



The role of *Musca domestica* in transmission of Toxoplasma in Baghdad

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Abstract

A total of 490 individuals adult of *Musca domestica* were collected from garbage of houses, local markets and stables of animals in Baghdad for the period from March to October 2012, to identify the oocysts of protozoa. The study showed two types of sporozoites, one was long, spindle, unineclate, other are small, short, crescent – shaped. This study recorded for first time the presence of *Toxoplasma* in the digestive tract of filth fly *Musca domestica*, the results of trophozoite and tachyzoit of *Toxoplasma* revered to two suggestion: first, filth fly transmitted *Toxoplasma*, transracially, second, filth fly infected with Toxoplasma as intermediate host.

Key words: House fly, *Musca domestica*, transmittion, Toxoplasma, Baghdad.

Introduction

Toxoplasmosis is a zoonotic disease caused by the protozoan parasite, *Toxoplasma gondii*. About 20% to 90% of the world's adult population in different regions are reported to have had contact with the parasite *Toxoplasma* (Galván-Ramirez *et al.*, 1998).

Toxoplasma oocyst shed in cat (the definitive host) feces sporulate in the soil under warm, humid conditions and could contaminate water and food, especially fruits and vegetables. Most cases of toxoplasmosis in humans are probably acquired by ingestion of sporulated oocyst in soil or contaminated unwashed, unpeeled vegetables and fruits tachyzoite in unpasteurized milk and cysts in raw or undercooked infected meat. Although beef is a potential source of infection, pork and lamb are known to be the most common sources of contamination. Filth flies (that is, flies that develop on animal dung, carcasses, feces, blood or garbage) such as the common housefly, *Musca domestica* Linnaeus and the oriental blow fly, *Chrysomya megacephala* (Fabricius) also have the capability of carrying viable *Toxoplasma* oocyst (for 1 to 2 days) from cat feces to food (Wallace, 1971).

The first record of Toxoplasmosis in Iraq by Machattie (1938) from spleen of wild dogs in Baghdad, after that the diagnosis of the disease by serological tests were applied at slaughtered sheep and goat at Al-Dura and Al-Shualla in Baghdad that appeared high infection rate 84.5% by Complement Fixation Test (CFT) and Indirect Haemagglutination Test (IHAT) (Rasheed, 1984). In another study at sheep and goat also recorded 43.3% that positive cases at IHAT 38.7% and positive cases at IFAT 33.14% (Mehdi, 1988). That mean Toxoplasmosis may caused by handling with blood of sheep and goat besides, polluted with feces of cats. The infection rate of Toxoplasmosis at aborted women in Baghdad 34.7% by Enzyme-linked immunosorbent assay (ELISA), Immuno-fluorescence technique (IFAT) (Al-Dejaly, 1988).

The current study aimed to revealed the role of *Musca domestica* in transmission of Toxoplasma .

Materials and Methods

Adult of *Musca domestica* (490) were collected from garbage of houses, local markets and stables of animals in Baghdad for the period from March to October 2012, to identify the oocysts of protozoa, two methods were applied:

- 1- Washing technique: all the flies (490) were dipped in distal water for 3 hrs and centrifuged, the supernatant was used to identify the parasites that transmitted mechanically (Gregor *et al.*, 2002).
- 2- Staining technique: The procedure to be used with digestive fluid of filth fly after deposit the abdomen, to identify the protozoa that transmitted internally by two stains technique, Giemsa stain (320 flies) and Zeal Nelson stain (170flies). Photographs, measurements and color of eggs, cysts and oocysts were taken after Ocular micrometer calibration (Thienpont *et al.*, 1984). This work and diagnosis were done in Iraqi Natural History Research center and Museum, University of Baghdad. Key of diagnosis were established according to Thienpont *et al.* (1986); Edward and Marietta (1959); Al- Joobori (2002) and WHO(2004).

Results and Discussion

Sporozoites: This study showed two types of sporozoites, one of each are long, spindle, unineclate, 2 -6 μ length (Figure 1), other are small, short, crescent - shaped, and 0.3-0.5 μ length (Figure 2).

***Toxoplasma* sp.:** A- Trophozoite; oval or reniform haemocytosoa, without pigment. B- Trophozoite; elliptical shape with two nuclei (schizogony). C- Tachyzoites: many organisms which developed by repeated binary fission (Figure 3).

