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Isolation of Allergic Fungal Microflora from the Aero-Spora of Khammam District, India

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A B S T R A C T

Allergies like Asthma, contact urticarial, bronchial problems, skin problems, hay fever, and common allergies are caused by fungal spores. Allergic proteins present in the fungal spores are responsible for the cause of these allergies. Isolation of fungi was done by exposed culture plates from three selected areas viz vegetable market area, surrounding area of factories and Government school of Pandurangapuram village, Khammam district, Telangana, India. Isolation was done from three different areas in order to study the variation in the fungal succession. Altogether 76 species32 genera were isolated from these areas. *Aspergillus, Alternaria, Pencillium, Rhizopus, Mucor, Fusarium* were commonly isolated. The present study infer/ showed that maximum fungal spores which are saprophytic, pathogenic and toxigenic were isolated from the market area. Wood rotting fungi were isolated from the industrial area.

Introduction

Allergy is one form of human disease which effects about 20% of human population (Sathavahan *et al.,* 2011)). People are exposed to allergens in various environment both at home and at work. The concentration of allergens in the environment varies depending on various factors including climate, vegetation and air quality.

The outdoor allergens are predominantly constituted by plant pollens and fungal spores. The outdoor allergens on the other hand are represented by allergens from dust mites, cockroaches and pets.The indoor environments the fungus settled on the beds, carpets, mattresses (Meriggi *et al*., 1996; Pasanen *et al*., 1992; Katz *et al*., 1999). Fungi are ubiquitous air borne allergens cause of human diseases like allergic rhinitis, conjunctivitis, bronchial asthma, and allergic Broncho-pulmonary mycoses resulting from exposure to spores (Braun, 2003).

The prevalence of respiratory allergies to fungi is estimated at 20% to 30% among atopic individuals and up to 6% in general population (Hodgson *et al.,* 1989). The most common allergic fungi are *Alternaria, Cladosporium, Aspergillus, Penicillium, Dechslera* and yeast (Mezzari *et al.,* 2002).

Materials and Methods

The aero spores of fungi were collected from the atmosphere from three locations i.e. Government school premises, factory area and Market area of Pandurangapuram village, Khammam district, Telangana, India. For the quantitative analysis of fungi Potato dextrose agar (PDA) media were used, 3 Petri dishes of agar medium were exposed for 3 minutes at intervals of 15 days. After exposure to the air the Petri dishes were brought to the laboratory in pre-sterilized polythene bags and incubated at 25^0C for 5-7days. The identification of colonies was based on their colour, size, shape and other morphological features (Nagamani and Manohara chary, 2006)

Results and Discussion

73 species were reported in Market area, 60 species were reported in factory area, 41species reported in Government school area of the Pandurangapuram village, Khammam district. In these three locations more fungal species were isolated from the market area than the factory area and government school premises of the Pandurangapuram village, Khammam.

*Aspergillus fumigatus, Aspergillus niger, Aspergillus flavus, Aspergillus terreus, Aspergillus flaviceps, Aspergillus candidus, Aspergillus ochraceus, Aspergillus sydowi, Aspergillus versicolor, Aspergillus tamarii, Aspergillus clavatus, Aspergillus gigantius, Aspergillus granulosus, Aspergillus nidulans, Aspergillus oryzae, Aspergillus restrictus, Alternaria alternata, Alternaria brassicae, Alternaria solani, Alternaria tenuis, stereum versicolor, Alternaaria chlamydospora, Botrytis cinera, Candida albicans, Cladosporium herbarum, Cladosporium lignicola, Cladosporium sphaerospermum, Curvularia geniculata, Curvularia lunata, Curvularia tetramera, Curvularia inequalis, Curvularia spicifera, Cunninghamella echinulata, Cunning-hamella elegans, Cephalosporium a cremonium, Cephalosporium roseum, Cephalosporium irregularis, Cyclindro-sporium acacia, Drechslera austrliensis, Drechslera spicifera, Fusarium moniliforme, Fusarium oxysporum, Fusarium solani, Fusarium roseum, Flavodon flavus, Ganoderma lucidium, Helminthospo rium oryzae, Hymenochaete fuliginosa, Mucor globosus, Mucor plumbens, Mucor racemosus, Mucor indicus, Memnoniella levispora, Nigrospora oryzae, Nigrospora sphaerica, Neurospora crassa, Pencillium citrinum, Pencillium chrysogenum, Pencillium italicum, Pencillium nigricans, Pencillium oxalicum, Pencillium digitatum, Pencillium notatum, Pencillium funiculosum, Phoma lingam, Phoma betae, Paecilomyces varioti, Paecilomyces fusisporus, Phellinus badicus, Phellinus fastutus, Rhizopus nigricans, Rhizopus stolonifer, Stemphylium solani, Sporotrichum arabicum, Stachybotrysatra, Trichoderma harizianum, Trichoderma viride, Trichoderma roseum, Verticillium glacum*were reported from the 3 areas of village.

