number of positive cases in *Passer domesticu*s, it is higher than the percentage recorded by Valian and Ebrahimi (34) in Iran using the direct agglutination test (DAT) Literák *et al*. (39) in the Czech Republic using an indirect fluorescent antibody (IFA) assay and Cong *et al*. (40) in Northwest China using MAT and PCR technology to search for the B1 gene and Khademvatan *et al*. (37) in southwestern Iran using PCR-RFLP technology to search for the GRA6 gene, which are 17%, 12.3%, (12.46%, 28.20%) and 26.5%, respectively. However, the number of positive cases of *P. domesticus* is lower than the percentage recorded by Hussein *et al*. (10) in Iraq using the rapid cassette testing 71.25%. As for *Streptopelia Senegalensis* in Iraq, there are no studies conducted.

The cause of the disparity in infection rates of *T. gondii* in the above studies can be explained on the basis of the difference in the number of samples examined, the sensitivity of the tests used in diagnosis, and the variation in the geographical and environmental location of those areas (32).

Conclusion

Three species of birds were found infected with *T. gondii* with possible transmission to human beings. It was the first time that *S. senegalensis* had been reported infected with the parasite.

Acknowledgements

I would like to thank the Biology Department, College of Education for Sciences, University of Basrah, Iraq for the facilities they provided for me to conduct the research.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

References

1. Rajendran C, Keerthana CM, Anilakumar KR, Satbige AS, Gopal S. Development of B1 nested PCR for assessing the prevalence of zoonotic protozoan disease agent *Toxoplasma gondii* among food animals from Karnataka State, Southern India. J Microbiol Lab Sci. 2018;1(1):1-8. [available at]
2. Arabpour M, Bandehpour M, Niyyati M, Abdollahi SH, Koochaki A, Kazemi B. Cloning and expression of *Toxoplasma gondii* tachyzoite P22 protein. African J Biotechnol. 2011;10(40);7746-7750. DOI: 10.5897/AJB10.2580
3. Al-Sadoon MA, Nasir MA, Yasir ET, Khalaf AO, Kadim SJ. Toxoplasmosis and risk factors among female students of medical colleges at Basra University, Iraq. Biomed Pharmacol J. 2018;11(4):2117-2122. DOI: 10.13005/bpj/1591
4. Gazzonis AL, Villa L, Lubian E, Ressegotti S, Grilli G, Raimondi S, Manfredi MT. Molecular survey on *Toxoplasma gondii* and Neospora caninum infection in wild birds of Prey Admitted to Recovery Centers in Northern Italy. Microorganisms. 2021;9(4):736. DOI: 10.3390/microorganisms9040736
5. Cabezón O, García-Bocanegra I, Molina-López R, Marco I, Blanco JM, Höfle U, Almería S. Seropositivity and risk factors associated with *Toxoplasma gondii* infection in wild birds from Spain. PLoS One. 2011;6(12);1-7. DOI: 10.1371/journal.pone.0029549
6. Frenkel JK, Dubey JP, Miller NL. *Toxoplasma gondii* in cats: Fecal stages identified as coccidian oocysts. Sci. 1970;167(3919), 893-896. DOI: 10.1126/science.167.3919.893
7. Dubey JP. A review of toxoplasmosis in wild birds. Vet Parasitol. 2002;106(2):121-153. DOI: 10.1016/S0304-4017(02)00034-1
8. Tenter AM, Heckeroth AR, Weiss LM. *Toxoplasma gondii*: From animals to humans. Intern J Parasitol. 2000;30(12-13):1217-1258. DOI: 10.1016/S0020-7519(00)00124-7
9. Al-Mashhadany RI, Hussein AJ, Al-nusear ANB. A Molecular and histological study of Turkey birds infected with toxoplasmosis. J Physics: Conference Series. 2019;1294(6):1-8. DOI: 10.1088/1742-6596/1294/6/062065
10. Hussein AJ, Al-Abodi HRJ, Al-Mashhadany RI. A serological and histological study of *Passer domesticus* infected with *Toxoplasma*

