

Role of House Flies (*Musca domestica*) as Vector Host for Parasitic Pathogens in Al-Diwaniya Province / Iraq

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Abstract: This study was conducted to determine role of house flies *Musca domestica* as vector host for parasitic pathogens in Al-Diwaniya province during period from March to July 2014. Three hundred and eighty samples of house flies were collected randomly from garbage of houses and examined both external surface and digestive tract to isolate and identify parasites. 309 (81.31%) out of 380 samples were infected with parasites, infection percentage with Protozoa (43.68%) while infection percentage with worms eggs (37.63%), as well as infection percentage with ectoparasites (52.36%) While infection percentage with endoparasites (28.94%). Results of this study recorded Ten species of parasites represented seven species of parasites which were isolated from external surface of house flies included two species of protozoa cyst were: *Entamoeba histolytica* (10.35%) and *Giardia lamblia* (7.76%) and five species of worm's eggs were: *Ascaris lumbricoides* (15.53%), *Enterobius vermicularis* (14.23%), *Hymenolepis nana* (7.11%), *Trichuris trichiura* (5.82%) and *Strongyloides sp.* (3.55%), in addition three species of protozoa oocyst which isolated from digestive tract were: *Cryptosporidium parvum* (14.88%), *Cryptosporidium muris* (12.29%) and *Cyclospora cayetanensis* (8.41%).

Keywords: House Flies, *Musca domestica*, Al-Diwaniya province

1. Introduction

House flies are the most prevalent of types flies in the world, accounting for about 90% of all flies in human habitation (Nmorsi *et al.*, 2006). There are about 170 genera and 4200 species in the family Muscidae, some of them are medically important including *Musca domestica* (Service, 2004). House flies abound in the tropics especially in dirty environment which prefer warm places and move around mostly during the day (Olsen, 1998). Their frequent movements between filth places, animals, human sources of food and defecate during they feed make them best vectors for disease and spread of pathogens, (Graczyk *et al.*, 2005).

House flies are reported as vectors for communicable diseases that collect pathogens on their body parts when females lay eggs on decomposing organic substances such as the corpses and foods, cow's and pig's feces, rubbish dumps and droppings of domesticated birds (Chin *et al.*, 2008).

Several studies in different parts of the world showed that house flies as carrier for microorganisms, Merchant, *et al.*, (1987) referred that house fly causative agent for spread of various diseases like anthrax, leprosy, tuberculosis, diphtheria, typhoid, dysentery and intestinal parasites in humans, Moreover they are intermediate hosts and vectors for horse nematodes and some of cestodes poultry and pointed that coccidian parasite of poultry may be transmitted mechanically by house flies.

Graczyk, *et al.*, (2001) observed that house flies are a major epidemiological factors responsible for spread of acute gastroenteritis and trachoma between infants and young children in developing countries and referred these flies play important role in transmission of nosocomial infections with multi drug resistance bacteria in hospital environments and

noted some of microorganisms can a live inside or on the bodies surface of flies from 5-6 hours up to 35 days..

Mullen and Durden (2002) Studied role of *Musca domestica* as carrier for parasitic pathogens and isolation eggs of parasitic worms were: *Trichuris trichiura*, *Diphyllobothrium sp.*, *Hymenolepis sp.*, *Ascaris lumbricoides*, *Strongyloides stercoralis*, *Enterobius vermicularis*, *Taenia sp.* and *Toxocara cani*, in addition protozoa cysts and trophozoites such as *Giardia sp.*, *Trichomonas sp.* and *Entamoeba histolytica*.

Sales, *et al.*, (2002) revealed role of *Musca domestica* in transport pathogens and isolated many species of yeast and filamentous fungi that cause illness, majority of these Fungi may cause life threatening infections especially in immunocompromised patients.

Tan *et al.*, (1997) in Malaysia showed in their study that house fly as mechanical vectors for rotavirus by their wings and legs, Harwood & James (1979) referred more than 100 species of pathogenic organisms have been isolated from external surface and digestive tract of flies and pointed these Pathogens remain alive in house flies for an appreciable time.

The aim of this study is isolate and identify parasitic pathogens from external surface and digestive tract of house fly *Musca domestica* in Al-Diwaniya province.

2. Materials and Methods

Samples Collection

This study was carried out between march to July 2014 in Al-Diwaniya province, Three hundred and eighty samples of house flies *Musca domestica* were collected randomly from garbage of houses in order to isolate and identify parasites that transmitted by *Musca domestica*, These flies were placed

into plastic container and transported to the laboratory of parasitology, Department of Biology, College of Education Al-Qadisiya university.

Isolation parasites from external surface of *M. domestica*:

Flies were killed by deep freezing, about 5 ml of normal saline was added into each plastic container containing flies and shaken vigorously to dislodge parasites from external surface (body). The washing fluid was transferred into a conical test tube and centrifuged at 3000 rpm for 5 minutes then sediment was examined with and without 1% Lugol's iodine stain under the light microscope (Fotadar *et al.*, 1992).

