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EGYPTIAN ACADEMIC JOURNAL OF
BIOLOGICAL SCIENCES
ENTOMOLOGY

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ISSN
1687-8809

WWW.EAJBS.EG.NET

Vol. 7 No. 2 (2014)

Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.

Entomology Journal publishes original research papers and reviews from any entomological discipline or from directly allied fields in ecology, behavioral biology, physiology, biochemistry, development, genetics, systematics, morphology, evolution, control of insects, arachnids, and general entomology.

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Isolation of Fungi from House fly (*Musca domestica*) at Slaughter House and Public Places in Riyadh

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ABSTRACT

House flies have long been regarded as potential carriers of microorganisms especially fungi. Since pathogenic microorganisms are widespread in the environment, there is abundant opportunity for flies to become contaminated and in turn to contaminate the human environment and residential regions. The aim of this study was to isolate and identify fungi which transmitted by flies and present in environment at the Slaughter House and Public Places. In this study, a total of 250 *Musca domestica* (125 flies from the Slaughter House environments and 125 flies from the public places) were collected in Riyadh. Flies were treated and Sabouraud's dextrose agar (SDA) was used for isolation of fungi. The main fungus isolates were *Aspergillus* spp. (66%). *Penecillium* spp. (14%), *Fusarium* spp. (11.3%), *Alternaria* spp. (6%) and among the filamentous fungi, (8.6%) of the isolates as *Microsporum gypseum* of dermatophytes was identified. The present study supports belief that the house fly is a carrier for fungal spores. Therefore they have to be controlled and density of their population should be reduced undertaken different vector control approaches.

Keywords: *Musca domestica* , Slaughter House and Fungi.

INTRODUCTION

The house fly, *Musca domestica*, is a well-known cosmopolitan pest of both public places and Slaughter Houses. The most important damage related to this insect is the annoyance and the indirect damage produced by the potential transmission of pathogens (viruses, bacteria, fungi, protozoa, and nematodes) associated with this fly [Banjo A, *et al.* (2005), Benjo A D, *et al.*(2006)]. House flies feed indiscriminately on garbage and sewage. In this manner the house flies are able to transport pathogenic organisms from infected materials to human [Butler, J. F *et al.* (2010)]. It has been demonstrated that some microorganisms may live inside and/or on the housefly body surface from 5–6 h up to 35 days [Cafarchia C, *et al.* (2009)]. Among the pathogens commonly transmitted by house flies are many species of yeast and filamentous fungi that cause illness [Cancado F.C *et al.* (2007)]. The majority of these Fungi cause

opportunistic infections that may lead to life threatening infections which are especially occurring in immunocompromised patients admitted in hospital [Cherry, S and N. Silverman (2006), Cirillo, V. J (2006)]. Dirt, soil, body discharges and excreta from animals in holding pens are the main sources of fungal contamination of house flies [Greig, J. D (2010)]. *Aspergillus* spp. and *Candida* spp. are commonly isolated from the soil, plant debris and the indoor environment, including hospitals [Kontoyiannis D. P. and Lewis R.E. (2010)]. The association of fungi and insects has been verified by several authors [Cancado, F. C, A. A Valerio .(2007) m Greig J. D (2010), Nazni WA, *et al.* (2005), Pfaller M A and Diekema D J. (2010)]. The present study was conducted for isolation and identification of filamentous and yeast fungi of medical importance that are picked up by house flies which were collected from the slaughter houses and the public places environments.

MATERIALS AND METHODS

In this study, houseflies were collected from Slaughter Houses and public places in Riyadh. The flies were captured with a sterile nylon net and transferred to the Entomology Laboratory and placed in the sterile dishes in freeze temperature for 15 min to anaesthetize them. Identification was made by examining the fly (inside test tube) under a dissection microscope and following standard taxonomic keys [Perlroth J *et al.* (2007)]. The flies were initially washed in a solution of 1% sodium hypochlorite for 3 min to decontaminate external surfaces, and twice in sterile distilled water for 1 min each. Two ml of sterile normal saline (0.85%) was added to the tube and the fly was thoroughly shaken for 2 minutes. Then, 0.1ml of this solution was transferred to Sabouraud dextrose agar (Scharlau, Spain) containing (1%) chloramphenicol to inhibit bacterial growth under sterile conditions. The plates were incubated at 25°C and were observed daily for up to 15 days. The resulting growth (if any) was identified by standard mycological methods based upon gross cultural and microscopic morphology [Salehzadeha A *et al.* (2007)]. The fungi that could not be identified by this manner were subcultured on potato dextrose agar, water agar and /or slide cultured for further identification.

RESULTS

From the total 250 houseflies, positive cultures were obtained from 85 samples, that contained 60 (70%) fungi from the Slaughter house and 100 fungi (80%) were isolated from the public places environments. The most common isolated fungi were *Aspergillus* spp. with 100 cases and another isolated were belong to *Penecillium* spp., 21 cases, *Fusarium* spp., 17 cases, *Microsporium gypseum* 13 cases, and *Alternaria* spp., 9 cases. The most prevalent fungi isolated from the public places environments were *Aspergillus flavus* (40 %) and *Aspergillus niger* (21%) respectively. These two fungal species were also the most frequent among the flies captured at the slaughter houses, with a frequency of (25%) and (16%) respectively. Among the filamentous fungi, (8.6%) of the isolates as *Microsporium gypseum* of dermatophytes was identified (Tables 1, 2 & 3).

Table 1: Fungal identification isolated from the external body surface of *Musca domestica* collected from the public places environments.

