Mycopath (2016) 14(1&2): 43-45 **Brief Article**

A study of fungal flora of house dust in Nagpur district, India

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Abstract

Fungi inhabit nearly all terrestrial environments. In this regard, the interiors of human dwellings and workspaces are no exception. The mould flora of human-inhabited indoor environments consists of a distinctive group of organisms that collectively are not normally encountered elsewhere. In our study of house dust flora mainly found *Aspergillus* species some are identified as *Aspergillus niger, Aspergillus fumigatus* and *Aspergillus flavus*.The *Aspergillus* species or their spores can cause allergic reactions. Peopole with severe asthma are often sensitive to *Aspergillus* and can suffer asthma attacks because of the spores. *Aspergillus* species can infect people and animals and begin to grow inside them, especially in the lungs. *Aspergillus* infections are categorized in the group of diseases called Aspergillosis.
Keywords: Allergic, aspergillosis, asthma, house dust flora.

Introduction

The large daily influx of organic debris to the dust of inhabited houses provides a rich primary nutrient source that supports an intricate micro community encompassing three kingdoms of organisms: animals (arthropods, and to some extent larger animals such as rodents, etc.), bacteria and fungi. The fibrous nature of a stable dust matt composed predominantly of hygroscopic fibers acts to harvest atmospheric moisture and simultaneously provides shelter from desiccation for the organism contained within. House dust is a complex of chemical and biological components originating from different internal and external sources. An important biological element of dust is viable mycelia fragments and fungal spores,and usually their concentration and composition in house dust reflects the fungal flora present in outdoor air (Calvo *et al.*, 1982; Pastuszka *et al.*, 2000; Medrela-Kuder, 2003; Dassonville *et al.*, 2008). Some species of fungi occurring in dust can affect humans, causing a variety of diseases. Among them there are the species of *Alternaria*, *Cladosporium*, *Penicillium* and *Aspergillus*, which are considered as the most allergenic agents. Substances produced by growing mycelium and spores of these fungi can evoke not only allergic reaction (rhinitis, sneezing, hoarseness, itchy eyes or skin) but also serious diseases such as asthma or lung aspergillosis (Kurup*et al.*, 2000; Cabral, 2010). Moreover, some moulds produce mycotoxins, which increase the risk factor of liver cancer (Bennet and Klich, 2003). In the case when the symptoms and diseases described above encompass many inhabitants of a house we talk about a "Sick Building Syndrome" (Wang *et al.*, 2008). Some researchers have demonstrated that the "Sick Building Syndrome" may be caused by high concentration of indoor fungi (Cooley *et al.*, 1980; Herbath *et al.*, 2003; Wang *et al.*, 2008). Therefore, an analysis of concentration and composition of fungal species in a house dust seems to be important, because inhalation and direct contact with house dust can be primary routes of exposure to fungal allergens (Garrett *et al.*, 1998; Rogers, 2003). There are several factors determining the composition and abundance of fungi in the dust. Among them, important are climatic conditions (Hjelmroos, 1993; Fernández *et al.*, 1998; Gniadek *et al.*, 2005). Other factors that probably could affect the abundance of fungi in the house dust are related to the behavior of the inhabitants. The present study was, therefore, carried out to investigate the mycoflora in house dust in district Nagpure, India.

Material and Methods

House dust sample were collected from different areas of Nagpur District. A suitable substrate or culture medium supporting nutritional needs of fungi was required for our study. Potato dextrose agar and Peptone dextrose agar media were used. Warcup's, serial dilution and culture plate exposure method was used for isolation of mycoflora present in the indoor and outdoor air. The isolated organisms were subcultured for purification and identified by standard microbiological and biochemical analysis method. Microscopic and biochemical nature of the isolated organisms were studied based on their morphological, nutritional and biochemical

characteristics. The culture of the fungus obtained was purified by single spore isolation and was maintained on PDA at 27 ºC for 5 to 7 days. To keep the culture viable, subculturing was done at an interval of 15 days and preserved at low temperature (5 ± 1°C) in the refrigerator.

Data Collections

The frequency of the fungus can be calculated by the following formula

$$\text{Frequency (\%)} = \frac{\text{No. of fungi containing in dust sample}}{\text{Total nnumber of dust samples}} \times 100$$

Results and Discussion

Fungi can grow virtually on any organic substance, when sufficient amounts of moisture and oxygen are present. Without fungi, our environment would be overwhelmed with large amounts of dead plant matter. No one knows how many species of fungi exist but estimates range to upwards of a million different species. Fungi grow best in warm and damp conditions and release spores to aid in dissemination and reproduction. Fungal spores can survive and remain dormant even in harsh environmental conditions such as dry conditions that do not support normal mold growth. Good indoor air quality is important for all of us; most people spend 90% or more of their time indoors (Schwab *et al.,* 1992). Most of this time consists of the hours spent at home or at work, but for example, school age children spend 20% of their time in schools (Clench-Aas *et al.,* 1999). Good IAQ consists of many aspects; it is an interaction of functioning and efficient ventilation and the lowest achievable amounts of chemical, inorganic or organic, and microbial compounds which should not evoke symptoms in the occupants (Spengler *et al.,* 2001). In our study of house dust flora mainly found *Aspergillus* species some are identified as *A. niger, A. fumigatus, A. flavus* (Table 1). The *Aspergillus* species or their spores can cause allergic reactions. Pepole with serve asthma are sensitive to *Aspergillus* and can suffer asthma attacks because of the spores. *Aspergillus* species can infect people and animals and begin to grow inside them especially in the lungs. Usually only people with weakened immune systems are susceptible to infection by *Aspergillus. Aspergillus* infections are categorized in the group of diseases called Aspergillosis. A number of studies focused on species such as *Cladosporium*, *Aspergillus* or *Alternaria*. This is mainly because these fungi can cause allergies. Fungi in indoor environments mainly originate from outdoor sources. Thus, common fungal genera found indoors are the same as that in outdoor air (Shelton *et al.,* 2002). In case of moisture damage, however, also indoor sources can be significant. Microbes involved in moisture-damage may differ from common microbes in indoor environments. In spite of extensive studies especially on indoor fungi, there is still a need for a better understanding of microbial exposures. A proper exposure assessment requires accurate measurements of exposing agents, and a deeper understanding of the factors determining how when and why these agents are produced.

Table 1: Fungi isolated from house dust of district Nagpure.

Fungi	Sample 1	Sample 2	Sample 3	Sample 4
Aspergillus flavus	+	+	+	+
Aspergillus fumigatus	–	–	+	+
Aspergillus niger	+	+	+	+
Aspergillus nidulans	+	+	–	–
Alternaria alternata	+	+	+	+
Penicillium chrysogenum	–	–	+	+
Fusarium oxysporum	+	+	+	+
White sterile mycelium1	+	+	+	+
White sterilemycelium2	+	+	+	+
Green sterile mycelium1	–	–	+	+
Green sterile mycelium2	–	–	+	+
Black steriliia mycelium1	+	+	+	+
Black sterile mycelium2	+	+	+	+
Yellow sterilemycelium	+	+	+	+

Conclusion

It is concluded that dust samples from carpets and floors of indoor environment harbor diverse fungal species. There are also indications that the indoor air qualities are influenced by the nature of fungi species present in the dust samples. Furthermore, these fungi could have adverse health effects on occupants or users of such indoor environment.

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