

The Role of *Musca domestica* as a Carrier of Parasites in Shiraz, Southern Iran

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Abstract: Flies recovered from environments may be contaminated with human pathogens. Houseflies *Musca domestica* are recognized as transport hosts for a variety of parasites of public health importance. This study was undertaken to determine the role of *M. domestica* as a carrier of parasites in Shiraz, Southern Iran. A total of 470 houseflies were collected from foodstuff markets and studied for parasitic infection using centrifugation, dissection and direct smear methods. From external body surfaces of flies, the following parasites were recovered: *Entamoeba coli* cyst in 2 butcheries, nematode larvae of *Ascaris lumbricoides* in one supermarket and a restaurant, free living unspecified lice in a supermarket and a butchery, mite species of the genus *Macrocheles* (Acari: Macrochelidae) in one butchery, a restaurant and a sandwich shop, trophozoites of *Giardia lamblia* and cysts of *Entamoeba histolytica/dispar* (recovered in a 4°C environment) in 3 sandwich shops, a restaurant and a grocery. No parasites were observed in intestinal tracts, vomitus and feces. The recovering of these parasites in this locality shows that public health importance of house flies in the area. Additional works seem necessary with more fly challenge densities to determine the role of fly ingestion and contamination of foods by fly fecal and vomit deposits.

Key words: *Musca domestica* • Public health • Parasite • Infection • Iran

INTRODUCTION

The common housefly *Musca domestica* is recognized as transport hosts to man for a variety of parasites in addition to viral and bacterial pathogens of public health importance through its vomits or excreta or mechanically through its appendages [1,2].

Although other routes of transmission, such as contaminated water, carriers and food handlers, might be major possibilities, the likelihood of non-biting flies mechanically transmitting these parasites cannot be excluded [3].

They are identified to play a role in the spread of *Sarcocystis* sp., *Toxoplasma gondii*, *Isospora* spp and *Giardia* spp [4-8]. Flies comprise several fauna of

arthropods with worldwide distribution. Fly species were reported from which *Escherichia coli*, an indicator of fecal contamination, was isolated [9]. It was shown to carry the human pathogens *Salmonella* or *Shigella* due to moving between contaminated environments and interacted with man [10, 11].

Musca domestica has been incriminated as a mechanical vector for transmission of helminthic eggs, i.e., *Toxocara* sp. [12], *Ascaris lumbricoides* [1], *Trichuris trichura* [13], *Enterobius vermicularis* [7], *Ancylostoma caninum* [2], *Strongyloides stercoralis* [14], larvae of *Habronema musca* [15] and *Taenia* spp. [16]. Role of this fly also were reported for carrying protozoan cysts and trophozoites, i.e., *Entamoeba histolytica* [3], *Cryptosporidium parvum* [17] and *Entamoeba coli* [3]

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and bacteria such as *Vibrio cholera* [18], *Staphylococcus aureus* [19], *Pseudomonas aeruginosa* [20] and *Rota virus* [21].

Myiasis as a medical and veterinary problem has economic importance affecting the human welfare especially in animal raising countries. Among myiasis, oral cavity myiasis in children was previously described in Egypt [22] and ophthalmomyiasis externa by *M. domestica* in a case of orbital metastasis in India [23].

Pesticides are commonly used for the management of houseflies, *M. domestica* (L.). Many pests have developed resistance to several insecticides emphasizing the public importance of this fly [24].

Recent studies in Shiraz city in South of Iran on soil samples collected from public places were found to be infected with *Toxocara cati* ova, *Ascaris lumbricoides* ova, larvae morphologically similar to *Strongyloides stercoralis* and *Coccidia* oocysts [25]. Other studies on stray cats and dogs have revealed a wide range of parasites of public health importance [26,27]. As stray cats and dogs still freely roam within the city and their feces are dispersed in the public places, they are regarded as dangerous sources of infection for man. The present study was undertaken to determine whether *M. domestica* plays any role as a carrier of parasites to man in this locality.

