

## THE RELATIONSHIP BETWEEN ASPERGILLOSIS IN CATS AND HUMAN OTOMYCOSIS OF PETS' OWNERS IN ASSIUT CITY

AML MOKHTAR

Microbiology and Immunology Department, Faculty of Vet. Medicine, Aswan University

**Received:** 26 June 2022; **Accepted:** 30 August 2022

### ABSTRACT

Fungus is considered a neglected zoonotic agent that transmitted naturally between animals and man causing various degrees of severity with attendant public health consequences. The growing interest in keeping pets in our houses gives rise to this problem. Otomycosis is a superficial fungal infection in the outer ear canal. The same zoonotic fungi isolated from pets were isolated from the ears of pets' owners. Morphological typing and identification of isolated fungus from 20 cats' hair reveal the presence of *Aspergillus flavus* isolated from all cases 20 (100%) and *Aspergillus nidulans* in 15 (75%) and another species of fungi were isolated. Morphological typing and identification of isolated fungus from ear swabs of pets ownership patients reveal 14/35 (40%). Isolates were mixed infection of *Aspergillus flavus* with *Aspergillus nidulans*, while *Aspergillus sydowii* was seen alone in 9/35 (25.7%) patients. Mixed infection with bacteria appeared in *Aspergillus flavus* 8/35 (22.9%) and in *Aspergillus sydowii* 4/35 (11.4%). The aim of our study is to warn pet owners that pets carrying fungal zoonotic agents on their hair cause some infections for their owners as otomycosis.

**Keywords:** Otomycosis , *Aspergillus flavus* , *Aspergillus nidulans*, pets

### INTRODUCTION

Some fungal infections, whether real pathogens or opportunists associated with the transmission of zoonoses are neglected in public health efforts, so there is more prevention strategies are required (Guarro *et al.*, 1999).

Infected fungi didn't adapt well to the human host environment which can elicit a high immune response, which can be fatal for immunocompromized patients (Zhang *et al.*, 2015).

Human who contact with pets such as cats and dogs suffers from many infections each year in the United States, ranging from superficial dermal diseases to dangerous systemic diseases. Fungal skin infections (skin dermatophytosis or other skin diseases) in contact with cats and dogs are probably the most common diseases associated with pets. Many zoonotic diseases can spread between pets and humans. The extent of the problem is not well understood because many zoonotic diseases are not reported to health authorities or are underdiagnosed (peter *et al.*, 2007).

Emotional, health and social benefits for the Pets ownership; however, domestic animals act as a source of zoonotic infection. A large survey found that about 75% of the family have close contact with pets such as sleeping

---

Corresponding author: Aml Mokhtar  
E-mail address: [amlmokhtar2011@hotmail.com](mailto:amlmokhtar2011@hotmail.com)  
Present address: Microbiology and Immunology Department, Faculty of Vet. Medicine, Aswan University

in their owners' beds and face licking (Stull *et al.*, 2012, 2013).

Further research suggests that peoples at high risk of pets related diseases are unaware of the risks accompanying raising pets or recommendations for reducing them, an example, 77% of humans raising pets that cancer diagnosis after buying a high-risk pet (stull *et al.*, 2014).

Studies of zoonotic infection from pets not surprising the statistics result because they suggest that physicians do not attend to ask about contact with pets and do not discuss the risks of zoonotic diseases with patients, regardless of the patient's immunity status (Hill *et al.*, 2012).

### Otomycosis in human

Otomycosis is a superficial fungal infection of the external ear canal, commonly spread in tropical and warm regions especially in summer because fungi need moisture and warmth to grow. Nearly about 60 different species of fungi cause otomycosis but the most common, *Aspergillus* and *Candida* may complicate with bacteria (Karen Gill, 2019).

The most pathogenic fungi detected from otomycosis are *A. niger*, *A. flavus*, *A. fumigatus*, and *Candida albicans* (Nwabuisi, 2001).

