

ASPERGILLUS FUMIGATUS IN COMMERCIAL POULTRY FLOCKS, A SERIOUS THREAT TO POULTRY INDUSTRY IN PAKISTAN

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ABSTRACT

The present study was carried out to determine the incidence of *Aspergillus fumigatus* in commercial poultry flocks. *Aspergillus fumigatus* was isolated from the lungs and air sacs of affected birds. Sixty four suspected cases of fungal infection were used in the study. Thirty one cases were found positive for *Aspergillus fumigatus* by culturing. Gross lesions were observed in lungs, trachea and thoracic air sacs at postmortem examination. Small white nodular lesions 1 millimeter diameter were observed in the congested lungs and thoracic air sacs. Branched septate hyphae were observed under oil emersion. *Aspergillus fumigatus* was cultured on sabouraud agar. Velvety white colonies were seen, at first, which turned dark green to grayish later. It was observed that disease was significantly ($P < 0.005$) higher in hot and humid season. The disease was significantly ($P < 0.000$) higher in birds of less than two weeks age. It was also found that incidence of *Aspergillus fumigatus* was considerably high in flocks reared on sawdust litter as compared to rice husk litter.

Key Words: Aspergillosis, incidence, season, litter, saprophyte.

INTRODUCTION

In native type of poultry husbandry, the control of infectious diseases in poultry is difficult due to lack of proper biosecurity measures, intense farming and greater germ load in the farm premises. Among the infectious diseases fungal diseases have their own importance and seems to one of the great obstacle for the poultry farmers in the form of high morbidity, mortality and production losses. Among the fungal diseases Aspergillosis is one of the important fungal infection, which is caused by *Aspergillus fumigatus* and less commonly by other *Aspergillus* species. (Richard 1991, Barnes and Denning, 1993). The warm, humid environment of the farm sheds, feed stores, floor etc., favor its growth. The disease mainly affects the respiratory tract of the birds. It is the second more expensive health problem on an affected flock basis.

Aspergillus fumigatus is a ubiquitous saprophyte and opportunistic fungal pathogen (Plopper and Adams, 1987). It is a contaminant of virtually every environment because of its adaptability to growth substrates and the production of spores (conidia) that remain viable under extremely harsh conditions (Bardana, 1980). Inhalation of air borne conidia is the principal mode of exposure (Richard and Thurston, 1980). The conidia are spheroidal and 2-3 mm in diameter, once inhaled get deposited deep in the respiratory tract (Campbell, 1970). The constant exposure occasionally results in clinically apparent infection. Aspergillosis in young chicks and pullets is commonly associated with overwhelming exposure to large numbers

of conidia from heavily contaminated feed, litter, or the hatchery environment (Dyar *et al.* 1984).

The disease can occur as an acute form with high mortality and morbidity especially in brooding age, but also has the tendency of chronic form in older birds. Clinical signs such as dyspnoea, gasping, cyanosis of unfeathered skin and hyperemia are usually associated with the disease. However, affected birds normally do not produce respiratory noise associated with other respiratory problems (Richard, 1991). Lesions in birds are commonly confined to lungs and air sacs, although oral mucosa, trachea, eyes may be affected. Typical lesions are fungal nodules or plaques within the lungs and on the air sacs. Occasionally, the syrinx may be also affected (Richard, 1991).

In recent past few years, aspergillosis has emerged as a significant poultry health concern for the poultry producers and humans health officials. The disease in human is common in immuno-compromised patients as a result of acquired immuno deficiency syndrome, neoplasia and chemotherapy (Barnes and Denning, 1993). The current study therefore, was planned and executed to explore the role of *Aspergillus fumigatus* in mortality and morbidity in commercial poultry flocks in native type of poultry farming.

MATERIALS AND METHODS

The present study was carried out to ascertain the incidence of *Aspergillus fumigatus* in commercial poultry flocks during different seasons. The year was divided into four seasons viz: Winter, December-February; Spring, March-May; Summer, June-August

and autumn, September-November. On the basis of clinical signs, symptoms, postmortem findings and history narrated by the poultry farmer, 64 suspected flocks were subjected for isolation of *Aspergillus fumigatus*. The affected dead and morbid birds were subjected to postmortem examinations. The isolation of *Aspergillus fumigatus* was carried from morbid samples (Lungs, air sacs and liver) from affected birds. These samples were directly streaked on sabouraud agar plates for culturing and were incubated for 7 days at 37 °C. *Aspergillus fumigatus* was identified according to its specific colony characteristics, slides were also prepared for identification of mycelium and hyphal arrangement with lactophenol blue staining method (Darise, 1987). The data regarding size of flock, breed, age of flock, type of litter, type of feed, season and mortality was recorded through personal communication from the poultry farmers on a prescribed questionnaire.