Species	Public places environments				total	
	Bags garbage		Food garbage		N	%
	N	%	N	%		
<i>Aspergillus flavus</i>	18	8.5	22	11.5	40	20
<i>Aspergillus niger</i>	15	5.5	20	9.3	35	14.8
<i>Penicillium spp.</i>	7	4.7	10	4.7	17	9.4
<i>Fusarium spp.</i>	4	3.8	8	3.8	12	7.6
<i>Microsporium gypseum</i>	8	1.4	3	1.4	11	2.8
<i>Alternria spp.</i>	5	0.9	2	0.9	7	1.8
<i>Total</i>	57	24.8	65	31.6	122	56.4

Table 2: Fungal identification isolated from the external body surface of *Musca domestica* collected from the slaughter house.

Species	slaughter house	
	Bags garbage	
	N	%
<i>Aspergillus flavus</i>	15	20
<i>Aspergillus niger</i>	10	6.2
<i>Penicillium spp.</i>	4	0.8
<i>Fusarium spp.</i>	5	1
<i>Microsporium gypseum</i>	2	0.4
<i>Alternria spp.</i>	2	0.4
<i>Total</i>	38	28.8

Table 3: Total percentage of fungal identification isolated from the external body surface of *Musca domestica* collected from public places and the slaughter house environments.

Species	Public places environments				slaughter house		Total	
	Bags garbage		Food garbage		Bags garbage		N	%
	N	%	N	%	N	%		
<i>Aspergillus flavus</i>	18	8.5	22	11.5	15	20	55	40
<i>Aspergillus niger</i>	15	5.5	20	9.3	10	6.2	45	21
<i>Penicillium spp.</i>	7	4.7	10	4.7	4	0.8	21	10.2
<i>Fusarium spp.</i>	4	3.8	8	3.8	5	1	17	8.6
<i>Microsporium gypseum</i>	8	1.4	3	1.4	2	0.4	13	3.2
<i>Alternria spp.</i>	5	0.9	2	0.9	2	0.4	9	2.2
<i>Total</i>	57	24.8	65	31.6	38	28.8	160	85.2

DISCUSSION

The results of the present study revealed that outer body surface houseflies collected from slaughter house and the public places environments are contaminated with different fungi. There are several studies which confirm the role of houseflies in the transmission of different fungi as mechanical vectors [Greig, J. D (2010), Nazni WA *et al.* (2005), Pfaller M A. and Diekema D J (2010)]. *Aspergillus* spp. was isolated in higher percentages from the flies taken from the public places environments. The opportunistic infectious disease due to *Aspergillus* spp. is of great importance and hospital related invasive fungal infections has been known as the fourth most common cause of this kind of disease [K ontoyianis D. P and Lewis R.E (2010), Srivoramas *et al.* (2012)]. The isolation of these fungi from houseflies in public places is alarming especially for patients, children and old people who frequently visit public places [Zarrin M *et al.* (2007)]. In our study, *Microsporium gypseum* of dermatophytes was isolated from the houseflies. Zarrin *et al.* [Greig J. D (2010)] have isolated two species of dermatophytes (*Microsporium gypseum* and

Trichophyton mentagrophytes) from similar places. 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. The importance of controlling *M. domestica* contamination, especially in public places, where children and old people are more likely to be exposed to opportunistic infections is shown to be clear based on the results of this study. Therefore they have to be controlled and the density of their population should be reduced by standard vector control approaches. Considering the per capita of public places garbage production and its contamination by various types of microorganisms such as fungi, the appropriate management of public places garbage disposal in order to prevent the accumulation and multiplication of insects especially houseflies and consequently the prevention of various diseases and environmental pollution is highly recommended.

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ARABIC SUMMERY

عزل الفطريات التي تنقلها الذبابة المنزلية (*Musca Domestica*) House Fly في بيئة المسالخ والمناطق العامة بالرياض

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مما لا شك فيه أن العيش في بيئة نظيفة أصبح ضرورة من ضروريات الحياة البشرية ودليل على التحضر و تقدم البلدان. حيث توجد عوامل كثيرة تحول دون تحقيق هذا الهدف. ومن هذه العوامل انتشار الحشرات في البيئة التي تحيط بالإنسان. ومن أشهر هذه الحشرات وأكثرها انتشاراً هي الذبابة المنزلية (*Musca Domestica*) fly إذ تنتقل بين كافة الأشياء القذرة والنظيفة على السواء، وأنها شرهة للغذاء، فهي إن تغذت على القاذورات بأكوام القمامة ثم طارت على طعام مكشوف فإنها سرعان ما تفرغ ما في بطنها عليه، لتفسح مكاناً للأكل الجديد، الأمر الذي يجعلها من أخطر مصادر نقل الأمراض كالزحار والتيفود والكوليرا والعديد من الأمراض خلال فصل الصيف الذي تتزايد فيه أعداد هذه الحشرة لنشاطها الكبير جداً للتكاثر في هذا الموسم. ولذلك كان الهدف من دراستنا عزل و تعريف الفطريات التي قد تنتقل بواسطة الذبابة المنزلية *Musca Domestica* الموجودة في بيئة المسالخ و المناطق العامة بمدينة الرياض. حيث تم تجميع 250 ذبابة لهذا الهدف و استخدام Sabourass dextrases (SDA) كوسط بيئي لعزل الفطريات المحتمل انتقالها بواسطة الذبابة المنزلية. حيث كانت الفطريات الأساسية المعزولة تتمثل في الأنواع الآتية:

Aspergillus spp. 66%; *Fusarium spp.* 11.3%; *Penicillium spp.* 14%; *Alternaria spp.* 6%; *Microsporum Eypseum* 8.6%.

وبذلك تؤكد الدراسة الحالية على الاعتقاد السائد بأن الذبابة المنزلية هي ناقل لجراثيم الفطريات و لابد من التحكم في انتشارها و خفض أعدادها باستخدام طرق المقاومة المختلفة.