71 species were isolated from the vegetable market area *Aspergillus fumigatus, Aspergillus niger, Aspergillus flavus, Aspergillus terreus, Aspergillus flaviceps, Aspergillus candidus, Aspergillus ochraceus, Aspergillus sydowi, Aspergillus versicolor, Aspergillus tamarii, Aspergillus clavatus, Aspergillus gigantius, Aspergillus granulosus, Aspergillus nidulans, Aspergillus oryzae, Aspergillus restrictus, Alternaria alternata, Alternaria brassicae, Alternaria solani, Alternaria tenuis, Alternaaria chlamydospora, Botrytis cinera, Candida albicans, Cladosporium herbarum, Cladosporium lignicola,*

Cladosporium sphaerospermum, Curvularia geniculata, Curvularia lunata, Curvularia tetramera, Curvularia inequalis, Curvularia spicifera, Cunninghamella echinulata, Cunning-hamella elegans, Cephalosporium acremonium, Cephalosporium roseum, Cephalosporium ir regularis, Drechslera austrliensis, Drechslera spicifera, Fusarium moniliforme, Fusarium oxysporum, Fusarium solani, Fusarium roseum, Helminthosporium oryzae, Hymenochaete fuliginosa, Mucor globosus, Mucor plumbens, Mucor racemosus, Mucor indicus, Nigrospora oryzae, Nigrospora sphaerica, Neurospora crassa, Pencillium citrinum, Pencillium chrysogenum, Pencillium italicum, Pencillium nigricans, Pencillium oxalicum, Pencillium digitatum, Pencillium notatum, Pencillium funi-culosum, Phoma lingam, Phoma betae, Paecilomyces varioti, Paecilomyces fusisporus, Rhizopus nigricans, Rhizopus stolonifer, Trichoderma harizianum, Trichoderma viride, Trichoderma roseum, Verticilliumg lacum these were dominant species in the market area.

59 speices were isolated from industrial area, *Aspergillus fumigatus, Aspergillus niger, Aspergillus flavus, Aspergillus candidus, Aspergillus sydowi, Aspergillus versicolor, Aspergillus tamarii, Aspergillus clavatus, Aspergillus gigantius, Aspergillus granulosus, Aspergillus nidulans, Aspergillus oryzae, Aspergillus restrictus, Alternaria alternata, Alternaria brassicae, Alternaria solani, Stereum versicolor, Botrytis cinera, Candida albicans, Cladosporium herbarum, Cladosporium lignicola, Cladosporium sphaerospermum, Curvularia geniculata, Curvularia lunata, Curvularia tetramera, Curvularia inequalis, Curvularia spicifera, Cunninghamella echinulata, Cunninghamella elegans, Cephalosporium acremonium, Cephalosporium roseum, Cylindrosporium acacia, Drechslera austrliensis, Drechslera spicifera, Fusarium moniliforme, Fusarium oxysporum, Fusarium solani, Fusarium roseum, Flavodon clavus, Ganoderma lucidium, Mucor globosus, Mucor Plumbens, Mucor racemosus, Mucor indicus, Nigrospora oryzae, Nigrospora sphaerica, Pencillium citrinum, Pencillium italicum, Pencillium nigricans, Pencillium funiculosum, Phoma betae, Phoma lingam, Phellinus badicus, Phellinus fastutus, Rhizopus nigricans, Rhizopus stolonifera, Trichoderma viride, Trichoderma roseum, Verticilliumglaucum*were dominant species in industrial area.

