

Identification of bacteria which possible transmitted by *Musca domestica* (Diptera: Muscidae) in the region of Ahvaz, SW Iran

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Abstract

The house-fly, *Musca domestica* L., not only is a nuisance pest, but also acts as an important mechanical vector for lots of pathogenic microorganism agents, including: bacteria, protozoa, worms, fungi and viruses amongst humans and animals. The aim of this study was to isolate and identification bacteria that are pick up by house-fly over the human and animal premises. In this study totally 230 houseflies were collected to isolate their bacteria, from the central slaughter house and a zoo in Ahvaz SW Iran. The most common isolated bacteria were *Escherichia coli* with 230 cases (36.5%). The results of the current study confirm that flies are much more than a nuisance and that they pose potentially serious health risks. Consequently, the population of houseflies has to be controlled.

Keywords: *Musca domestica*, *Escherichia coli*, *Staphylococci aureus*, *Pseudomonas spp.*, *Proteus spp.*, Ahvaz

Introduction

The house-fly, *Musca domestica*, not only is a nuisance pest, but also acts as an important mechanical vector for lots of pathogenic microorganism agents, including: bacteria, protozoa, worms, fungi and viruses amongst humans and animals. The population of houseflies transmit the disease agents by means of different parts of their bodies (hairs body, appendages and mouth parts) and secretions (regurgitates and feces). House-flies enter

to the several places, including contaminated premises because of their own biologic habits for feeding [1]. The habits of house-fly favor the spread of bacteria and other disease-causing organisms [2]. Consequently, house fly, for example, can spread diseases such as food poisoning and dysentery regarding to bacteria [1, 2].

More than 100 pathogens associated with the house fly may cause diseases in humans and animals, including typhoid, cholera, bacillary dysentery, tuberculosis, anthrax,

ophthalmia and infantile diarrhea, as well as parasitic protozoa and worms [3]. Pathogenic organisms are picked up by flies from garbage, sewage and other sources of filth, and then transferred on their mouthparts and other body parts, through their vomits, feces and contaminated external body parts to human and animal food [3]. In addition to classical pathogens, there are newly recorded bacteria which are medical importance. As the new findings Macovei and Zurek [4] have reported which houseflies in food-handling and serving facilities carry and may have the capacity to transfer antibiotic-resistant and potentially virulent bacteria.

Meek [5] in the study founded by Orkin Pest Control has described new nine transmitted bacteria by houseflies. Three of them consisting, *Acinetobacter baumannii*, that has been linked to meningitis, *Bacillus pumilus*, which can cause food poisoning and *Enterobacter sakazakii* which can cause urinary tract, pulmonary and bloodstream infections. Because *M. domestica* is capable of carrying a variety of bacteria, viruses, fungi and parasites diseases over its body's appendages, we can make some critical steps forward to fight against these micro organisms. Basically, one of these steps is to identify those pathogenic agents and as a result promoting the status of society health [1]. Therefore one way to stop these diseases is to control and reduce the population of house flies in the human and animal habits [1].

The aim of this study was to isolate and identification bacteria that are pick up by housefly over the human and animal premises.

Methods and materials

In this study a total 230 houseflies were collected from the central slaughter house and a zoo in Ahvaz SW Iran. The samples were transported to the parasitology laboratory and placed in the sterile dishes

in freeze-temperature for 15 min to anaesthetize them. The procedure of Nunes *et al.* [6] was followed to prepare the samples for culturing. Briefly, the samples were washed by distilled water two times and for one minute in each time. In the last stage, the flies were soaked in 0.85% saline solution using a watch-glass. Then, the yield solution was transferred to a culture media by a sterile loop under hood and sterile conditions [6]. Prepared solution was transported to the media cultures by a sterile loop under hood and sterile conditions. The used culture media in this study were consisted of Blood Agar (BA), EMB and differentiate media [4-7].

Results and Discussion

A total of 629 samples (from 230 houseflies) as positive cultures were obtained. The most common isolated bacteria were *Escherichia coli* with 230 cases (36.5%) and another isolated bacteria were belong to *Staphylococci aureus*, 169 cases (26.9%), *Pseudomonas spp.*, 137 cases (21.8%), and *Proteus spp.*, 93, (14.8%). All isolated bacteria from *M. domestica* in the current study are pathogenic. These findings agree with the results of Sulaiman *et al.* [7] in Malaysia which were *Acinetobacter sp.*, *Bacillus sp.*, *Enterobacter sp.*, *Proteus sp.*, *Escherichia sp.* and *Klebsiella sp.* The specimen in the above study was collected from poultry farm which is very similar to the current study that was carried out in the slaughter house and zoo [7].

