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RESEARCH ARTICLE

AN INVESTIGATION OF FUNGUS INSIDE SOME HOUSES

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ABSTRACT

Fungal spores can cause a range of health problems in humans such as respiratory diseases and mycotoxicoses. In order to estimate air contamination by fungal spores, air monitoring was conducted in some houses which were air conditioned. Sedimentation plate method was used for the detection of viable fungal spores. In this study, 10 species were trapped, isolated and identified. From five houses total ten fungal colonies were observed and identified and the rest which are not identified were kept as unidentified fungi. *Cladosprium (16.56%) Aspergillus niger (15.38%) and Aspergillus fumigatus (14.20%) Penicillium* (12.42%) were the dominant fungal species in the present experimental study than the other rest form of fungi.

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INTRODUCTION

Fungi are ubiquitous microorganisms that are known as important bio contaminants of the indoor environment (Aydogdu *et al*, 2005; Aydogdu and Asan, 2008). Their spores are easily liberated in the air and may cause diverse health problems in humans such as: irritations, infections, allergies and toxicoses (Menetrez and Foarde, 2004; stetzen bach *et al*., 2004) The most common sources of airborne fungal particles indoors are outdoor air and fungal particles indoors encouraged by favorable environ mental factors (dampness, high temperature and the presence of organic and inorganic substances) (Pessi *et al*., 2000). Human exposure to airborne microorganisms may result in a variety of adverse health effects, including infectious diseases, allergic and irritant responses, respiratory problems, and hyper sensitivity reactions. Airborne microorganisms have been identified and enumerated by using a variety of aerobiological sampling methods, yet the impact of air borne microorganisms on indoor air quality and human health remains poorly understood. Nowadays, the Development of buildings with minimum energy usage has led to "tight" air conditioned buildings in which exchange of air with the outside is greatly reduced. Water vapor, which would otherwise have been vented, condenses on cool surfaces in the same way as in poorly insulated buildings without air- conditioning and creates conditions for microbial growth and an associated build-up of bioaerosols. It is well known that spores of species of *Aspergillus, Cladosporium* and *Penicillium* generated in damp buildings can cause bouts of asthma and/ or rhinitis among topic occupants. Several large- scale epidemiological investigations in North America have noted a strong association between reported dampness/ mould in homes and reported respiratory symptoms (Brunekreef *et al*., 1989; Dales *et al*., 1991 a, b; spengler *et al*., 1991) and, in Finland, Jaakkola *et al*. (1993) observed a two fold increase in respiratory symptoms among pre- school children living in homes with reported dampness or mould. Mould growth in homes is therefore a major health issue, and there is an urgent need to obtain objective microbiological data in order to confirm the role of moulds indicated by these investigations.

MATERIALS AND METHODS

Airborne fungal spores were collected in five air-conditioned houses. Sedimentation plate method was used, with malt extract agar as the growth media. Petri plates were placed 1 m above the ground level in different parts of each investigated room and were exposed to air for 10 minutes by removing the cover lid. Sampled plates were incubated at 25° c for 5 to 7 days. After the incubation period, grown colonies were counted, isolated and identified with the help of available literature (Barnett, 1969; Nigmani *et al*., 2006). Percentage contributions of individual species were calculated as per the standard formula:

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$$\% \text{ Contribution} = \frac{\text{Total no.of colonies of one species}}{\text{Total no.of colonies of all species}} \times 100$$

The use of sedimentation plate sampling method enabled the recovering of cultivable fungi which easily produce reproductive structures necessary for proper determination fungal colonies which did not sporulate after 10 days were recorded as sterile.

Table of Fungal colonies

Sr.No.	Fungal types	I	II	III	IV	V	Total	Total%
1.	*Aspergillus niger*	6	4	4	5	7	26	15.38
2.	*Aspergillus fumigatus*	5	4	5	4	6	24	14.20
3.	*Aspergillus flavus*	3	2	1	2	3	11	6.50
4.	*Alternaria*	2	1	-	3	2	8	4.73
5.	*Caldosporium spp*	5	6	4	7	6	28	16.56
6.	*Chaetomium spp*	1	2	-	-	3	6	3.55
7.	*Fusarium spp.*	2	-	3	4	-	9	5.32
8.	*Mucor spp.*	3	2	-	1	2	8	4.73
9.	*Penicillium spp.*	4	5	5	4	3	21	12.42
10.	*Rhizopus spp.*	2	1	-	3	2	8	4.73
11.	*Unidentified fungi*	5	6	4	2	3	20	11.83
	Total	38	33	26	35	37	169	

Number of colonies and % Contribution of fungal spores isolated from different houses.

RESULTS AND DISCUSSION

The data depicted in the table shows that a total of t**en** species were trapped isolated or recovered and identified, These identified species were *Aspergillus fumigates*, *Aspergillus niger, Aspergillus flavus, Pencillium, Alternaria, Fusarium Spp., Clostridium Spp., Rhizopus, Spp., Mucor Spp.* The most common airborne fungal spores in the indoor environment belong to the following genera: *Cladosporium, Penicillum, Alternaria and Aspergillus* (Etzel *et al*., 1998; Rolka *et al*., 2005, Kalyoncu, 2008) which is in accordance with our results. Moreover, *Penicillium amd Cladosporium* which were present in all of the investigated sites and dominated among other fungal genera detected, were found to be predominant in many other indoor aeromycological studies (Hu*et al*., 2002; Sarica *et al*., 2002 ; Shelton *et al*., 2002; Lee *et al*., 2006).

Many of the airborne spores recorded in the indoor environments particularly those of Cladosporium and Alternaria, orginate from outdoor sources (Hindy 2000). In contrast, species of *Aspergillus and Penicillium* are mainly derived from indoor sources (Aydogdu *et al*., 2005) Airborne fungi identified in the selected houses may affect the health of children's and adults. Daisey *et al*. (2003) determined that the symptoms of asthma and "sick building syndrome" are common in school children. According to Pastuszka *et al*. (2000) *Cladosporium, Alternaria and Aspergillus* represent the main group of airborne molds to which children may be sensitized of and which may cause allergic symptoms, *Alternaria and Cladosporium* are considered to be the most important aeroallergens in the outdoor air, as well as the cause of mycotoxicosis in humans. Frequent exposure to airborne aeroallergens of the genus *Alternaria* can result in respiratory arrest in children and adolescents with asthma. Records on the *Aspergillus and Penicillium* viable fungal spores could indicate the presence of molds that are known to be responsible for mylotoxin production and emission of volatile organic compounds (Kasznia-Kocot *et al*., 2007). Spores of *Aspergillus and Penicillium* represent the most widespread aeroallergens in the world (Aydogdu *et al*., 2005) and are recently recognized as the most important allergens of indoor air (Fishre and Dott, 2003).

Conclusion

Results of our study indicated notable presence of viable fungal spores in the air of examined houses. Hence the need for further more detailed investigations, Presence of airborne fungal spores in houses can affects the health of children adults. Seasonal air monitoring of fungal spores and application of more accurate quantitative sampling method would provide a more detailed of insight about indoor air quality. Information obtained by such studies is required for the assessment of health threatening factors.

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