### Aspergillosis in cats

There are over 180 species of aspergillosis common in the environment and cause disease in cats and dogs if has a compromised immune system or one exposed to a very large amount of fungus. In most cases, the fungal infection mainly confined to the sinus/or bit region in cats may spread on the body in severe cases. Two types of aspergillosis can occur in cats: (nasal aspergillosis or upper respiratory tract aspergillosis) and (disseminated aspergillosis, or systemic aspergillosis). Nasal

aspergillosis is the most common form and zoonotic form. Infection occurs by breath in microscopic *Aspergillus* spores and grows in the nose, nasal cavity and sinuses. The disseminated aspergillosis may be due to a poorer immune system (Katrin Hartmann *et al.*, 2013)

## MATERIALS AND METHODS

### Samples collected:

This investigation was conducted over a course of year (2021) in Assiut Governorate, Egypt, at a major University teaching hospital and a private animal clinic. The study comprised 35 pet owners who had otomycosis and were clinically diagnosed as having a fungal etiology, in addition to 20 hair samples collected from 20 cats at a private pet clinic. Samples were obtained using sterile swabs in sterile containers under strict aseptic conditions. To minimize sample contamination or the spread of infectious agents, these samples were handled with care and taken directly to the mycological laboratory at Assiut University Mycological Centre (AUMC), making a direct microscope, culture, isolation and identification of fungal characterization.

### Direct microscopic examination (DME)

From each ear swab, a slide was prepared, and stained with lactophenol cotton blue (LPCB) stain. Positive fungal infection findings were obtained when samples showed fungal conidia or hyphae (Moubasher., 1993).

### Culturing of specimens

Swabs were streaked over the surface of Sabouraud's dextrose agar medium (SDA) (de Hoog *et al.* 2000). For up to 7 days, cultures were incubated at 25 °C. A microscopic inspection of colony development was performed to establish the existence of fungal units. The developing fungi were kept in SDA slants at 4 °C for further study.

### Phenotypic identification of the obtained fungi

The identification of fungal genera and species was based on the macroscopic and microscopic features as following keys described by (Raper and Fennell., 1965) for *Aspergillus* species, (Moubasher., 1993) and (Domsch *et al.*, 2007) for fungi in general

### RESULTS

Morphological typing and identification of isolated fungus from cats' hair revealed the presence of *Aspergillus flavus* isolated from all cases 20 (100%) and *Aspergillus nidulans* in 15 (75%) in Table (1) and another species of fungi were isolated in Table (2).

**Table 1:** Zoonotic fungi isolated from both cats' hair and human ear.

Type of zoonotic fungi isolated from cats hair and human ear	NO	%
<i>Aspergillus flavus</i>	20	100%
<i>Aspergillus nidulans</i>	15	75%

**Table 2:** All Fungi isolated from Cats hair

Fungi species	1-2 years 5 cases	2-4 years 5 cases	4-7 years 10 cases	NO / % (20)
<i>Aspergillus flavus</i>	+	+	+	20 / 100%
<i>Aspergillus nidulans</i>	-	+	+	15 / 75%
<i>Aspergillus niger</i>	-	+	-	5 / 25%
<i>Alternaria alternata</i>	+	-	+	15 / 75%
<i>Botryotrichum piluliferum</i>	+	-	+	15 / 75%
<i>Cladosporium cladosporioides</i>	+	-	+	15 / 75%
<i>Curvularia lunata</i>	-	+	-	5 / 25%
<i>Curvularia spicifera</i>	+	-	+	15 / 75%
<i>Chrysosporium Keratinophilum</i>	-	+	-	5 / 25%
<i>Penicillium chrysogenum</i>	-	-	+	10 / 50%
<i>Scopulariopsis brevicaulis</i>	+	-	+	15 / 75%

Morphological typing and identification of isolated fungus from ear swabs of pets ownership patients reveal 14/35 (40%) Isolated mixed infection of *Aspergillus flavus* with *Aspergillus nidulans*, while *Aspergillus sydowii* was seen alone in 9/35

(25.7%) patients. Mixed infection with bacteria (*S. aureus*) appeared in 8/35 (22.9%) *Aspergillus flavus* and 4/35 (11.4%) *Aspergillus sydowii* in Table (3) and the total presence of separate or mixed fungi isolated from human ear in Table (4).