It is unlikely that human protozoan parasites are transmitted transracially through the larval and pupal stages of synanthropic insects to the adult stages of species whose larval stages, e.g.: maggots, breed in contaminated substrates (Hedges, 1980). Transracial transmission is the passage of an infectious agent from the egg to the adult insect stage. This is because the pupation process involves intense reorganization of the digestive tract tissue, resulting in the development of a new digestive system and production of the meconium (Graczyk *et al.*, 1999), accumulated intestinal wastes that remain behind in the puparium. This has been confirmed in laboratory experiments. *Toxoplasma gondii* oocysts were isolated from larvae and pupae of house flies reared in infectious cat feces but not

from newly emerged adult house flies (Wallace, 1971).

This study recorded for first time; the presence of *Toxoplasma* sp. in the digestive tract of filth fly, the results of trophozoite and tachyzoit of *Toxoplasma* revered to two suggestion: first, filth fly transmitted *Toxoplasma* sp, transracially, that similar to (Wallace, 1971) who isolated *Toxoplasma gondii* from larvae and pupae reared in infectious cat feces. Second, filth fly infected with *Toxoplasma* as intermediate host (FAO, 1994).

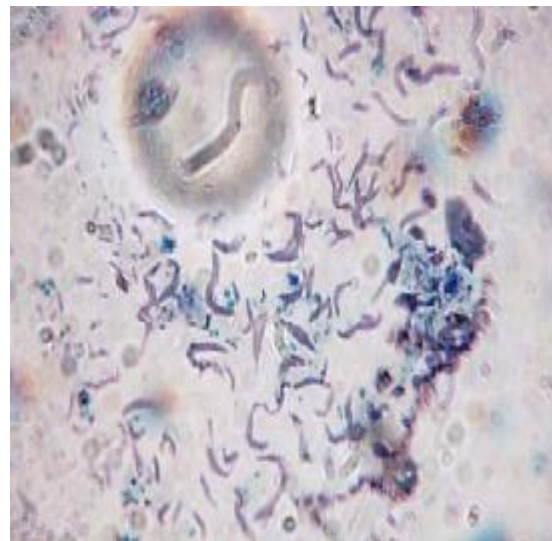


Figure (1): Sporozoites (1000X)

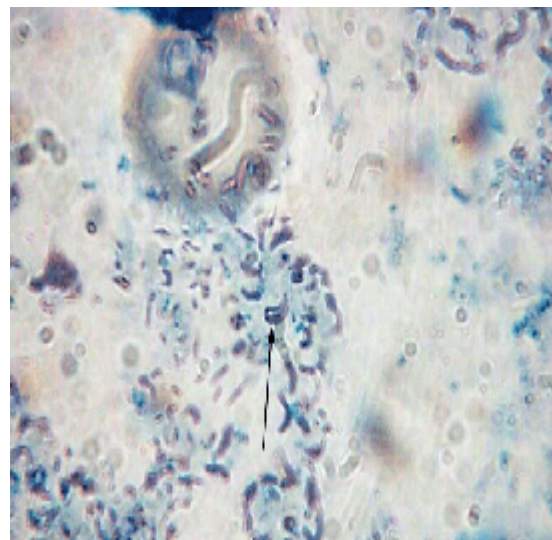


Figure (2): Gametocytes copulate in pairs (1000X)

