Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Der Pharmacia Lettre, 2016, 8 (12):216-220
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Aspergillosis in chickens and human contacts

Mona S. Zaki[1], Suzan O. Mostafa[2] and Nagwa S. Rabie[3]

[1]*Prof of Clinicalpathology, Department of Hydrobiology, National research Centre, Dokki, Giza, Egypt*
[2]*Department of Biochemistry, National Research Centre, Dokki, Giza, Egypt*
[3]*Department of Poultry Diseases, National Research Centre, Dokki, Giza, Egypt*

ABSTRACT

Regarding to human beings, Aspergilli were isolated from all age groups but the majority of infection exists among the 20-40 years group but it was nearly equal and higher in farm workers than in farm owners and veterinarians. Aspergillus species was detected in sputum samples but in blood serum samples by using ELISA IgG. The zoonotic Importance of Aspergillosis as occupationally disease among poultry farm workers as well as the suggested hygienic measures were discussed to decrease its transmission to humans. A. Niger is commonly found as a saprophyte growing on dead leaves, stored grain, compost piles, and other decaying vegetation. The spores are widespread, and are often associated with organic materials and soil. Most of the fungi particularly A. niger, and A. flavus were also isolated from sputum of poultry-men working in such five farm in Mounofia Governorate.

Keywords: Epidemiology, Aspergillosis, Chicken farms, Human Contacts, Egypt.

INTRODUCTION

In recent years, Fungal infections have emerged as a world-wide health care and has become an important cause of respiratory infection in humans owing to extensive use of broad spectrum antibiotics, corticosteroids and immune-suppressive agents and increasing population of terminally ill and debilitated patients [1] which trigger an interest to examine the source and reservoir of such fungi.

The clinical signs such as dyspnea, gasping, cyanosis and hyperemia are usually associated with the disease. However, the affected birds normally don't produce respiratory noise associated with other respiratory problems [3]. Moreover, Aspergillosis primarily causes high morbidity and mortality especially in young chicks [4]. Aspergilli can be isolated from environmental samples and are worldwide in distribution due to the spores of this fungal pathogens are resistant in nature and the birds as well as people who work with them, coming in contact with spores through contaminated feed or litter and may get affected after inhaling the spores [5]. Poultry farm workers are at high risk of developing respiratory problems as they are exposed to high levels of dust containing Aspergillus spores during handling and processing of contaminated material[6].

On the other hand, several species of Aspergillus produce toxins which have various effects such as Aflatoxins that are carcinogenic and cause hepatic and kidney damage or chronic damage of human bones [7]. The diagnosis of Aspergillus infection presents considerable difficulty as the signs and symptoms in most cases of Aspergillosis are non-specific, and radiological findings are of little diagnostic help, so the diagnosis of Aspergillosis requires the isolation and identification of the fungus. Serologic essays are now being developed as an attempt to allow for the rapid and specific diagnosis of Aspergillus infections.

From the economic point of view, avian aspergillosis is an important disease leading to high economic losses through spoilage of eggs, lowering the hatchability precepetage due to increased dead-in-shall-embryos and the infection may spread among brooders, hence aspergillosis particularly the acute form may lead to considerable

losses in young birds. From the public health point of view, Aspergilli have been incriminated as causative agents in-many pulmonary infections in man. Morcover, other infections could also eccur through the heamatogenous metastatic dissemination from the lung to the liver, intestine, kidneys and the abrain, in addition to location and dissiminated skin infection, mostly occur through skin abrasions [8].

What is Aspergillosis?

Aspergillosis is filamentous, increasingly common ubiquitous fungal infection of birds and occasionally other animals including man. It most frequently occurs when birds are exposed to large numbers of Aspergillus fungal elements through the respiratory tract. The genus Aspergillus includes over 185 species. Around 20 species have so far been reported as causative agents of opportunistic infections in man. Among these, *Aspergillus fitmigatus* is the most commonly isolated species, followed by *Aspergillus flavus* and *Aspergillus niger*. *Aspergillus elavatus, Aspergillus glaucu*s group, *Aspergillus nidulans*, *Aspergillus orvzae*, *Aspergillus terreus*, *Aspergillus ustus* and *Aspergillus versicolor* are among the other species less commonly isolated as opportunistic pathogens. The fungus grows quite readily on ordinary laboratory culture media at room temperature, at 37° C, and higher. Czapek's solution agar or Sabouraud's agar may be used. The colonies are green to bluish green at first and darken with age so as to appear almost black. The colonies vary from velvety to floccose [9].