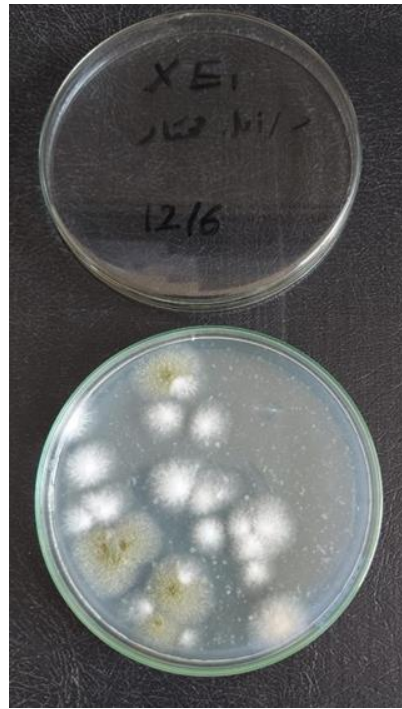
**Table 3:** Fungi isolated from the human ear.

Types of fungi isolated from the human ear (mixed or single infection)	NO	%
<i>Aspergillus flavus</i> with <i>Aspergillus nidulans</i>	14	40%
<i>Aspergillus sydowii</i>	9	25.7%
<i>Aspergillus flavus</i> with bacteria	8	22.9%
<i>Aspergillus sydowii</i> with bacteria	4	11.4%
Total cases	35	100%

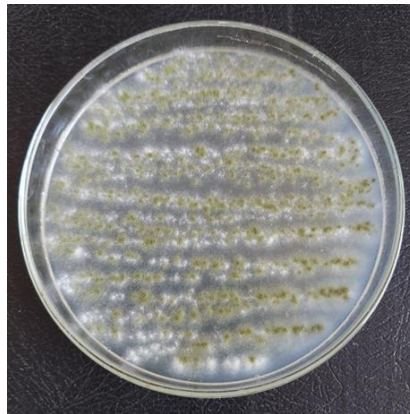
**Table 4:** Total presence of each fungus isolated from human ear.

Type of fungi	NO of isolated fungi from (35) human case
<i>Aspergillus flavus</i>	22 / 35
<i>Aspergillus nidulans</i>	14 / 35
<i>Aspergillus sydowii</i>	13 / 35

**Photo****Fig. (1)** *Aspergillus sydowii*



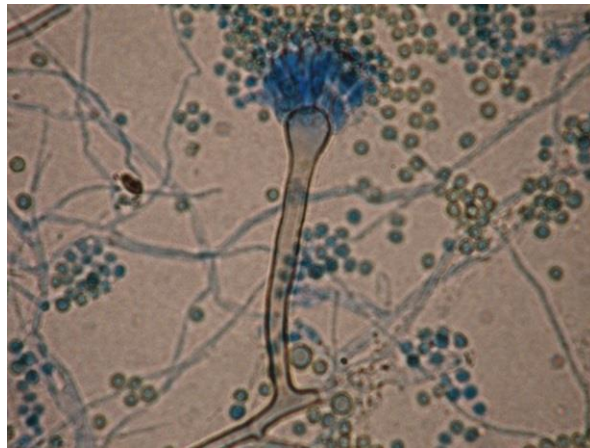
**Fig. (2)** *Aspergillus flavus* (green) and *Aspergillus nidulans* (whitish to buff)



