

Full Length Research Paper

Parasitic load on *Musca domestica* (Diptera: Muscidae) from different synanthropic environments in Umuahia metropolis

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Houseflies (*Musca domestica*) have been incriminated as transmitters of pathogenic organisms from humans or animals to humans. They transmit viruses, bacteria, protozoa and helminthes. This study was aimed at ascertaining the different parasites retrieved in houseflies from different sampling sites during the wet and dry season in Umuahia metropolis of Abia State, Nigeria. During the study, 500 houseflies were collected in the two seasons of the year in the study area (250 for each season). Six different parasites were isolated from both the exoskeleton and the gut of the houseflies captured in the different synanthropic sites. The pit latrines had the highest parasite prevalence (57.60%), while the eateries had the lowest prevalence (30.92%). *Entamoeba histolytica* was the parasite with the highest prevalence (25%), while *Haemonolypes nana* had the lowest prevalence (11.36%). The result was attributed to inadequate personal and environmental hygiene. Therefore, proper health education and community participation is advocated to get rid of this health scourge.

Key words: Houseflies, transmitters, protozoa, helminthes, health education.

INTRODUCTION

Houseflies (*Musca domestica*) are the most common of all domestic flies, accounting for about 90% of all flies in human habitation all over the world (Nmorsi et al., 2006). There are about 170 genera and 4200 species in the family Muscidae, some of which are medically important including the housefly, *M. domestica* (Service, 2004). Insects are classified as vectors when they transmit pathogenic organisms from humans (or animals) to humans. Insects, particularly refuse and promiscuous-landing synanthropic flies, that is, houseflies (*M. domestica*) are known to be transport hosts of a variety of pathogens of public health importance (Akinboade et al.,

1984; Umeche and Mandah, 1989; Tatteng et al., 2005). Refuse houseflies have been incriminated in transmission of helminth eggs, that is, *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis*, *Toxocara canis* and *Strongyloides stercoralis*, protozoan cysts and trophozoites such as *Entamoeba histolytica*, *Giardia* species, *Trichomonas* species, *Taenia* species, *Hymenolepsis* species, *Dipylidium* species, *Diphyllobothrium* species and bacteria such as *Shigella* species, *Escherichia coli*. *Eimeria tenella*, the coccidian parasite of poultry can be mechanically transmitted by house flies (Graczyk et al., 1999; Mullen and Durden

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Table 1. Parasite load on houseflies captured during the dry season in the study area.

| Sampling site | Parasites isolated | | | | | | Total |
|-------------------|---|------------------------|------------------------------|-----------------------------|--------------------------|--------------------------------|------------|
| | <i>Entamoeba histolytica</i> [No. (%)] | <i>Giardia lamblia</i> | <i>Ascaris lumbricooides</i> | <i>Trichuris trichiuria</i> | <i>Haemenolypes nana</i> | <i>Enterobius vermicularis</i> | |
| Abattoir | 2 (4.17) | 1 (2.08) | 2 (4.17) | 1 (2.08) | 0 (0.00) | 1 (2.08) | 7 (14.60) |
| Dustbin | 3 (6.25) | 2 (4.17) | 2 (4.17) | 1 (2.08) | 1 (2.08) | 1 (2.08) | 1 (20.83) |
| Latrines | 4 (8.33) | 3 (6.25) | 2 (4.17) | 3 (6.25) | 3 (6.25) | 3 (6.25) | 18 (27.60) |
| Eateries | 1 (2.08) | 1 (2.08) | 1 (2.08) | 1 (2.08) | 1 (2.08) | 0 (0.00) | 5 (18.42) |
| Fish/Tomato shops | 2 (4.17) | 1 (2.08) | 1 (2.08) | 2 (4.17) | 1 (2.08) | 1 (2.08) | 8 (18.67) |
| Total | 12 (25.00) | 8 (16.66) | 8 (16.66) | 8 (16.66) | 6 (12.50) | 6 (12.50) | 48 (100.0) |

Of these sites, the highest parasite abundance was recorded in the pit latrines 12 (30.00%), out of a total of 50 (100%) parasites isolated, while the least occurred in the eateries centre as well 5 (12.50%) out of the same total of 50 (100%).