gondii parasite. Int J Res Pharm Sci. 2019;10(1):402-406. DOI: 10.1088/1742-6596/1294/6/062065
11. Al-Safar A, Mohammed SA, Al-Ghazal AT. An epidemiological and diagnostic study of *Toxoplasma gondii* by serological and molecular methods using nPCR technique in pregnant and abortive women in mosul and it environ. Rafidain J Sci. 2019;28(3):24-37. DOI: 10.33899/rjs.2019.163154.
12. Al-Ammash MSJ, Al-Shaibani KTM, Al-Abodi HRJ. Investigating the prevalence of infection with *Toxoplasma gondii* in men and women in Samaraa city, Iraq. Plant Arch. 2018;18(2):2501-2508. DOI: 10.29079/vol16iss1art432
13. Elmore SA, Jones JL, Conrad PA, Patton S, Lindsay DS, Dubey JP. *Toxoplasma gondii*: Epidemiology, feline clinical aspects, and prevention. Trends Parasitol. 2010;26(4):190-196. DOI: 10.1016/j.pt.2010.01.009
14. Dubey JP, Hill DE, Jones JL, Hightower AW, Kirkland E, Roberts JM, Gamble HR. Prevalence of viable *Toxoplasma gondii* in beef, chicken, and pork from retail meat stores in the United States: Risk assessment to consumers. J Parasitol. 2005;91(5):1082-1093. DOI: 10.1645/GE-683.1
15. Dubey JP, Felix TA, Kwok OCH. Serological and parasitological prevalence of *Toxoplasma gondii* in wild birds from Colorado. J Parasitol. 2010;96(5):937-939. DOI: 10.1645/GE-2501.1
16. Godoi FSLD, Nishi SM, Pena HFDJ, Gennari SM. *Toxoplasma gondii*: Diagnosis of experimental and natural infection in pigeons (*Columba livia*) by serological, biological and molecular techniques. Revist Brasil de Parasitol Vet. 2010;19(4);237-243. DOI: 10.1590/S1984-29612010000400009
17. Jiménez-Coello M, Acosta-Viana KY, Guzmán-Marín E, Puerto-Solís M, Ortega-Pacheco A. Toxoplasmosis: A relevant zoonotic food borne disease in tropical conditions. African J Microbiol Res. 2012;6(12):2956-2964. DOI: 10.5897/AJMR11.1548
18. Yan C, Yue C L, Yuan ZG, He Y, Yin CC, Lin RQ, Zhu XQ. *Toxoplasma gondii* infection in domestic ducks, free-range and caged chickens in southern China. Vet Parasitol. 2009;165(3-4):337-340. DOI: 10.1016/j.vetpar.2009.07.015
19. Tsai YJ, Chung WC, Lei HH, Wu YL. Prevalence of antibodies to *Toxoplasma gondii* in pigeons (*Columba livia*) in Taiwan. J Parasitol. 2006;92(4):871-871. DOI: 10.1645/GE-716R2.1
20. Turner GVS. Some aspects of the pathogenesis and comparative pathology of toxoplasmosis. J South African Vet Associat. 1978;49(1):3-8. [available at]
21. Hubbard G, Witt W, Healy M, Schmidt R. An outbreak of toxoplasmosis in zoo birds. Vet Pathol. 1986;23(5):639-641. DOI: 10.1177/030098588602300520
22. 22.Furness JB. The Enteric Nervous System. NY; Blackwell Publishing; 2006. 288 p.
23. Dubey JP, Graham DH, Dahl E, Hilali M, El-Ghaysh A, Sreekumar C, Lehmann T. Isolation and molecular characterization of *Toxoplasma gondii* from chickens and ducks from Egypt. Vet Parasitol. 2003;114(2):89-95. DOI: 10.1016/S0304-4017(03)00133-X
24. Coutinho SG, Lobo R, Dutra G. Isolation of *Toxoplasma* from the soil during an outbreak of toxoplasmosis in a rural area in Brazil. J Parasitol. 1982:866-868. DOI: 10.2307/3280995
25. Zia-Ali N, Keshavarz-Valian H, Rezaian M, Khorramizadeh MR, Kazemi B, Fazaeli A, Darde M. Molecular characterization of *Toxoplasma gondii* from bird hosts. Iranian J Public Hlth. 2005;34(3):27-30. [available at]
26. Burg JL, Grover CM, Pouletty P, Boothroyd J. Direct and sensitive detection of a pathogenic protozoan, *Toxoplasma gondii*, by polymerase chain reaction. J Clin Microbiol. 1989;27(8):1787-1792. DOI: 10.1128/jcm.27.8.1787-1792.1989
27. Campbell T. Avian hematology. Iowa: Iowa State University press; 1995. 3-13 p. [available at]
28. Grigg ME, Ganatra J, Boothroyd JC, Margolis TP. Unusual abundance of atypical strains associated with human ocular toxoplasmosis. J Infect Dis. 2001;184(5):633-639. DOI: 10.1086/322800
29. Lass A, Ma L, Kontogeorgos I, Zhang X, Li X, Karanis P. First molecular detection of *Toxoplasma gondii* in vegetable samples in China using qualitative, quantitative real-time PCR and multilocus genotyping. Sci Rep. 2019;9(1):1-11. DOI: 10.1038/s41598-019-54073-6
30. McPherson MJ, Moller SG. PCR: The Basics. China: Taylor and Francis; 2006. 23-63 p.
31. Alaraji F, Al-Mahmoudi AHJ, Jasim NS. Serological study of toxoplasmosis in domestic pigeon *Colombia livia* in Babylon province. Al-Qadisiyah J Vet Med Sci. 2019;18(1):5-8. [available at]
32. Hamza HM, Dakhel MH. Isolation of *Toxoplasma gondii* histocysts from local chickens, wild and domestic pigeons. Al-Qadisiyah J Pure Sci. 2012;17(4):36-47. [available at]
33. Al-Abodi HJ. Serological and molecular detection of *Toxoplasma gondii* in *Columba livia* hunting pigeons of Al-Qadisiyah province. Al-Qadisiyah J Vet Med Sci. 2017;16(1):136-141. DOI: 10.29079/vol16iss1art432
34. Valian HK, Ebrahimi A. Prevalence of *Toxoplasma gondii* in birds of Kerman city by serological and parasitological methods. Iranian J Public Hlth. 1994;23(1-4):25-34. [available at]
35. Waap H, Vilares A, Rebelo E, Gomes S, Ângelo H. Epidemiological and genetic characterization of *Toxoplasma gondii* in urban pigeons from the area of Lisbon (Portugal). Vet Parasitol. 2008;157(3-4):306-309. DOI: 10.1016/j.vetpar.2008.07.017
36. Alvarado-Esquivel C, Rajendran C, Ferreira LR, Kwok OCH, Choudhary S, Alvarado-Esquivel D, Dubey JP. Prevalence of *Toxoplasma gondii* infection in wild birds in Durango, Mexico. J Parasitol. 2011;97(5):809-812. DOI: 10.1645/GE-2844.1
37. Khademvatan S, Saki J, Yousefi E, Abdizadeh R. Detection and genotyping of *Toxoplasma gondii* strains isolated from birds in the southwest of Iran. British Poult Sci. 2013;54(1):76-80. DOI: 10.1080/00071668.2013.763899
38. Tayyub M, Ali S, Javid A, Imran M. Molecular detection of *Toxoplasma gondii* and *Neospora caninum* in rock pigeons (*Columba livia*) in Punjab, Pakistan. Parasitol Res. 2022;121:1499-1505. DOI: 10.1007/s00436-022-07494-8
39. Literák I, Pinowski J, Anger M, Juřicová Z, Kyu-Hwang H, Romanowski J. *Toxoplasma gondii* antibodies in house sparrows (*Passer domesticus*) and tree sparrows (*P. montanus*). Avian Pathol. 1997;26(4):823-827. DOI: 10.1080/03079459708419255
40. 40.Cong W, Huang SY, Zhou DH, Zhang XX, Zhang NZ, Zhao Q, Zhu XQ. Prevalence and genetic characterization of *Toxoplasma gondii* in house sparrows (*Passer domesticus*) in Lanzhou, China. Korean J Parasitol. 2013;51(3):363. DOI: 10.3347/kjp.2013.51.3.363