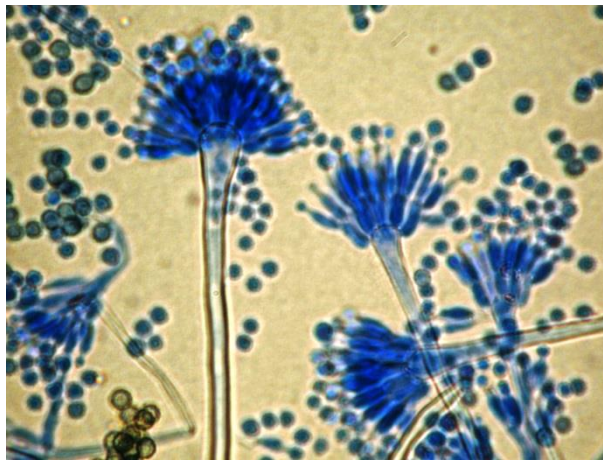
**Fig. (3)** *Aspergillus flavus* and *Aspergillus nidulans*



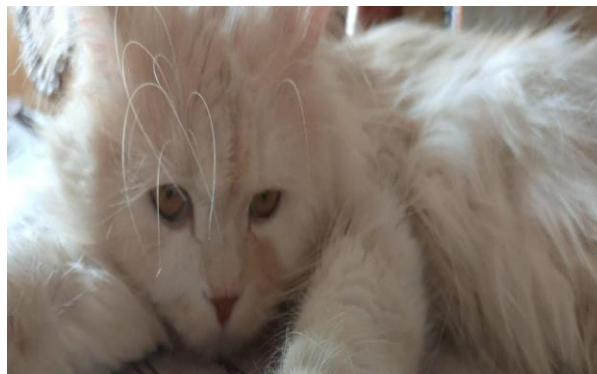
**Fig. (4):** *Aspergillus flavus*



**Fig. (5):** *Aspergillus nidulans*



**Fig. (6):** *Aspergillus sydowii*



**Fig. (7):** cat pets

## DISSCUSION

Some research is in contrast to this study. Patient scanning and epidemiological studies inspire that occurrence of zoonotic pets associated diseases are very low, as reported by (Adebowale and Daniel, 2018). Another agrees with this study, molecular and epidemiologic evidence proved that the direct contact of animals hair, saliva, body

fluids and other secretions with the owner skin or mucous membranes are a prospect for about 70 human zoonotic diseases as multidrug-resistant bacteria, as reported with (Chomel., 2014 and Morris *et al.*, 2012)

Another opportunistic filamentous type of *Aspergillus* detected as *Aspergillus niger*, was identified as the cause of chronic bilateral otomycosis in case of female

patient who was unresponsive to different treatments also detect other similar fungal elements (Mishra *et al.*, 2004). A detected case of otomycosis and the isolated causative agent was *Aspergillus versicolor* which is rarely reported in otomycosis (Santosh *et al.*, 2020).

*Aspergillus* spp. is the major fungi isolated from otomycosis (*A. niger*, *A. fumigatus* and *A. flavus*) in 80% of cases, followed by *Penicillium* and *Candida albicans*. Otomycosis may associate with bacterial infection (Sampath *et al.*, 2014). Additionally, *Aspergillus fumigatus* is the most fungal pathogen isolated from nine cats (Barrs *et al.*, 2012)

The upper respiratory tract (URT) infection with aspergillosis in cats is restricted to individual case reports (Hoffman, 2010).

The main danger is from the apparently healthy cats, where the infections with *Aspergillus* species occur without clinical manifestation, mainly in non-invasive mucous membrane colonization (Whitney *et al.*, 2005), nearly similar to the results of the current study.

In our result there are newly otomycotic fungi transmitted from pets related to *Aspergillus* spp. were detected, *Aspergillus nidulans* and *Aspergillus sydowii*.

## CONCLUSIONS

Controlling human contact with animal stores can protect and prevent many susceptible zoonotic diseases.

From a global public health perspective, many efforts are needed to raise awareness of neglected zoonotic fungi, as well as to provide an integrated platform for prevention and control strategies.

## REFERENCES

Adebowale I. Adebisi and Daniel O. Oluwayelu (2018): Zoonotic fungal diseases and animal ownership in

Nigeria, Alexandria Journal of Medicine 54 (2018) 397–402.