Isolation parasites from digestive tract of *M. domestica*:

After the washing procedure of flies described above for external parasites, digestive tract of each fly washed was dissected out under microscope by needles and forceps, internal contents of each flies staining with modified Ziehl Nielsen stain then examined to isolate and identify parasites (Getachew *et al.*, 2007).

3. Results

Medically important parasites were isolated from external surface and digestive tract for (81.31%) of *M. domestica* were collected from garbage in houses of Al-Diwaniya province. Results of this study showed infection percentage with protozoa (43.68%) while infection percentage with worm's eggs (37.63%) and infection percentage with ectoparasites (52.36%) while infection percentage with endoparasites (28.94%) as Table (1 and 2)

Results of this study revealed presence ten species of parasites were isolated from external surface and digestive tract of house flies represented seven species of parasites which were isolated from external surface included two species of protozoa cyst were: *Entamoeba histolytica*

(10.35%) and *Giardia lamblia* (7.76%) and five species of worm's eggs were: *Ascaris lumbricoides* (15.53%), *Enterobius vermicularis* (14.23%), *Hymenolepis nana* (7.11%), *Trichuris trichiura* (5.82%) and *Strongyloides sp.* (3.55%) as Table (3) and Figures (1-7).

In addition three species of protozoa oocyst that isolated from digestive tract were: *Cryptosporidium parvum* (14.88%), *Cryptosporidium muris* (12.29%) and *Cyclospora cayetanensis* (8.41%), as Table (4), Figures (7), (8) and (9).

Table 1: Type of parasites and percentage of infections in *M. domestica*

| Type of parasites | No. examined | No. infected | Percentage (%) |
|-------------------|--------------|--------------|----------------|
| Protozoa | 380 | 166 | 43.68 |
| Worms | 380 | 143 | 37.63 |

Table 2: Percentage of ectoparasites and endoparasites recorded in *M. domestica*.

| Type of infection | No. examined | No. infected | Percentage (%) |
|-------------------|--------------|--------------|----------------|
| Ectoparasites | 380 | 199 | 52.36 |
| Endoparasites | 380 | 110 | 28.94 |

Table 3: Parasites isolated from external surface of *M. domestica*.

| Species of parasites | Class | No. infected | Percentage (%) |
|------------------------------------|----------|--------------|----------------|
| <i>Entamoeba histolytica</i> cyst | Protozoa | 32 | 10.35 |
| <i>Giardia lamblia</i> cyst | Protozoa | 24 | 7.76 |
| <i>Ascaris lumbricoides</i> egg | Nematode | 48 | 15.53 |
| <i>Enterobius vermicularis</i> egg | Nematode | 44 | 14.23 |
| <i>Hymenolepis nana</i> egg | Cestode | 22 | 7.11 |
| <i>Trichuris trichiura</i> egg | Nematode | 18 | 5.82 |
| <i>Strongyloides sp.</i> egg | Nematode | 11 | 3.55 |

Table 4: Parasites isolated from digestive tract of *M. domestica*.

| Species of parasites | Class | No. infected | Percentage (%) |
|---------------------------------------|----------|--------------|----------------|
| <i>Cryptosporidium parvum</i> oocyst | Protozoa | 46 | 14.88 |
| <i>Cryptosporidium muris</i> oocyst | Protozoa | 38 | 12.29 |
| <i>Cyclospora cayetanensis</i> oocyst | Protozoa | 26 | 8.41 |



Figure 1: *Entamoeba histolytica* cyst (40X).



Figure 2: *Giardia lamblia* cyst (40X).



Figure 3: *Ascaris lumbricoides* egg (40X).

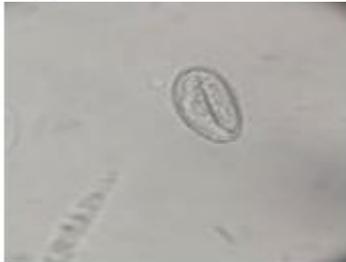


Figure 4: *Enterobius vermicularis* egg (40X).



Figure 5: *Hymenolepis nana* egg (40X)



Figure 6: *Trichuris trichiura* egg (40X)



Figure 7: *Strongyloides* sp. egg (40X)



Figure 8: *Cryptosporidium parvum* (40X)

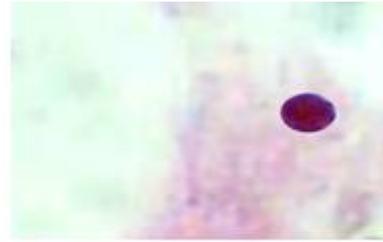


Figure 9: *Cryptosporidium muris* (40X).