2002). House flies move around mostly during the day and like warm places showing a preference for direct sunshine. Their filthy habits is seen in the way they defecate while they feed, thereby distributing germs (Olsen, 1998). Houseflies as mechanical vectors pick up the infection agent on the outside of its body and transmit it in a passive manner. Flies can carry human pathogens on the sponging mouth part, on body and leg hairs (that is, setae) or on the sticky pads of the feet (that is, tarsi) (Graczyk et al., 1991). Protozoan parasites can pass through the fly gastrointestinal tract without alteration of their infectivity and can be subsequently deposited on visited surface in fecal spots (Graczyk et al., 1999). Houseflies are recognized as carriers of communicable diseases. They collect pathogens on their body parts when females lay eggs on decomposing organic matter such as the droppings of domesticated birds, cows and pig's feces, rubbish dumps, corpses and foods (Chin et al., 2008). Diseases carried by houseflies include typhoid, cholera and dysentery. Other diseases carried by houseflies include salmonella, anthrax, and tuberculosis. They have also been known to transmit the eggs of parasitic worms. Synanthropic flies abound in the tropics especially in areas with substandard environmental sanitary conditions. Here, they constitute serious public nuisance through their dirty breeding environments, feeding mechanisms and indiscriminate travel, thus making them efficient vectors of human enteric protozoan parasites (Graczyk et al., 2005).

In other parts of the globe, information on the occurrence of veterinary and medically important parasitic agents, non-biting flies such as *M. domestica* exists (Graczyk et al., 2001; Cladel et al., 2002; Szostakowska et al., 2004).

However, despite the abundance of house flies in our immediate locality, there is little or no information on their role as mechanical transmitters of parasitic diseases in Umuahia metropolis. This paper apart from giving more

information on this subject in Nigeria (Dipeolu, 1982; Akinboade et al., 1984; Umeche and Mandah, 1989; Okonkwo and Onwuliri, 2000), reports on the parasitic load on house flies gotten from different sites in Umuahia metropolis, the capital town of Abia State, Nigeria.

MATERIALS AND METHODS

This investigation was carried out between November 2009 and October 2010 in Umuahia, Abia State, Nigeria, that is located on latitude 5.5°N and longitude 7.5°E. November to March is the dry season with relatively low rainfall while April to October marks the rainy season in the study area. The monthly temperature ranges from 22 to 37°C. The average relative humidity is between 80 and 85%.

Five hundred house flies were captured in two seasons, the wet and dry seasons (250 for each season) using the sweep net method over the surfaces where flies visited from the residential areas, dustbins, abattoir sites and eateries centre.

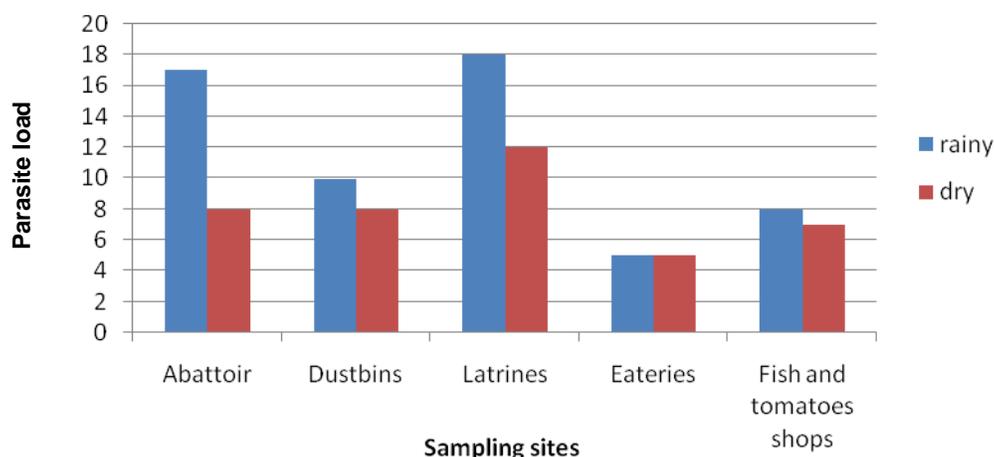
The house flies were placed into labeled plastic container and transported to the laboratory of Zoology Department, Michael Okpara University of Agriculture, Umudike for further procession. About 5 ml of formal saline was added into each universal bottle containing the house flies and shaken vigorously to dislodge the parasites from the exoskeleton (body) especially hair of the house flies. The fluid was transferred into a conical tube and centrifuged at 3000 rpm for 300 s. The sediment was examined microscopically for parasites under x400 magnification. The parasites were also quantified (Nmorsi et al., 2006). The houseflies were later dissected and the gut examined for parasites. Identification of the parasites was done with reference to a Color Atlas of Parasitology authored by John T. Sullivan, University of San Francisco (2009). The data were subjected to statistical analysis using Microsoft Excel.