Barrs, V.R.; Halliday, C.; Martin, P.; Wilson, B.; Krockenberger, M.; Gunew, M.; Bennett, S.; Koehlmeyer, E.; Thompson, A.; Fliegner, R.; Hocking, A.; Sleiman, S. Brien, C.O'. and Beatty, J.A. (2012): Sinonasal and sino-orbital aspergillosis in 23 cats: Aetiology, clinicopathological features and treatment outcomes, The Veterinary Journal Volume 191, Issue 1, January 2012, Pages 58-64

Booth, C. (1971): The genus fusarium commonwealth mycological institute. Kew, Surrey 237.

Chomel B. (2014): Emerging and re-emerging zoonoses of dogs and cats. *Animals*; 4: 434-45.

De Hoog, G.S.; Guarro, J.; Gené, J. and Figueras, M. (2000): Atlas of clinical fungi Centraalbureau voor Schimmelcultures (CBS).

Domsch, K.; Gams, W. and Anderson, T. (2007): Compendium of soil fungi. 1–672. IHW-Verlag, Eching, Germany.

Guarro, J.; Gene, J. and Stchigel, AM. (1999): Developments in fungal taxonomy. *Clin Microbiol Rev*; 12:454–500.

Karen Gill, M.D. (2019): Otomycosis: What You Need to Know Medically review, Written by Lana Bandoim .

Katrin Hartmann, Albert Lloret, Maria Grazia Pennisi, Lluís Ferrer, Diane Addie, Sándor Belák, Corine Boucraut-Baralon, Herman Egberink, Tadeusz Frymus, Tim Gruffydd-Jones, Margaret J Hosie, Hans Lutz, Fulvio Marsilio, Karin Möstl, Alan D Radford, Etienne Thiry, Uwe Truyen, and Marian C Horzinek (2013): clinical review, aspergillosis in cats abcd guidelines on prevention and management, *Journal of Feline Medicine and Surgery* 15, 605–610 European Advisory Board on Cat Diseases www.abcd-vets.org

- Louisiana State University Last full review/revision. Oct (2020): MSD veterinary manual
- Leslie, J. and Summerell, B. (2006): Fusarium laboratory workshops--a recent history. *Mycotoxin Research* 22 (2), 73.
- Mishra, GS.; Mehta, N. and Pal, M. (2004): Chronic bilateral otomycosis caused by *Aspergillus niger*. *Mycoses*. Feb; 47(1-2): 82-4. doi:10.1046/j.0933-7407.2003.00935.x. PMID: 14998406.
- Moubasher, A. (1993): Soil fungi in qatar and other arab countries The Centre for Scientific and Applied Research, University of Qatar.
- Morris, DO.; Lautenbach, E. and Zaoutis, T. (2012): Potential for pet animals to harbour methicillin-resistant *Staphylococcus aureus* when residing with human MRSA patients. *Zoonoses Public Health*; 59: 286-93.
- Nwabuisi, C. and Ologe, FE. (2001): The fungal profile of otomycosis patients in Ilorin, Nigeria. *Niger J Med*; 10: 124-6.
- Pitt, J.I. (1979): The genus penicillium and its teleomorphic states eupenicillium and talaromyces. The genus *Penicillium* and its teleomorphic states *Eupenicillium* and *Talaromyces*.
- Raper, K.B. and Fennell, D.I. (1965): The genus *aspergillus*. The genus *Aspergillus*.
- Hill, WA.; Petty, GC. and Erwin, PC. (2012): A survey of Tennessee veterinarian and physician attitudes, knowledge, and practices regarding zoonoses prevention among animal owners with HIV infection or AIDS. *J Am Vet Med Assoc*; 240: 1432-40.
- Peter M. Rabinowitz, Zimra Gordon and Lynda Odofin, (2007): Pet-Related Infections; 76: 1314-22. Copyright © American Academy of Family Physicians.
- Stull, JW.; Peregrine, AS. and Sargeant, JM. (2012): Household knowledge, attitudes and practices related to pet contact and associated zoonoses in Ontario, Canada. *BMC Public Health*; 12: 553.
- Stull, JW.; Peregrine, AS. and Sargeant, JM. (2013): Pet husbandry and infection control practices related to zoonotic disease risks in Ontario, Canada. *BMC Public Health*; 13: 520.
- Stull, JW.; Brophy, J. and Sargeant, JM. (2014): Knowledge, attitudes, and practices related to pet contact by immunocompromised children with cancer and immunocompetent children with diabetes. *J Pediatr*; 165: 348-55.e2
- Santosh Kumar Swain, Priyanka Debta, Mahesh Chandra Sahu and Jatindra Nath Mohanty (2020): Otomycosis due to *Aspergillus Versicolor* International Journal of Health & Allied Sciences- DOI: 10.4103/ijhas. IJHAS\_89\_19, [Downloaded free from <http://www.ijhas.in> on Friday, April 10, 2020, IP: 103.112.27.11].
- Sampath Chandra Prasad, Subbannayya Kotigadde, Manisha Shekhar, Nikhil Dinaker Thada, Prashanth Prabhu, Tina D' Souza, and Kishore Chandra Prasad (2014): Primary Otomycosis in the Indian Subcontinent: Predisposing Factors, Microbiology, and Classification Hindawi Publishing Corporation International Journal of Microbiology Volume 2014, Article ID 636493, 9 pages <http://dx.doi.org/10.1155/2014/636493>
- Whitney, BL.; Broussard, J. and Stefanacci, JD. (2005): Four cats with fungal rhinitis. *J Feline Med Surg*; 7: 53-58.
- Zhang, Y.; Hagen, F.; Stielow, B.; Rodrigues, AM.; Samerpitak, K. and Xun, Z. (2015): Phylogeography and evolutionary patterns in *sporothrix* species with a pathogenic potential for mammals. *Persoonia*; 35: 1-20.