الكشف الجزيئي والمصلي عن المقوسة الكوندية في ثلاثة أنواع من الطيور البرية في محافظة بابل، وسط العراق

أمير إبراهيم عبد الزهرة[1] و باسم هاشم عبد الله[2]

[1]قسم العلوم، كلية التربية الأساسية، جامعة بابل، بابل، [2]قسم علوم الحياة، كلية التربية للعلوم الصرفة، جامعة البصرة، البصرة، العراق

الخلاصة

الطيور هي مضائف وسيطة وخازنات مهمة تلعب دورا مهما في وبائية المقوسة الكوندية (معقدات القمة، عائلة Sarcocystidae) وتنتقل العدوى إلى البشر عن طريق تناول اللحوم النيئة أو غير المطبوخة جيدا. الهدف من هذه الدراسة هو تشخيص عدوى المقوسة الكوندية في ثلاثة أنواع من الطيور البرية (الحمام الطوراني وفاختة النخيل والعصفور الدوري) في محافظة بابل من مايـــو ٢٠٢١ إلى أغســـطس ٢٠٢١،

باستخدام اختبار تلازن اللاتكس والتشخيص الجزيئي باستخدام تقنية تفاعل البلمرة المتسلسل المتداخل لتحديد الجين SAG1. أظهرت النتائج أن الأجسام المضادة وجدت في ١٤٤/٥٦ عينة (٣٨,٨٨٪). علاوة على ذلك، أظهرت نتائج تقنية تفاعل البلمرة المتسلسل المتداخل للكشف عن جين SAG1 في أن ٤١ (٧٣,٢١٪) من العينات الإيجابية لاختبار تلازن اللاتكس وجدت إيجابية فقط في ثلاثة أنواع من الطيور. تم العثور على هذه الأنواع الثلاثة من الطيور مصابة بطفيلي المقوسة الكوندية مع احتمال انتقالها إلى البشر. ولأول مرة تم تسجيل إصابة طائر فاختة النخيل بطفيلي المقوسة الكوندية في محافظة بابل خصوصا وفي العراق عموما.