A study of prevalence of some parasites and protozoa from *musca domestica* in Baghdad

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Abstract

Three species of protozoa: *Entamoeba coli, Entamoeba histolytica* and *Iodamoeba sp*. and nematode eggs belong to four species: *Ascaris lumbrecoides, Ascaridia sp, Strongyloides sp* and *Habronema sp*. were reported in this study for the first time in Iraq, that transmitted mechanically by *Musca demostica*. Three species of protozoa were showed from tested of 170 *Musca demostica* fly after stained with Zeal Nelson: *Cryptosporidium parvum, Cryptosporidium muris, Cyclospora cayetanensis*, after appearance of their oocysts. The results were discussed with ratios of prevalence of these parasites in Baghdad.

دراسة انتشار بعض الطفيليات والاوالي من الذبابة المنزلية في بغداد

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الخلاصة

أظهـرت الدراســة إن الذبابــة المنزليــة تنقـل ميكانيكيـا ثلاثــة أنــواع مــن الاوالــي:*Iodamoeba sp.* و*Entamoeba. Coli* و *Entamoeba. histolytica* . وأربعة أنواع من بيوض الديدان الاسطوانية لأول مرة في العراق:*Ascaris lumbrecoides* و *Ascaridia sp* و *Strongyloides sp* و*Habronema sp.* . تم تشريح 170 ذبابـة منزليـة وصـبغ السـوائل الجسمية باسـتعمال صـبغة زيل نلسـن أظهـرت النتـائج ثلاثـة أنـواع مـن الاوالي:*Cryptosporidium parvum* و*Cryptosporidium muris* و *Cyclospora cayetanensis* ونوقشت النتائج مع نسب انتشار هذه الطفيليات في بغداد.

Introduction

The biology and ecology of *Musca domestica* ensure efficient transmission of human protozoan parasites. Adult female flies can live 15 to 25 days and lay five to six batches of 75 to 150 eggs (1). In temperate climates there can be 10 to 12 fly generations in the summer. Winter usually ends the breeding cycle; however, indoors, i.e., barns and houses, flies can develop several generations during the winter months (2). Individual flies can travel as far as 20 miles and their movement is generally oriented toward unsanitary sites (3). The feeding mechanisms and filthy breeding habits of synanthropic insects such as flies make them efficient vectors and transmitters of human enteric protozoan parasites (4) as same as animals. Outbreaks and cases of food-borne diarrheal diseases in urban and rural areas are closely related to the seasonal increase in abundance of filth flies, and enforced fly control is closely related to reductions in the number of cases of such diseases (5). Over 50 species of synanthropic flies have been reported to be associated with unsanitary conditions and involved in dissemination of human enteropathogens in the environment. Of these, 21 species of filth flies have been listed by regulatory agencies concerned with sanitation and public health as causative agents of gastrointestinal diseases in people based on synanthropy, endophily (the preference of insects to enter buildings), communicative behavior, and strong attraction to filth and human food (6). This study reported that human and animal protozoan

parasites that transmitted externally and internally by *Musca demostica* for first time in Iraq.

Materials and methods

Adult of *Musca demostica* 490 were collected from garbage of houses, local markets and stables of animals in Baghdad at March to October 2010, so as to identify the eggs, larvae and oocyts of protozoa; Two methods applied:

1. Washing technique: all the flies 490 put in distal water for 3 hours and centrifuge the supernatant to identify the parasites that transmitted mechanically (7).
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 fly and Zeal Nelson stain 170 fly.

Measurements and color Photographs of eggs, cysts and oocysts were taken after Ocular micrometer calibration (8). This work and diagnosis in Iraqi Natural History Researches center and Museum, University of Baghdad. Key of diagnosis (8,9,10,11)