Where is Aspergillus found?

Aspergillus spores are commonly found in air, water, soil, plant debris, rotten vegetation, manure, sawdust litter, bagasse litter, animal feed, on animals and indoor air environment[9].

What is unique about Aspergillus?

Aspergillus may be considered unique among the fungi, since it can be readily identified using its gross macroscopic and microscopic characteristics. Some of Aspergillus noticeable macroscopic features include its growth rate, color of the colony and tolerance to temperature or thermotolerance [9].

What are the signs of Aspergillus infection?

Signs are physical manifestation of a disease condition. Common signs associated with Aspergillosis infection include difficulty with breathing in which forced or labored breathing may occur. There may be increased thirst, fever, diarrhea blindness and inflammation of the brain and membranes surrounding the brain may occur in the later stages resulting in increased morbidity and mortality[9].

What are the health implications of Aspergillus?

Aspergillus spp. can cause disease in birds and man. Three different disease states are observed in man:

(i) Infections that can arise from the weakening effects of aspergillosis e.g. colonization of lung cavities due to tuberculosis, neoplasms or new growths in lungs and kidneys. Almost any organ or system in the human body may be involved. Onychomycosis, sinusitis, cerebral aspergillosis, meningitis, endocarditis, myocarditis, pulmonary aspergillosis, osteomyelitis, otomycosis, endophthalmitis, cutaneous aspergillosis, hepatosplenic aspergillosis, as well as Aspergillus fiingernia, and disseminated aspergillosis may develop. Nosocomial occurrence of aspergillosis due to catheters and other devices is also likely. Construction in hospital environments constitutes a major risk for development of aspergillosis particularly in neutropenic patients.

(ii) Allergic reactions to Aspergillus spp. e.g. allergic bronchopulmonary aspergillosis.

(iii) Toxic reactions occur as a result of toxins produced by Aspergillus spp. e.g. mycotoxins such as aflatoxin which are carcinogenic and may induce hepatocellular carcinoma or liver cancer.

Pulmonary aspergillosis is the most common clinical manifestation of aspergillosis. The, most common symptoms of pulmonary aspergillosis are a chronic productive cough and hemoptysis [coughing up blood]. According to a standard medial textbook, "Aspergillus can colonize ectatic bronchi, cysts, or cavities in the lung. Colonization is usually a sequel of a chronic inflammatory process, such as tuberculosis, bronchiectasis, histoplasmosis, or sarcoidosis. A ball of hyphae may form within an air-containing space, particularly in the upper lobes, and is termed an aspergilloma. The fungus rarely-invades the wall of the cavity, cyst, or bronchus in such patients" [10]. It is not clear what role Aspergillus plays in non-invasive lung disease. Plugs of hyphae may obstruct bronchi. Perhaps allergic or toxic reaction to Aspergillus antigens could cause bronchial constriction and damage [11].

While morphology provides a reasonable means of classification and assignment within the *A. Niger* group, it is not a reliable means for identifying a given isolate from the field. The major distinction currently separating *A. Niger* from the other species of Aspergillus is the production of carbon black or very dark brown spores from biseriate phialides [1965 12]. Other features include the smooth and generally colorless conidiophores and spores that are 5 pm, globose, and have conspicuous ridges or spines not arranged in rows. *A. Niger* isolates grow slowly on Czapek agar [12]. These physical characters such as spore color and rate of growth on a defined media are subject to change,

especially under extended pure culture or selection and mutation. Though *A. Niger* is relatively stable to spontaneous mutation compared to other aspergilli, variation in morphology may still be a problem with some strains. Thus this species may be misidentified with other Aspergillus spp.