MATERIALS AND METHODS

A total of 470 *M. domestica* were caught from 94 different sites (5 from each site), comprising 16 supermarkets, 27 butcheries, 13 sandwich shops, 13 restaurants, 23 confectionaries and 6 fruit shops over a period of 6 months. The flies were collected with insect nets and released into a glass box for transportation to the laboratory.

The place and date of collection for each site were recorded on the glasses. The parasites carried on the body surfaces, were studied by washing the body in sterile physiological saline. The solution was then

concentrated by centrifugation and the precipitate was placed on glass slides and examined under microscope for presence of any parasite. The intestinal tracts were studied by dissection of the flies under a microscope and their alimentary canal were crushed and washed in sterile physiological saline. The solution was centrifuged and examined for presence of any parasite again.

Data analysis was performed using SPSS software (version 12.0 for Windows, Chicago, IL). A Chi Square test was used to compare different independent variables with carriage of the parasites. Degree of parasite contamination was evaluated calculating the relative frequency. A P value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

From external body surfaces of flies, the following parasites were recovered as shown in Table 1: *Entamoeba coli* cyst in 2 butcheries, free living nematode larvae of *Ascaris lumbricoides* in one supermarket and a restaurant, free living unspecified lice in a supermarket and a butchery, mite species of the genus *Macrocheles* (Acari: Macrochelidae) in one butchery, a restaurant and a sandwich shop, trophozoites of *Giardia lamblia* and cysts of *Entamoeba histolytica/dispar* (recovered in a 4°C environment) in 3 sandwich shops, a restaurant and a grocery.

All parasites were just recovered from external body surface of the flies (Table 2).

Female flies can live 15-25 days and lay 5-6 batches of 75-150 eggs in temperate climates, there can be 10-12 fly generations in the summer [2] which their public health importance during summer time for transmission of infection. Winter usually ends the breeding cycle of the housefly. However, indoor flies can develop several generations during winter. However, the vast majority of flies, i.e., more than 88%, do not travel more than 2 miles and their movement is oriented toward unsanitary sites [2,6].

Table 1: Presence of contaminated pooled flies per type of parasite

Fly (n=470)	Helminthic nematode	Helminthic cestode	Protozoa	Mite	Louse
<i>Musca domestica</i>	+	-	+	+	+

Table 2: Locations of recovered parasites in *Musca domestica* in Shiraz, Iran

Fly	Salivary gland	Crop	Vomitus	Gut	Feces	External body surface
<i>Musca domestica</i>	-	-	-	-	-	+

In this study, a total of five different parasites were recovered from external surfaces of *M. domestica*. The *Entamoeba coli* cysts and free living nematode larvae observed were not harmful to man. The recovered parasites were specific for houseflies and were not also pathogenic to man as previously reported [28, 29]. In spite of nonpathogenic parasites were recovered in this study it demonstrates the important role of house flies in transmission of parasites in society. *Entamoeba coli* was previously recovered from houseflies [3,7,13,14]. Ecologic monitoring of houseflies flight range showed that individual flies can travel as far as 20 miles [2,17]. This character helps spreading parasites from one area or country to another. The continuous migration of people from rural areas to urban localities in Shiraz especially in southern and eastern parts in search of better economical opportunities has led to overcrowding and inadequate sanitary facilities in these places.

Transmission of the parasites by adult houseflies can occur via fecal deposition, mechanical dislodgment of parasite from the exoskeleton, or through regurgitation of ingested particles. Houseflies may pick up parasites like free amoebae from public places and transmit them directly or via water to man. These parasites are dangerous and is life threatening. Houseflies can easily transmit the cysts of other protozoa. A prevalence of helminthic ova in Shiraz playground and recovering of *E. coli* in this study show that serious measures should be done in this locality as they are of public health importance.

Hence, some control measures are necessary. Such measures should include a persistent sanitation campaign, proper disposal of human wastes, proper drainage of open gutters, control and treatment of stray dogs and cats, using new devices for preventing the houseflies to enter food-stuff shops and education of people of the role of these flies in transmitting pathogens to man. These measures will reduce the housefly population and thus minimize the incidence of infection transmitted by these flies.

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