RESULTS AND DISCUSSION

The incidence of *Aspergillus fumigatus* was calculated in Sixty-four suspected flocks with respiratory complaints. The incidence of Aspergillosis on the basis of isolation and identification in commercial poultry flocks was 48.43%. These cases were selected on the basis of clinical signs, symptoms and postmortem findings. The clinical signs observed in these birds were respiratory distress, dyspnoea, gasping and nasal discharge in some birds. Postmortem examination revealed congested lungs, grayish white nodules and frothy exudate in lungs. Similar findings were reported by Bhattacharya (2003), who observed gross lesions in postmortem of ducklings. In some cases generalized haemorrhages and involvement of air sacs and pneumonia were observed. Similar findings were reported by Richard (1991), Rao *et al.*, (1982).

Kunkle and Rimler (1996) observed lung lesion consisted of severe pleuritis, pneumonia and mild interstitial inflammation involving deep to lateral margins. Isolation of *Aspergillus fumigatus* was carried from these morbid samples on Sabouraud agar. Thirty-one samples revealed positive *Aspergillus fumigatus* culture, on the basis of colony characteristics (velvety white colonies, at first, which turned dark green to grayish later) and numerous branched septate hyphae under microscope staining with lactophenol blue stain. The findings of the present study were in line with the findings of Yokota *et al.* (2004) who reported that white to green mold growth on the walls of caseous thickened air sacs when cultured yielded pure growth of *Aspergillus fumigatus*. Ustimenko (1982) also isolated *Aspergillus fumigatus* from lung tissue of dead chicken.

In the present study it was observed that the disease is prevailing through out the year but in hot and humid weather (June, July and August) condition, the

number of cases were significantly ($P < 0.005$) higher 54.85% followed by (December, January and February) as compared with other seasons of the year (Table-1).

Table-1: Incidence of aspergillosis in different seasons

| Months | No. of Positive Cases | Percentage |
|--------------------|-----------------------|--------------|
| Winter | 8 | 25.8% |
| Spring | 2 | 6.45% |
| Summer | 17 | 54.85% |
| Autumn | 4 | 12.9% |
| Chi-Square/P-value | | 12.751/0.005 |

The results of present study are also in-agreement with the findings of Richard (1991) who reported that *Aspergillosis* is a threat to poultry health because of the warm, humid environment. It was also observed that in winter, the incidence of Aspergillosis was also significantly ($P < 0.005$) high (25.8%). These results are in line with the Kunkle and Rimler (1996) who reported that outbreaks are more common in winter when indoor gas levels tend to be highest.

The incidence of Aspergillosis with respect to age was significantly ($P < 0.000$) high in younger ages. Results revealed that this disease mostly occurs in first two weeks of age. Out of 31 positive cases, 25 cases (77.41%) were observed in the chicks under 2 weeks of age. Five cases (16.14%) were of 3-4 weeks of age and one case (3.33%) was observed in a layer flock 53 weeks of age (Table-2).

Table-2: Incidence of aspergillosis in different age groups

| Age groups (Weeks) | No. of Positive cases | Percentage |
|--------------------|-----------------------|--------------|
| >2 | 24 | 77.41 |
| 3-4 | 5 | 16.14 |
| 53 | 2 | 6.45 |
| Chi-Square/P-value | | 18.871/0.000 |

These findings are inconsistent with those of Sing and Malhotra (1980) who reported Aspergillosis in three different flocks in 3-4 days old broiler chicks. These findings are also supported by Bennett (1988) who reported that increased susceptibility of young chicks to Aspergillosis might be due to immaturity of phagocytes or to environmental factors. Present results were also supported by Paixao *et al.* (2004) who isolated *Aspergillus fumigatus* from 5 months old ostrich with the history of cough, dyspnoea and weight loss. In the present study the incidence of Aspergillosis was considerably higher in flocks with sawdust as litter. The results revealed that 21 Aspergillosis positive flocks

(67.74%) were being reared on sawdust as litter and 10 flocks were found positive (32.26%) for Aspergillosis in which rice husk was used as litter (Table-3). It is speculated that the sawdust is more favorable for the fungal growth as compared to rice husk because of its higher moisture contents, allowing the fungal growth.