Results

- **Washing technical**: Three species of protozoa and four species of nematodes eggs were reported in this study that transmitted mechanically by *Musca demostica* Table (1).
- **Protozoa cysts:** ***Entamoeba coli***: spheroid cyst, 20µ in diameter. It contains 4-8 nucleate, glycogen vacuoles and chromatoid bodies (Fig.1). ***Entamoeba histolytica***: small round cyst, 8 µ in diameter, uninucleate, a transparent, smooth cyst wall (Fig.2). ***Iodamoeba sp***.: ellipse- shaped, irregular in outline, 1-4 nucleus, and granules of chromatin. Its 16 µ length, 6 µ width (Fig.3).
- **Eggs of Nematodes:** ***Ascaris lumbrecoides***: Medium sized worm egg: 50µ in length -40 µ in width, ellipse-shaped to round, golden brown. thick, rough albuminous outer wall, very thick colorless middle layer, inner layer contains a thin yolk membrane. contents: un segmented cell with rough granules (Fig.4). ***Ascaridia sp***.: Small sized worm egg, 15 µ in length, 10 µ in width, ellipsoid, slightly barrel-shaped side- walls. Thick smooth three layer shell. The unsegmented contains (Fig.5). ***Strongyloides sp*****:** Medium-sized worm egg: 48 µ in length, 35 µ in width, elliptical, greish green, very thin single wall. Contains a short, thick larva, Its may be ***Strongyloides stercoralis*** (Fig.6). ***Habronema*** sp.: Small worm egg: 45 µ in length, 16 µ in width. Cylindrical, strongly elongated, thick shell, contain a larva. (Fig.7)**. Giemsa stain technical**: There are no results.
- **Zael Nelson stain technical**: A total of 56 (32.9%) fly were showed four species of protozoa from tested of 170 *Musca demostica* fly after stained with Zael Nelson: ***Cryptosporidium parvum:*** Oocyst is spherical shape, red color, 4 µ in diameter contain one dark spot to be sporozoites (Fig.8). ***Cryptosporidium muris***: oocyst slightly elliptical shape, colored with violet 5µ to 7 µ, contain four dark spots to be sporozoites (Fig.9). ***Cyclospora cayetanensis***: oocyst is spherical shape; colored with dark red rounded with wrinkled spheres, 8µ in diameter, contain small round bodies (5-10). (Fig.10).

Table (1) Measurements of parasites from *Musca demostica* externally and internally

Parasites	Measurements
Entamoeba coli (cyst)	20 µ diameter
Entamoeba histolytica(cyst)	8 µ diameter
Iodamoeba sp.(cyst)	16 µ length, 6 µ width
Ascaris lumbrecoides (egg)	50 µ length, 40 µ width
Ascaridia sp.(egg)	15 µ length, 10 µ width
Strongyloides sp.(egg)	48 µ length, 35 µ width
Habronema sp.(egg)	45 µ length,16 µ width
Cryptosporidium parvum (oocyst)	4 µ diameter
Cryptosporidium muris (oocyst)	5 µ to 7 µ
Cyclospora cayetanensis (oocyst)	8µ diameter

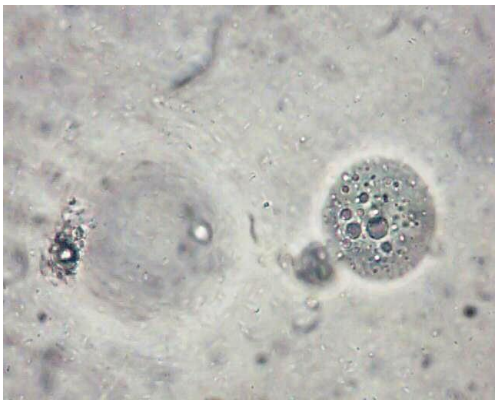

Fig. (1) *Entamoeba coli* 40X.

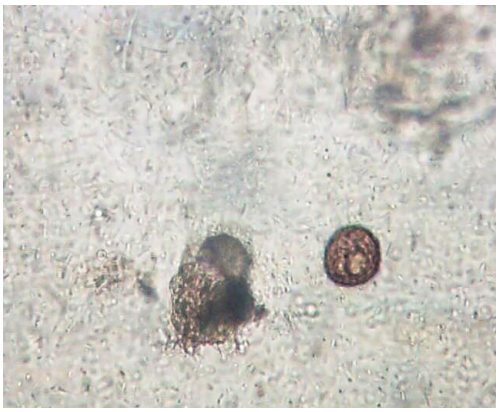

Fig. (2) *Entamoeba histolytica* 40X.

Fig. (3) *Iodamoeba sp*. 40X.