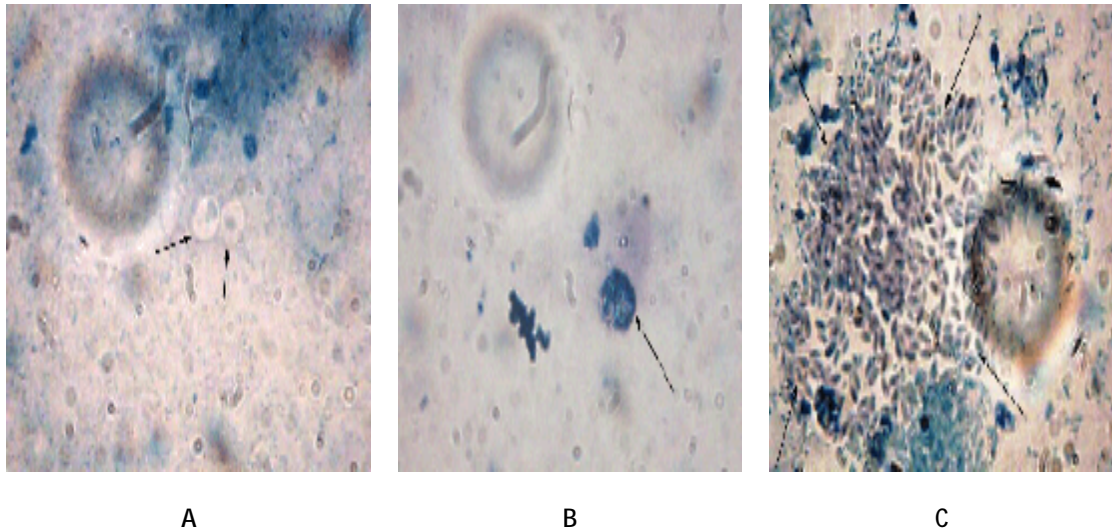


Figure (3): Shizogony of *Toxoplasma* sp. : A: Trophozoites, B: Trophozoit, C: Tachyzoites (1000X)

References

- Al-Dejaly, K.A. 1988. A sero- epidemiology study of Toxoplasmosis at aborted women in Baghdad. M. Sc. thesis submitted to the College of Veterinary Medicine University of Baghdad.
- Al-Joobori, T.I. 2002. Medical Parasitology Laboratory Manual Medical Helminthology. Department of medical microbiology. College of Medicine, University of Al-Nahreen.
- Edward, K.M. and Marietta, V. 1959. Diagnostic Medical parasitology. W.B. Saunders Company. Philadelphia and London. Library of Congress Catalog Card No. 58-7955.
- Food and Agriculture Organization (FAO), Animal production and health paper – 119, 1994. Life cycle of Toxoplasmosis. WWW.Fao.org/documents
- Galván-Ramírez, M.L.; Guillen-Vargas, C.; Saavedra-Duran, R. and Islos Rodriguez, A. 1998. Analysis of *Toxoplasma gondii* antigens with sera from toxoplasmosis patients. Rev. Soc. Brazil Med. Trop., 31: 271-277.
- Graczyk, T.K.; Cranfield, M.R.; Fayer, R. and Bixler, H. 1999. House flies (*Musca domestica*) as transport hosts of *Cryptosporidium parvum*. Am. J. Trop. Med. Hyg., 61:500-504.
- Gregor, F.; Rozkosny, R.; Bartak, M. and Vanhara, J. 2002. The Muscidae (Diptera) of Central Europe. Scientiarum Naturalium Universitatis Masarykianae Brunensis. 107. Masaryk.: Masaryk University.
- Hedges, A. 1980. Flies, gnats and midges. In A. Mallis ed., Handbook of pest control. Franzak and Foster Co., Cleveland, Ohio.
- Machattie, C. 1938. Notes of two cases of naturally occurring Toxoplasmosis in Baghdad. In: Fatohi, F.A. 1985. Detection of toxoplasmosis among different groups population in Mosul city using IHAT and CFT. M. Sc. Thesis College of Medicine University of Mosul, Iraq.
- Mehdi, A.J. 1988. Sero- epidemiological study on ovine Toxoplasmosis. M. Sc. thesis submitted to the College of Veterinary Medicine University of Baghdad.
- Rasheed, R.N. 1984. Isolation of *Toxoplasma gondii* and serological diagnosis of Toxoplasmosis in sheep and goat. A thesis submitted to the College of Veterinary Medicine, University of Baghdad.
- Thienpont, E.; Rochette, F. and Vanparijs, O.F.J. 1986. Diagnosing helminthiasis by coprological examination. Turnhoutsebaan 30, 2340 Beerse, Belgium). Available from: Vet. Lab. Services, UNIT 11. Station Road, South water, Sussex RH 13 7HQ.

- Wallace, G.D. 1971. Experimental transmission of *Toxoplasma gondii* by filth flies. Am. J. Trop. Med. Hyg., 20: 411-13.
- World Health Organization (WHO), 2004. Integrated Guide to Sanitary Parasitology. Regional office for the Eastern Mediterranean, Amman.