How is Aspergillus transmitted to man and Bird?
Aspergillus may be transmitted to animals in the following ways:
(I) Air can transport Aspergillus spores to considerable distances where they may be inhaled by susceptible birds and resulting in infection of these animals.
(II) Water can also transport spores and can infect that share water containers.
(III) Soil may contain high levels of Aspergillus spores that may contaminate birds and animals. Plant matter.
(IV) Other Wild birds and other animals may infect domesticated birds and animals with *Apergillus spp* when they come into contact with them.
So the aim of this study was to determine the epidemiology of Aspergillus species in man work in five chicken farms in Mounofia Governorates

MATERIALS AND METHODS

20 sputum samples and 20 blood serum samples were collected from the occupationally human contacts with these farms and with the history of cough, chest pain and chronic respiratory disease. All samples were aseptically-transported to the laboratory University and were prepared according to [13].

All samples except blood serum were directly streaked on Sabouraud's dextrose agar containing chloramphenicol [50 mg per liter] to control bacterial contamination for isolation of fungus. The suspected Aspergillus colonies were cultured on Czapeck- Dox agar for final macroscopic and microscopic identification according to [14, 15].

Enzyme Linked Immunosorbant Assay [ELISA] for detection of IgG qualitative and quantitative Aspergillus species has been done on serum samples of human.

RESULTS

Table 1: Percentage of man infected with Aspergillus species in five farm

Species	Infected man in Chicken farm	Percentage
A. flavus	10 out 100	10%
A. niger	8 out 100	8%

Table 2 colour of the colony in various Aspergillus species

Species	Surface colour
A. flavus	Yellow green
A. niger	black

Table 3: Micrscopic features of various Aspergillus species

Species	Characteristic of structures supporting asexual spores	Shape of vesicles
A.Flavus	Colorless round	Round, radiate
A. niger	Long smooth, colourless or brown	Round, radiate

DISCUSSION

Asplin and Garengban [16] could isolate A. flavus from the feeds of poultry and reported that the presence of this fungus in the feed was the cause of heavy losses in young ducklings and turkey poults. Boyed and stock [17] reported that generalized granulomatous lesions in chickens and ducks were caused by Aspergiljus spp.

Refai [18] isolated A. fumigatus, *A. flavus, A. glaucus, A. niger*, Pecilomyces, Fusarium and Stephylium from the internal organs of chickens, turkeys and ducks moreover A. flavus A. niger, Mucor, Fusarium and Stemphylium could be isolated from dead-in-shell embryos as well as from feeads of poultry. Sharma et al. [19] isolated a. fumigatus. A. niger, Mucor and acllomyces spp. From the respiratory tract of fowls with gross lesions of sasp rgillosis.

Aspergillesis in man
Isolated A. fumigatus from the sputum of patients with pulmonary infection and concluded that precipitation tests together with culture from sputum of patients constituent an important aid in the diagnosis of pneumemycosis,

Stinghe et al [20] could isolate A. fumigates from the sputum of patients with pulmonary Aspergillosis and karkowka et al [21] reported that diagnosis of pulmonary Aspergillosis's in patients is based on the isolation of A. funmigatus from the sputum and x-ray examination which received the presence of round or oval structures surrounded by a thickened cavity wall. Jordan et al [22] could isolate A. funmigatus from sputum of patients with a history of bronchial asthma and a persistent productive cough

Kaplan [23] reported that all fungal cultures isolated from the respiratory tract of fowls have at the same time been incriminated in domestic animals or human disease syndrome, yet there is no evidence that systemic mycotic diseases are contagious but are transmissible from host to aother, as far the causative fungal agents exit and prolife rate in nature a ssaprophytes and man, animals and birds can be infected with these diseases by exposure to their sources in the environment.

Ahmed et al [24] could isolate *A. Niger* A. flavus, A. cndidus A. Fumigatus, A. erreus, A. glacucus and many other fungi of other genersa from inedible hen eggs and suggested that aspergillus spp. Partyictulary A. tumigtus has been often incriminated as a causative agent in many infections in man

CONCLUSION

From this study, it can be concluded that the human beings and chickens may share the hazard of contracting Aspergillosis and the presence and distribution of Aspergillus species in poultry farms suggests possible occupational health problem and the predisposing factors play an important role in such affection. Due to the ubiquitous nature of the fungus.