RESULTS

The parasitic load on house flies captured from different environments namely pit latrines, dustbins, abattoir, fish/tomatoes stores and eateries sites in Tables 1 and 2. Table 1 shows the parasitic load on houseflies captured

Table 2. Distribution of parasites retrieved from the gut of houseflies collected from different sampling sites during the rainy season.

| Sampling site | Parasites isolated | | | | | | Total |
|-------------------|---|------------------------|-----------------------------|-----------------------------|--------------------------|--------------------------------|-------------|
| | <i>Entamoeba histolytica</i> [No. (%)] | <i>Giardia lamblia</i> | <i>Ascaris lumbricoides</i> | <i>Trichuris trichiuria</i> | <i>Haemenolypes nana</i> | <i>Enterobius vermicularis</i> | |
| Abattoir | 3 (7.50) | 1 (2.50) | 2 (5.00) | 1 (2.50) | 0 (0.00) | 1 (2.50) | 8 (20.00) |
| Dustbin | 2 (5.00) | 1 (2.50) | 1 (2.50) | 2 (5.00) | 1 (2.50) | 1 (2.50) | 8 (20.00) |
| Latrines | 2 (5.00) | 3 (7.50) | 1 (2.50) | 2 (5.00) | 2 (5.00) | 2 (5.00) | 12 (30.00) |
| Eateries | 1 (2.50) | 1 (2.50) | 1 (2.50) | 1 (2.50) | 0 (0.00) | 1 (2.50) | 5 (12.50) |
| Fish/Tomato shops | 2 (5.00) | 2 (5.00) | 1 (2.50) | 1 (2.50) | 1 (2.50) | 0 (0.00) | 7 (17.50) |
| Total | 10 (25.00) | 8 (20.00) | 6 (15.00) | 7 (17.50) | 4 (10.00) | 5 (12.50) | 10 (100.00) |

**Figure 1.** Prevalence rate of parasites recovered from the house flies.

during the rainy season in the study year. Of these sites, the highest parasite abundance was recorded in those caught in the pit latrines 18 (27.60%), out of 96 (100%) parasites isolated, while the least occurred in the eateries centre 5 (18.42%), out of the same total of 96 (100%).

DISCUSSION

The present study shows that these parasites are present in Umuahia, South Eastern Nigeria and are transmitted by houseflies. This also demonstrates the fact that houseflies are mechanical transmitters of important and predominant tropical diseases such as gastroenteritis and other human helminthiasis which abound in our locality despite the growing level of personal hygiene. This study is in agreement with the findings reported by Adeyeba and Okpala (2000) in Ibadan, Nigeria, where the presence of some pathogens like *E. histolytica*, *A. lumbricoides* and *T. trichiura* were isolated in *M. domestica*.

High endemicity of human gastroenteritis has been

attributed to poor personal and environmental hygiene, inadequate supply of clean potable water and indiscriminate defaecation. The parasites retrieved from both the external body and guts of houseflies as encountered in this study, has been attributed to the aforementioned factors.

The very high parasite load encountered among houseflies captured in the pit latrines in both seasons of the study year, showed that parasitic organisms thrive more in environments contaminated with feces and are subsequently transmitted in the locality under study. This is in agreement with a similar finding by Nmorsi et al. (2006) who made similar assertion in a study in Ekpoma, Nigeria. Of the parasites encountered within the body and gut of the houseflies, *E. histolytica* had the highest prevalence of 25% with *Giardia lamblia* trailing behind with 18.20% from both seasons in the year (Tables 1 and 2). This is in agreement with the findings of Pai et al. (2003) who reported the presence of *E. histolytica* in *M. domestica* in China. *Haemenolypes nana* had the lowest prevalence rate in both seasons (11.36%) (Figure 1). This is in agreement with the

findings of Akogun and Badaki (1998) in Adamawa who attributed it to low survival of the parasite in tropical environments. The parasitic organisms recovered from the houseflies during the two seasons under study did not vary much, though it was slightly higher during the rainy season (19.20%) than in the dry season (16.00%). This could be due to the fact that houseflies multiply and develop in their dirty environments more during rainy season than during the dry season. Also, manure decay faster during the rainy season which happens to be a suitable environment for the multiplication of houseflies.

With respect to eateries site, parasites isolated from houseflies captured in these areas were limited owing to the fact that such areas were always closed and the food kept in ovens and show cases which discouraged access to the houseflies.

Some of the parasites reported causes morbidity and often mortality arising from the infection in man. House flies have been reported to be a major epidemiologic factor responsible for the spread of acute gastroenteritis and trachoma amongst infants and young children in predominantly developing countries (Mache et al., 1989; Okonkwo and Onwuliri, 2000; Graczyk et al., 2001). It has been reported that *A. lumbricoides* and *T. trichiura* are causative agents of human helminthiasis and these pathogens were isolated on the exoskeleton and guts of *M. domestica* in the study area. It is quite imperative to note that the rate of people getting infected in the study area will be quite high if not properly handled.

Conclusion

This study underscores the need to institute a functional control measures such as community health education and proper environmental sanitation where everyone will be made to actively participate. Basic social amenities such as potable water, proper means of waste disposal and treatment of wastes in the environment should be intensified. Finally, the practice of personal hygiene is strongly advocated.

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