31 species were isolated from Government school area. *Aspergillus fumigatus*, Aspergillus niger, Aspergillus flavus, Aspergillus terreus *Aspergillus versicolor, Aspergillus tamaraii, Aspergillus gigantius, Aspergillus granulosus, Aspergillusoryzae, Alternatria alternata, Alternaria solani, A;ternaria tenuis, Alternaria alternata, Cladosporium lignicola, Curvularia geniculata, Curvularia lunata, Cunninghamella echinulate, Cephaliophora irregularis, Drechslera australiensis, Fusarium moniliforme, Fusarium oxysporum, Fusarium solani, Mucor globosus, Mucor plumbens, Mucor racemosus, Mucor indicus, Pencillium chrysogenum, Pencillium oxalicum, Pencillium notatum, Phoma betae, Rhizopus nigricans, Rhizopus stolonifera, Trichoderma viride, Trichoderma roseum* were dominant species in this area.

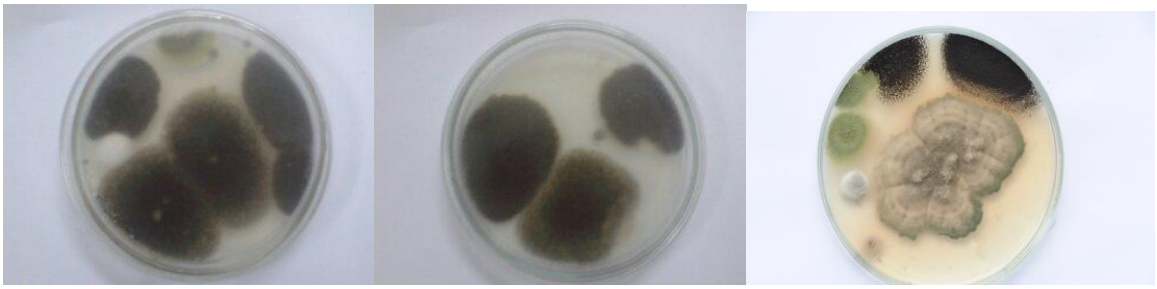
Table.1

S. No	Fungal species	Vegetable Market area	Industrial area	Government school area
1.	*Aspergillus fumigatus*	+++++	++++	+++
2.	*Aspergillus niger*	+++++	+++	+
3.	*Aspergillus flavus*	+++++	+++	+
4.	*Aspergillus terreus*	++++	----	+
5.	*Aspergillus flaviceps*	++++	----	----
6.	*Aspergillus candidus*	+++++	+++	----
7.	*Aspergillus ochraceus*	++++	----	----
8.	*Aspergillus sydowi*	++++	++	----
9.	*Aspergillus versicolor*	++++++	++++	++
10.	*Aspergillus tamaraii*	+++++	+++	++
11.	*Aspergillus clavatus*	++++++	++	----
12.	*Aspergillus gigantius*	+++++	+++	++
13.	*Aspergillus granulosus*	++++++	++	+++
14.	*Aspergillus nidulans*	+++++	+++++	----
15.	*Aspergillus oryzae*	+++++	+++	++
16.	*Aspergillus restrictus*	+++++	++++	----
17.	*Alternaria brassicae*	+++++	+++	----
18.	*Alternaria solani*	+++++	++++	++
19.	*Alternaria tenuis*	++++	----	+
20.	*Alternatria alternate*	++++++	++++	+++
21.	*Alternaria chlamydospora*	++	++++++	----
22.	*Stereum versicolor*	+++++	----	----
23.	*Botrytis cinera*	+++++	++++	----
24.	*Candida albicans*	+++++	+++++	----
25.	*Cladosporium herbarum*	++++++	++++	----
26.	*Cladosporium lignicola*	++++++	+++	+
27.	*Cladosporium sphaerospermum*	++++++	++	----
28.	*Curvularia geniculate*	++++++	+++	+++
29.	*Curvularia lunata*	+++++	+++++	++++
30.	*Curvularia tetramera*	++++++	+++	----
31.	*Curvularia inelqualis*	+++++	+++	----
32.	*Curvularia spicifera*	+++++	++	----
33.	*Cunninghamella echinulate*	+++++	++++	----
34.	*Cunninghamella elegans*	++++++	++	+
35.	*Cephalosporium acremonium*	+++	+++	----
36.	*Cephalosporium roseum*	+++++	++	----
37.	*Cephaliophorairregularis*	+++	----	+
38.	*Cyclindrosporium acacia*	----	+++++	----
39.	*Drechslera australiensis*	+++++	++++	+
40.	*Drechslera spicifera*	+++++	++++	----