## العلاقة بين داء الرشاشيات في القطط والالتهاب الفطري في أذن الإنسان لأصحاب الحيوانات الأليفة بمدينة أسيوط

امل مختار

E-mail: amlmokhtar2011@hotmail.com

Assiut University web-site: www.aun.edu.eg

تعتبر الفطريات من العوامل الحيوانية المنشأ المهمة التي تنتقل بشكل طبيعي بين الحيوانات والإنسان مسببة درجات متفاوتة من الخطورة مع ما يصاحب ذلك من عواقب صحية عامة. الاهتمام المتزايد بتربية الحيوانات الأليفة في منازلنا يثير هذه المشكلة. فطر الأذن هو عدوى فطرية سطحية في قناة الأذن الخارجية. تم عزل نفس الفطريات الحيوانية المنشأ المعزولة عن الحيوانات الأليفة من آذان ملاك الحيوانات الأليفة. كشف التصنيف المورفولوجي وتحديد الفطر المعزول من شعر القطط عن وجود فطر *Aspergillus flavus* المعزول من جميع الحالات ٢٠ (١٠٠٪) و *Aspergillus nidulans* في ١٥ (٧٥٪) وتم عزل أنواع أخرى من الفطريات.

كشف التصنيف المورفولوجي وتحديد الفطريات المعزولة من مسحات الأذن لمرضى مالكي الحيوانات الأليفة عن ٣٥/١٤ (٤٠٪) عدوى مختلطة معزولة من *Aspergillus flavus* مع *Aspergillus nidulans* ، بينما لوحظ *Aspergillus sydowii* بمفرده في ٣٥/٩ (٢٥,٧٪) من المرضى. تظهر العدوى المختلطة بالبكتيريا في ٣٥/٨ (٢٢,٩٪) *Aspergillus flavus* و ٣٥/٤ (١١,٤٪) *Aspergillus sydowii*.

الهدف من دراستنا هو تحذير مالكي الحيوانات الأليفة بأن هذه الحيوانات قد تحمل عامل فطري حيواني المنشأ على شعرها مما يسبب بعض العدوى للبشر مثل الالتهاب الفطري لأذن الانسان.