Fig.(4) *Ascaris lumbrecoides*.40X

Fig. (5) *Ascaridia sp*. 40X

Fig. (6) *Strongyloide sp*. 40X

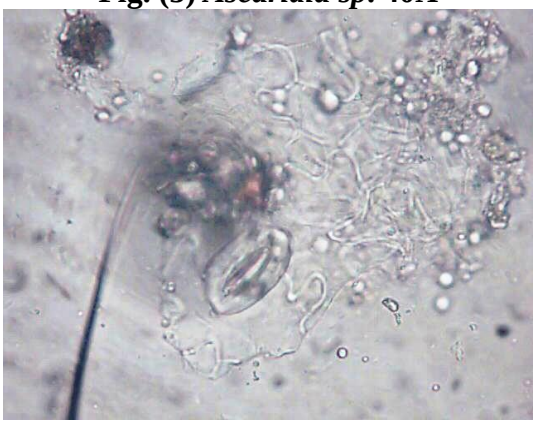

Fig. (7) *Habronema sp*.40X

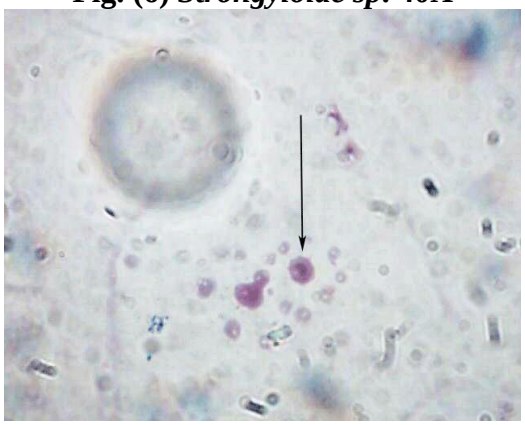

Fig. (8) Oocyst of *Cryptosporidium parvum*.100X

Fig. (9) Oocyst of *Cryptosporidium muris.*100X

Fig. (10) Oocyst of *Cyclospora sp.*100X

Discussion

Mechanical Transmission of human protozoan parasites by synanthropic insects is predominantly mechanical. In adult flies it occurs via mechanical dislodgement from the exoskeleton, fecal deposition, and regurgitation, i.e., vomit (5). Current study revealed that three species of protozoa: *E. coli*, *E. histolytica* and *Iodamoeba sp*. are transmitted mechanically by *Musca demostica* for the first time in Iraq. Flies can carry human pathogens on the sponging mouthparts, on body and leg hairs (i.e., setae), or on the sticky pads of the feet (i.e., tarsi). Fine hairs on the pads of a fly's feet are coated with a sticky substance which improves the fly's ability to adhere while resting or climbing on nonhorizontal surfaces. This substance also enhances the adhesion of particles, i.e., viruses, bacteria, and protozoan cysts, to fly legs, which then can be directly transported to the next visited surface and dislodged. Small particles readily adhere to a fly's exterior surfaces due to their electrostatic charge (5). Fly exoskeletons have certain electrostatic charges, and any particle with a different charge or a neutral charge will adhere to the fly surface. In Baghdad, highest protozoa infection rate was recorded for *Entamoeba coli* 14.1%, *Entamoeba histolytica* 7.4% and *Iodamoeba butaschlii* 4.2% between the pupils of schools (12). Then at 1998, the infection rate with *E. coli* 8.5%, *E. histolytica* 0.6% and *Iodamoeba butschlii* 0.8% (13). Latest, the rate of infection with *E. histolytica* 31% between children was recorded in Baghdad at 2005 (14). All these ratios assurance the pollution with these parasites and filth fly play a role in this pollution. The transmission of infectious agents by house flies is a result of fecal viscosity, which increases the efficiency of tarsi and bristles in trapping particles suspended in the feces (15). That interpretation appearance of *Ascaris lumbrecoides* and *Strongyleides stericoralis* with the mechanical transmission in this study. In addition of the filth flies standing on the feces of chickens, birds, horses…etc. So as it was transmitted of *Ascarid sp*. and *Habronema sp*. also any nematode eggs excreted in the feces. There are no results from Giemsa stain that mean this technical is not useful, or may be 320 fly are pure Protozoan parasites can pass through the fly gastrointestinal tract without alteration of their infectivity and can be subsequently deposited on visited surfaces in "fecal spots" (16). Alternatively, the parasites present in fly alimentary tracts can be regurgitated, i.e., vomit drops, on a surface perceived by a fly as a meal (regurgitation always precedes feeding). Frequent meals on contaminated substrates together with alternating regurgitation and ingestion cause progressive accumulation of human pathogens in the fly alimentary system (5). Human pathogens can also be transmitted as airborne particles for short distances from fly-electrocuting traps, as electrocuting traps do not alter the infectivity of pathogens transported by flies (6). House flies can serve as transport hosts for infectious *Cryptosporidium parvum* oocysts (16). In Baghdad, previous study showed that *Musca demostica* transmit cryptosporidium *sp*. mechanically (17), but this study recorded *Cryptosporidium parvum*, *Cryptosporidium muris* and *Cyclospora sp*. Were transmitted by *Musca demostica* after appeared of their cysts of these protozoa.This record may be explained the prevalence of these parasites in Baghdad in human: *Cryptosporidium sp*.15.15%,

Cyclospora *sp*. 1.5%. In rats: *Crypto. sp*. 50% and *Cyclo. sp*. 2.63%, in cats and dogs: *Crypto. Sp*.20%, in vegetables: *Crypto. sp*.7.40% and *Cyclo. sp.* 3.70% (18). Based on these results and the observation that flies may play a role in distributing these parasites in the environment.

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