41.	*Fusarium moniliforme*	+++++	+++++	+++
42.	*Fusarium oxysporum*	+++++	+++++	+++
43.	*Fusarium solani*	+++++	++++	++
44.	*Fusarium roseum*	+++++	+++	----
45.	*Flavodon flavus*	----	+++++	----
46.	*Ganoderma lucidium*	----	+++++	----
47.	*Hymenochaete fuliginosa*	++	----	----
48.	*Mucor globosus*	+++++	+++++	+++
49.	*Mucor plumbens*	+++++	+++++	++
50.	*Mucor racemosus*	+++++	+++++	++
51.	*Mucor indicus*	+++++	+++++	++
52.	*Nigrospora oryzae*	++++	++++	-----
53.	*Nigrospora sphaerica*	+++	+++	----
54.	*Neurosporacrassa.*	++++	----	----
55.	*Pencillium citrinum*	++++++	+++	----
56.	*Pencillium chrysogenum*	+++	----	+
57.	*Pencillium italicum*	++	++	----
58.	*Pencillium nigricans*	++++	++	----
59.	*Pencillium oxalicum*	++++	----	+
60.	*Pencillium digitatum*	+++	----	----
61.	*Pencilium notatum*	+++++	----	+
62.	*Pencillium funiculosum*	+++++	+++	----
63.	*Phoma betae*	++++	++	+
64.	*Phoma lingam*	++++	+++	----
65.	*Paecilomyces varioti*	+++++	----	----
66.	*Paecilomyces fusisporus*	+++	----	----
67.	*Phellinus badicus*	----	+++++	----
68.	*Phellinus fastutus*	----	+++++	----
69.	*Rhizopus nigricans*	+++++	+++++	+
70.	*Rhizopus stolonifera*	++++++	++++	+
71.	*Sporotrichum arabicum*	++	----	----
72.	*Stachy botrysatra*	++++	----	----
73.	*Trichoderma harzianum*	+++++	----	----
74.	*Trichoderma viride*	+++++	++++	+
75.	*Trichoderma roseum*	+++++	+++	+
76.	*Verticilliumg laucum*	+++++	++++	----

The below petriplates were showing the fungal colonies isolated from the three areas of Pandurangapuram village.

A **B** **C**



D **E** **F**

In the present study, highest number of fungi were isolated from the vegetable market areas when compared to the other two locations. Pathogenic species of *Aspergillus sps, Alternaria sps, Fusarium sps, Drechslera sps, Mucor sps* (Aghase and Vidhya, 1997) *Curvularia spp, Cunninghmella sps, Helminthosporium sps, Nigrospora sps, Phoma sps, Phellinus sps, Sporotrichum sps, Verticillium sps, Ganoderma, Hymenochaete sps, Cyllindrosporum sps, Phellinus sps.* Saprophytic and storage fungal species of *Pencillium* , Aspergillus (Bundy *et al* 2009); Iossifova *et al*, 2009)*Cladosporium sps, Mucor sps, Fusarium sps, Rhizopus sps, Neurosporasps*were isolated from the 3 areas of village.

Fungal spores and their proteins care triggering factor for respiratory allergy and asthama (Green *et al.,* 2003) were isolated from market areas, this areas were more susceptible for the growth of the fungus. Due to the presence of spoiled materials, dumped plant material and debris these acts as reservoirs of plant pathogens (Umesh *et al.,* 2012). As these species carry out biodegradation and deterioration because of their requirements for prime sources of Carbon, Nitrogen and other nutrients (Pitt and Hocking, 1985). Some fungal spores isolated from the industrial area were less than market area and higher than school area.Industrial area contain wood, fly ash and ice factories due to this due to this atmosphere have full of dust, wood and scrap of other materials. Fungal spores from Government school area were less the same observation was done by (Dung *et al.,* 1986) hence it is concluded that the schools are "protected environments".

In conclusion, in the present study market is very congenial for the growth of allergic fungi which leads to the respiratory problems.

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