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RESEARCH ARTICLE

POTENTIAL PUBLIC HEALTH HAZARD OF THE MYCOFLORA OF POULTRY LITTER IN SOME SELECTED POULTRY FARMS IN JOS, NIGERIA

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ABSTRACT

We investigated the mycoflora of poultry litter in some selected farms to determine their mycological composition and hence their public health implication. The study was done in twenty five poultry farms in Jos, Plateau State of Nigeria. Five samples of litter were collected from each farm for mycological analysis. Samples were cultured on Sabouroud Dextrose Agar and incubated at 25^{o}C for three weeks. Positive cultures were identified through standard methods. Results indicated that 80.0% of poultry farms in the locality had mycotic infestation. All the isolates obtained are agents of human myscoses. The most encountered genus was of the *Trichophyton* species (28.0%) followed by *Aspergillus* species (26.0%) and *Mucor* species (20.0%). The least however was of the *Malassezia* species (2.0%). Also, the most encountered species were those of Mucor (20.0%) followed by *Penicilliun notatum* (16.0%) and *Aspergillus niger* (12.0%) while *Malassezia furfur, Malassezia gypsium, Microsporium audouinii* and some species of Trichophyton were the least encountered with a prevalence of 2.0%. These findings therefore suggest that poultry litter provides a good ecology for fungi thereby posing a great public health threat to humans

Key words: mycoflora, mycoses, poultry, species, Jos

INTRODUCTION

Poultry farms provide a good ecology for microbiological activities due to the interplay of biotic and abiotic activities (Okoli *et al*., 2006). The colonisation of such farms by microorganisms could be detrimental to the health of the poultry, poultry workers, poultry product consumers and residents proximal to poultry farms. High concentrations of fungal spores have been detected in poultry houses. Species of *Aspergillus fumigatus*, *Aspergillus flavus*, *Penicillium crysogenum*, *Cladosporium cladosporioides*, *Scopulariopsis*, prevailed in the poultry farm (Gentles *et al*., 1999). Nursey (1997) indicated that mould contamination of poultry products may occur at any point along the production chain; in feed raw materials, compound poultry feed, poultry flocks or processing. Species of *Aspergillus*, *Fusarium* and *Penicillium* could be isolated from chicken's mash, while *Alternaria*, *Aspergillus*, *Penicillium* and *Mucor* were detected in litter (Skrinjar *et al*., 1995). *A. flavus*, *Fusarium moniliforme* and *P. chrysogenum* were isolated from poultry feed samples accompanied with the production of aflatoxins, T-2 toxin, fumonisin and zearalenone (Hess *et al*., 1995). *Trichoderma* and *Phialophora* species could be isolated from decaying matter, foodstuffs, animal tissues and poultry feed (Samson *et al*., 1996). Santos *et al.* (1996) found that *Aspergillus* species occurred in 64% of the samples of compound poultry feed and aflatoxin B1 in 5% of the same samples but at values above the legal limits. Rudy (1991) stated that mould contamination in poultry industry begins from broiler incubators and he isolated mainly some *Aspergillus* species from incubators and dead chicks affected with aspergillosis. Grewal *et al.* (1988) found that chicken manure may act as a major source of contamination in poultry meat industry According to published data, the majority of the identified fungal species are characterized as allergenic and an exposure to their spores may provoke adverse health effects (such as allergic rhinitis, bronchial asthma or extrinsic allergic alveolitis) in susceptible individuals (Gentles *et al*., 1999). The poultry house provides an environment in which fungi can thrive, the fungal spores in the environment are gaining more

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importance as the outbreak of fungal diseases in poultry are becoming more common due to suppression of bacterial diseases by antibiotics. Cleanliness of the feed handling system, feed residence, time, feed age, relative humidity, percent fine in pelleted feeds and pellet quality have been observed are related to the fungal activity of poultry feeds (Good and Hamilton, 1981; Jones *et al*., 1982). Micro-organism present in the air of animal house affects health of animals as well as people looking after them (Sporik *et al*., 1993). The study is aimed at assessing the mycological composition of poultry litter and their potential risk implications.

MATERIALS AND METHODS

Study Area and Sample Collection

Twenty five poultry houses in Jos, Plateau State were targeted for this study. Five samples of poultry litter were collected from each farm. A spatula was used to pick the samples from different locations in the farm. The samples were labelled accordingly and conveyed to the laboratory for investigation.

Sample Processing

Standard microbiological procedure was adopted, Saboraud Dextrose Agar (SDA)

(Oxoid, England) to which Penicillin and Streptomycin had been incorporated and using spread plate technique. The medium was prepared based on manufacturer's instructions and allowed to solidify. 10g of each sample was diluted into 10ml of normal saline. One millilitre of each dilution was subsequently dispensed in duplicate on media and spread uniformly. The plates were allowed to set and incubated at 28±2°C for 3-5 days. Fungal colonies appeared as discrete colonies. Discrete colonies were isolated and purified by repeated sub-culturing. Identification of isolates was based on their macroscopic and microscopic characteristics with reference to standard identification keys and atlas (De Hoog *et al*., 2000; Tsuneo, 2010).