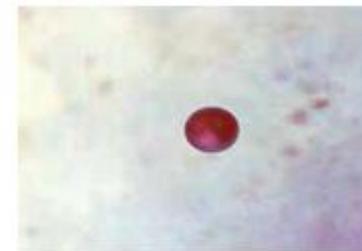


Figure 10: *Cyclospora cayentanensis* (40X)

4. Discussion

Several studies in different countries reported various pathogenic microorganisms that have great medical important transmitted by house flies. This study showed infected (81.31%) of *Musca domestica* were collected from garbage in houses of Al-Diwaniya province, infection percentage with Protozoa was (43.68%) while infection percentage with worm's eggs (37.63%). These result agree with finding of Dipeolu (1977) in Nigeria when recorded infection percentage with protozoa more than infection percentage with worms.

House flies feed on wide variety of materials such as food, excreta, nasal secretions, sputum, secretions from sores and wounds (Gordon & Lavoipierre, 1976). Also when feed on contaminated substances contain cysts of parasites, these cyst adhering on the external surface and in gut that can pass through the fly digestive tract without alteration of their infectivity (Graczyk, *et al.*, 1999).in addition these parasites present in fly digestive tracts can be regurgitated on a surface perceived by a fly as a meal (regurgitation always precedes feeding). frequent feeding on contaminated substances with parasites and regurgitation parasites alternating causes progressive accumulation of human pathogens in digestive tracts of flies (Adeyeba & Okpala, 2000).

Also the present study showed infection percentage with ectoparasites (52.36%) while infection percentage with endoparasites (28.94%). These results are similar to the findings of Sulaiman *et al.*, (1989) when reported a higher percentage of parasites in external surface.

Transmission of parasites by house flies are mostly mechanical, where can flies carrying human pathogens on their bodies such as wings, sponging mouth parts, leg hairs and sticky pads of the feet, also hairs on pads of feet fly's coated with a sticky material that help flies to adhere while resting or climbing on surfaces, in addition this substance enhances adhesion of particle like protozoan cysts, bacteria, and viruses on fly's external surfaces because of different electrostatic charge then transported directly to visited surface (Greenberg, 1973).

This study appeared seven species of parasites transmitted by external surface of house flies represented two species of protozoa cyst were: *Entamoeba histolytica* (10.35%) and *Giardia lamblia* cyst (7.76%) and Five species of worm's eggs were: *Ascaris lumbricoides* (15.53%), *Enterobius vermicularis* (14.23%), *Hymenolepis nana* (7.11%), *Trichuris trichiura* (5.82%) and *Strongyloides* sp. (3.55%), these results are consistent with results of Getachew, *et al.*, (2007) when isolated eggs and cysts of following parasites: *Trichiura trichiura*, *Hymenolepis nana*, *Strongyloides stercoralis*, *Taenia* sp., *Ascaris lumbricoides*, *Ancylostoma* sp., *Entamoeba coli*, *Giardia lamblia*, *Entamoeba histolytica* and *Cryptosporidium* spp. from external surface and digestive tract of house flies that collected from market, Garbage, Butchery and defecating grounds in Addis Ababa, Ethiopia, also agree with results of Umeche & Mandah (1989) when examined 5000 house flies collected from markets and residential areas in Nigeria and detected *Entamoeba* sp., *Ascaris lumbricoides* eggs, *Strongyloides stercoralis* eggs, *Toxocara* eggs, *Enterobius vermicularis* eggs and *Hymenolepis nana* eggs as well as they revealed that *M. domestica* a harbor for parasites on their bodies that may cause diseases. These flies can carry and spread microorganisms to other places because their ability to fly up to 20 miles to unsanitary sites (Cladel *et al.*, 2002).

The present study showed there are three species of protozoa oocyst isolated from digestive tract of *M. domestica* were: *Cryptosporidium parvum* (14.88%), *Cryptosporidium muris* (12.29%) and *Cyclospora cayetanensis* (8.41%), these results agree with all of Graczyk *et al.*, (2000) that showed role of house flies as carrier for *Cryptosporidium parvum* oocysts on their external surfaces and digestive tracts, and with Nmorsi *et al.*, (2006) in Nigeria when identified protozoan parasites and worms eggs were *Chilomastix mesnili*, *Cryptosporidium parvum*, *Cyclospora* sp. *Entamoeba histolytica*, *Isospora belli*, *Ascaris lumbricoides*, *Dicrocoelium hospes*, *Enterobius vermicularis*, *Strongyloides stercoralis* and *Trichura trichiura* in house flies collected from various sites.

Also agree with result of Graczyk *et al.*, (2003) when showed in their study that house flies can transport oocysts of protozoa on their external surfaces and digestive tract then contaminate food stuff by mechanical dislodgement, feces and regurgitation.

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