There are more studies which confirm the role of houseflies on transmission of different bacteria as a world wide agent. The more evident to find the role of houseflies on the transmission of bacteria is using different insect species and different methods of transmissions. Olsen and Hammack [8] isolated *Salmonella enteritidis*, *S. infantis* and *S. heidelberg* from house flies over poultry houses. Sulaiman *et al.* [9] have isolated 18 species of entero-pathogenic bacteria from different cyclorrhaphan flies in Malaysia. Zarrin *et al.* [10] have isolated two species of dermatophytes (*Microsporium gypseum* and

Trichophyton mentagrophytes) from same place. This confirm that the housefly's body can act as a mechanical vector either bacteria or many micro organisms. Nazni *et al.* [11] have isolated *Bacillus sp.*, *Staphylococcus sp.* and *Micrococcus sp.* from faeces and, vomits of houseflies too other than from the external body of houseflies. Grubel *et al.* [12] have isolated variable *Helicobacter pylori* from alimentary tracts of houseflies which indicate that houseflies can dismiss more different bacteria using more methods. In the other study Fotedar [13], showed the vector potential of house flies in the transmission of *Vibrio cholerae* in an outbreak in India. Nazni *et al.* [11] have reported isolation of *Acinetobacter sp.*, *Bacillus sp.*, *Enterobacter sp.* and *Proteus sp.* from external body of *M. domestica* that is a similar study to the current research.

Lamiaa *et al.* [14] have compared the transmitted bacteria between houseflies and American cockroach, *Periplaneta americana*. They have isolated *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus spp.*, *Salmonella spp.*, *Shigella spp.*, *Proteus vulgaris*, *Proteus spp.*, *Serratia spp.*, *Klebsiella spp.*, *Enterobacter spp.* and *Escherichia coli* from the external surface of both insects. This is an evident for further study using different insects and different parts or secretions of these insects as dispersing bacterial diseases.

The results of the current study confirm that flies are much more than a nuisance and that they pose potentially serious health risks as mechanical vectors. Therefore they have to be controlled and density of their population should be reduced undertaken different vector control approaches.

References

- 1) Service MW. (2000) Medical entomology for students. 2nd ed. Cambridge University Press.
- 2) www.idph.state.il.us/envhealth/pcfilthflies.htm.
- 3) www.edis.ifas.ufl.edu/in503.
- 4) Macovei L, Zurek L. Ecology of Antibiotic Resistance Genes: Characterization of Enterococci from Houseflies Collected in Food Settings. *Applied and Environmental Microbiology* 2006; 72: 4028-4035.
- 5) www.pctonline.com/articles/article.asp?ID=1510&IssueID=91.
- 6) Nunes SM, Costa S, Gisela L, Elias VR, Bittencourt P. Isolation of fungi in *Musca domestica* Linnaeus, 1758 (Diptera: Muscidae) captured at two natural breeding grounds in the municipality of Seropédica, Rio de Janeiro, Brazil. *Brazil Mem Institute Oswaldo Cruz, Rio de Janeiro* 2002; 97: 1107-1110.
- 7) Sulaiman S, Aziz AH, Hashim Y, Abdul Rahim S. Isolations of entero-pathogenic bacteria from some cyclorrhaphan flies in Malaysia. *Malaysian Applied Biology* 1988; 17:129-133.
- 8) Olsen AR, Hammack TS. Isolation of *Salmonella spp.* from the housefly, *Musca domestica* L., and the dump fly, *Hydrotaea aenescens* (Wiedemann) (Diptera: Muscidae), at caged-layer houses. *Journal of Food Protection* 2000; 63: 958-960.
- 9) Sulaiman S, Othman MZ, Aziz AH. Isolation of enteric pathogens from synanthropic flies trapped in downtown Kuala Lumpur. *Journal of Vector Ecology* 2000; 25: 90-93.
- 10) Zarrin M, Vazirianzadeh B, Shams SS, Zarei Mahmoudabadi A, Rahdar M. Isolation of fungi from housefly (*Musca domestica*) in Ahvaz, Iran. *Pakistan Journal of Medical Sciences* 2007; 23: 917-919.
- 11) Nazni WA, Seleena B, Lee HL, Jeffery JT, Rogayah TAR, Sofian MA. Bacteria fauna from the house fly, *Musca domestica* (L.). *Tropical Biomedicine* 2005; 22: 225-231.
- 12) Grubel P, Hoffman JS, Chong FK, Burstein NA, Chandrakant M, Cave DA. Vector Potential of Houseflies (*Musca domestica*) for *Helicobacter pylori*. *Journal of Clinical Microbiology* 1997; 35: 1300-1303.
- 13) Fotedar R. Vector potential of houseflies (*Musca domestica*) in the transmission of *Vibrio cholerae* in India. *Acta Tropica* 2001; 78: 31-34.
- 14) Lamiaa B, Mariam L, Ahmed A. Bacteriological analysis of *Periplaneta americana* L. (Dictyoptera; Blattidae) and *Musca domestica* L. (Diptera; Muscidae) in ten

districts of Tangier, Morocco. *African Journal of Biotechnology* 2007; 6: 2038-2042.

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