RESULTS

Table 1 reveals that only 5 (20.0%) of the 25 poultry farms investigated had no fungal infestation of their poultry litter. Another 5 (20.0%) had just one fungal isolates while the remaining farms had multiple fungal infestation of the litter. A total of 50 (40.0%) fungal agents were isolated from 125 samples obtained from 25 poultry farms investigated (Table 2). This put the prevalence rate of mycotic infestation of poultry farms in the locality at 40.0%. The most encountered species were those of Mucor (20.0%) followed by Penicilliun notatum (16.0%) and Aspergillus niger (12.0%) while Malassezia furfur, Malassezia gypsium, Microsporium audouinii and some species of trichophyton where the least encountered with a prevalence of 2.0% (Table 2). Table 3 reveals the distribution of isolates according to genera. Trichophyton species (28.0%) were the most encounterd followed by Aspergillus species (26.0%) and Mucor species (20.0%). The least however was Malassezia species (2.0%). Table 4 shows the distribution of fungi in the farms investigated. Trichophyton species were isolated in as many as 9 (36.0%) farms while Aspergillus species were isolated in as many as 8 (32.0%) farms while Malassezia furfur was the least distributed as it was isolated in just 1 (4.0) farm.

Table 1: Isolate Count According to Farm

No of isolates	No of Farms	%
0	5	20.0
1	5	20.0
2	7	28.0
3	4	16.0
4	1	4.0
5	3	12.0

Table 2: Prevalence of Mycotic Agents Isolated

Mycotic Agent	Number	%
Aspergillus niger	6	12.0
Aspergillus fumigatus	3	6.0
Aspergillus flavus	4	8.0
Trichophyton rubrum	2	4.0
Trichophyton mentagrophytes	2	4.0
Trichophyton verrucosum	4	8.0
Trichophyton equinum	3	6.0
Trichophyton schoenleinii	1	2.0
Trichophyton simii	1	2.0
Trichophyton begeili	1	2.0
Penicillium notatum	8	16.0
Mucor species	10	20.0
Microsporium ferrugineum	2	4.0
Microsporium audouinii	1	2.0
Malassezia furfur	1	2.0
Malassezia gypsium	1	2.0
Total	50	

Table 3: Prevalence of Isolates According to Genera

	Number	%
Aspergillus species	13	26.0
Trichophyton species	14	28.0
Mucor species	10	20.0
Micosporium species	4	8.0
Penicillium species	8	16.0
Malassezia species	1	2.0
Total	50	40.0

Table 4: Prevalence of Isolates with respect to Poultry Farms Investigated

	Farm	Farm Prevalence
Aspergillus species	8	32.0
Trichophyton species	9	36.0
Mucor species	7	28.0
Microsporium species	2	8.0
Penicillium species	5	20.0
Malassezia species	1	4.0

DISCUSSION

Mould occurrence and growth in poultry farms is one of the major threats to poultry economy and health. Besides their negative impacts on nutritional and organoleptic properties, moulds can also synthesize different mycotoxins. More than 100.000 fungal species are considered as natural contaminants of agricultural and food products (Jemmali, 1979). The fact that only 5 (20.0%) of farms were free from mycotic infestations and that more than one fungal isolate was obtained from most farms clearly shows that poultry litter presents a conducive ecology for fungal growth thereby aiding the survival and perpetuity of mycotic agents that may be injurious to man and his animals. Researchers have previously highlighted that farm inputs such as feed and water are likely routes of poultry farm contamination (Shareef, 2009; Frisvad *et al*., 2004). A breakdown of the isolates obtained indicates that *Mucor* species, *Penicillin notatum* and *Aspergillus niger* were the most encountered organisms. This finding is in agreement with Labuda and Tancinova (2006) who found Mucor species as the leading mycotic contaminants of poultry feed. Both Penicillium and Aspergilus species have already been fingered as major contaminants in poultry houses where they were isolated (Delcero *et al*., 1998; Glenda *et al*., 2006). However, assembling the isolates according to genus, the genera of Trichophyton was the most encountered followed by Aspergillus, Mucor and Penicillium. This is credible since these agents are geophilic in nature and possessing airborne spores. This special adaptive feature enhances their spread, both within and outside the farm. Also, Fusarium was the least encountered in this study. This is in variance with Labuda and Tancinova (2006). These results were less than that reported who found that *Eurotium* and *Fusarium* genera were widespread through the samples they examined and were occurred with the same frequency of 42%. The public health implication of these findings is the main thrust of this research. All the agents isolated from poultry litter in this study are pathogenic to man and his animals to some extent. The socio-economic impacts are counter-porductive. They are either responsible for systemic, cutaneous or superficial mycoses.

The transmission of Aspergillus species either by aerosol or direct contact is a concern judging from the fact that some species are aflatoxin producers, the clinical complications of which are grave and lethal (Shareef, 2010). It therefore means that poultry attendants and consumers are at great risk especially in the farms visited where protective clothing including face masks are not used. Some poultry farmers also do not observe septic precautions, like hand washing, especially after the day's job. Others such as Penicillium and Trichophyton species responsible for subcutaneous mycoses (Olivia *et al*., 2006) will be dangerous to man especially when poultry attendants have open wounds or abrasions as this can easily lead to direct implantation of spores leading to severe clinical presentations(Sharma, 1993). The implication of this is very negative on poultry production as a sickened workforce is a weakened workforce and a weakened workforce cannot be optimally productive. Another dimension to this is the fact that the crop farmers depend on the poultry droppings as manure to enrich their farms. This manure is not passed through any special treatment before application in the farms thereby widening the scope of spread of fungal spores resident in the litter to the crop farmer, his immediate vicinity and possible consumers of his farm produce. Any contact with these spores on a susceptible host results in disease onset.

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