1- Diseased animal should not be allowed to enter the food chain and reach the consumer
2- All incoming feed, litter and water should be inspected thoroughly to ensure that they are free from Aspergillus. Any signs of mold activity or presence in feed, litter or water should be refused and discarded appropriately.
3- Poultry and other meats should be cooked thoroughly at an internal temperature of: Poultry-83 °C, Beef-77 °C, Pork-77 °C, and Lamb-75°C.
4- Animal infected with Aspergillosis should be either treated with the necessary antibiotics, antifungal agents.
5- Water sources given to animals should to chlorinated
6- Watering and feeding utensils should be cleared and sanitized regularly.
7- It should be noted that Aspergillosis is difficult to treat and presentation is far better than cure and the necessary proactive steps should be adopted as described herein to prevent, reduce and / or eliminate Aspergillosis

REFERENCES

[1] D. Biswas, S. Agarwal, G. Sindhwani, and Rawat J. **2010**. *Annals of Clinical Microbiology and Antimicrobials*, 9(28), **2010**,1-7.
[2] Z. Xiao-dong, H. Xiao-peng, Y. Hang, W. Wei, Z. Xin, M. Lin-lin, et al. **2008** *Chinese Medical Journal*, 121(9), ,791-94.
[3] C. Milos,V.Kapetanov, and Dubravka V. **2011**. *Proc. Nat. Sci, Matica Srpska Novi Sad* (120), 267-276.
[4] K. Dhama, S.Chakraborty, A. K.Verma, R. Tiwari, R. Barathidasan, A. Kumar, and Singh S.D. **2013**. Areview.*Pakistan Journal of Biological Sciences*, 1-15.
[5] K. R.Dhama, R. Barathidasan, R. Tiwari, and Singh S.D. **2012**. *Poult, World*,(9), ,7-9.
[6] [6]. R. Sabino, V.M Faisca, E. Carolino, C.Verissimo, and Viegas C. **2012**. *Journal of Toxicology and environmental health. part* A,(75), ,1381-1391.
[7] P. N Acha, and Szyfres B. **2006**. "Aspergillosis" 3 rd Ed.(1), 305-310.
[8] A. Saif and F. A. Aboul khier **1979**. *J. Egypt. Vet. Med. Assoc*. 39(3): 139-153.
[9] D. D. Pattron **2006**: *Internet Journal of food safety* 8:19-23
[10] Bennett, J.E. **1979a**. Aspergillosis, pp. 546-547. In P. Beeson, W. McDermott, and J. Wyngaarden, (eds.), Cecil textbook of medicine, 15th edition. W.B Saunders, Philadelphia.
[11] Bennett, J.E. **1980**. Aspergillosis, pp. 742-744. In K.J. Isselbacher, R.D. Adams, E. Braunwald, R.G. Petersdorff, and J.D. Wilson (eds.), Harrison's Principles of Internal Medicine, McGraw-Hill, New York.
[12] Raper, K.B. and Fennell, D.I. **1965**. The genus Aspergillus. Williams and Wilkins, company Baltimore, Maryland. 686 p.
[13] M.R. Mcginnis **1990**. *J. Med. Microbiol*, 1(5), 399401.
[14] D.A. Stevens **2002**. *J. Anti microb. Chemother*, (49), 11-19.
[15] N. McClenny **2005**. *Medical Mycology Supplemen* 1 (43), 125-128
[16] Asplin, P.A. and Coranegüan, R.B. **1961** *Vet. RRec*. 37. 1215.
[17] Boyed, L. and Stock, D.V.M. **1961**. *Avian Dis*. 5, 89.

[18] Refai, M. **1971** On the incidence of moulds in the poultry industry and determination of pathogenicity and disinfection trials. Proceedings of be Mycological Congress, Frankfort, w. Germany.
[19] Sharma, V.B., Sethi, M.S. and Negis, S.K. **1971**. *poult. Sci*. 50, 1041.
[20] Stinghe R. Zoi, A., Kercea, V. and Vesiloche. V. **1969**. *J. Fr. Med. Chir. Thorac*. 23(6): 581
[21] Karkowka, P. Halweg, H. and Cjaaek, J **1970**. Lek. 25(10): 368
[22] Jordan, M. Bierman,CW, and Van Arsdeli PP .**1971**. *Archs. Intern. Med*. 128(4): 56-7
[23] Kaplan.,W (**1973**) Epidemiology of the principal systemic mycosis of man and lower animals. *J. AMw Vct.* Med. Ass. 0, 921
[24] Ahmed, A. A., Abu-Gabal, M. Enab, S.M. and Moustafa, T.H. (**1974**) *Assiut Vet. Med*. 1. 77.