Table 3: Incidence of aspergillosis in different types of litter

| Type of litter | No. of Positive Cases | Percentage |
|--------------------|-----------------------|-------------|
| Saw dust | 21 | 67.74% |
| Rice husk | 10 | 32.26% |
| Chi-Square/P-value | | 2.639/0.104 |

The present from results, it is obvious that litter is usually the source of infection, which is also substantiated by Dyar *et al.* (1984) and Rao *et al.* (1982).

From the results of present study it may be concluded that Aspergillosis is prevailing through out the year in native type of poultry husbandry and the incidence of disease increases in the hot and humid months of year and disease is significantly high in young age of birds. The sawdust litter is also has an important role in the incidence of Aspergillosis in poultry.

REFERENCES

- Bardana, E. J. (1980). The clinical spectrum of Aspergillosis Part-1 epidemiology, pathogenicity, infection in animals and immunology of Aspergillus. CRC Crit. Rev., Clin. Lab. Sci., 13:21-83.
- Barnes, A. J. and D. W. Denning. (1993) Aspergilli-Significance as pathogens. Rev. Med. Microbiol., 4:176-180.
- Bennett, J. E. (1988). Role of the phagocyte in host defense against Aspergillosis. In: Aspergillus and aspergillosis. H.V.Bassche.D.W. Mackenzie and G. Cauwenbergh. Eds. Plenum press, New York.PP.115-119.
- Bhattacharya, A. (2003). *Aspergillus fumigatus* infection in Khaki Campbell ducks in an organized duck farm in Tripura. Indian Vet. J. 80(11) 1178-1179.
- Campbell, C. K., (1970). Electron microscopy of aspergillosis in fowl chicks. Sabouraudia 8: 133-140.
- Darise. H. L. (1987) Medically important Fungi. A guide to identification. P. 14-15.
- Dyar, P. M., O. J. Fletcher and R. K. Page. (1984) Aspergillosis in Turkeys associated with use of contaminated litter. Avian. Dis. 28: 250-255.
- Kunkle, R.A., and R.B. Rimler (1996) Pathology of acute Aspergillosis in Turkeys. Avian Dis. 40: 875-886.
- Paixao, T. A., D. A. Nascimento, E. F. DO, P. N. S., Parra, R. D. E. Santos (2004). *Aspergillosis* in an ostrich (*Struthio camelus*) in Brazil. *Ciencia Rural* 34(2) 573-576.
- Plopper, C. G. and D. R. Adams. (1987) Respiratory systems In: Text book of Veterinary histology, 3rd ed. H. Dieter Dellmann and E.M. Brown, eds. Lea and Febiger, Philadelphia, Pa.P. 206.
- Rao, P. N., Lakshmanachar and S. V. Rao, (1982). Pulmonary Aspergillosis in chicks. Poultry Abstracts. 8, (4):138.
- Richard., J. L., (1991) Aspergillosis In: Disease of Poultry.9th ed. B.W. Calnek, H.J. Barnes, C.W. Beard. W.M. Reid, and H.W.Yoder, Jr., eds. Iowa State University Press. Ames, Iowa, PP. 326-334.
- Richard, J. L. and J. R. Thurston. (1980) Rapid hematogenous dissemination of *Aspergillus fumigatus* and *A. flavus* spores in Turkey poultry following aerosol exposure. Avian Dis., 27: 1025-1030.
- Sing, J. and F. C. Malhotra, (1980). Experimental studies on Aspergillosis in chicks. Veterinary bulletin, 49, 5279.
- Ustimenko, A. N., (1982). Aspergillosis of fowls and sanitary condition of incubators in U.S.S.R. Poultry Abstract.8, (4):138.
- Yokota, T., T. Shibahara, Y. Wada, R. Hiraki, Y. Ishikawa and K. Kadota, (2004). *Aspergillus fumigatus* infection in ostrich (*Struthio camelus*). J. Vet. Med. Sci. 66(2): 201-204.