RESEARCH ARTICLE

PREVALENCE OF AIRBORNE FUNGAL DIVERSITY IN THE KITCHEN ENVIRONMENT OF JABALPUR CITY

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ABSTRACT

The present approach aims to screen out the prevalence of airborne fungal spores of intramural and extramural environments of kitchen in Jabalpur city. The air sampling was conducted using Anderson two stage Sampler (Anderson, 1958;1966) containing SDA plates.Different kitchen environments of Jabalpur city were surveyed every month for a period of one year (January 2012-December 2012). During the study period a total of 33 fungal species belonging to 16 genera were observed. *Aspergillus*specieswere recorded the maximum (9) followed by 4 species of *Penicillium*. *Aspergillusniger* was found to be the most dominant of all fungal types in both indoor and outdoor environment, followed by *Penicilliumchrysogenum*, *Cladosporium* spp. and *Curvularialunata*. The maximum fungal load was found in the month of March. The more number of fungi were found as a tendency of attraction towards the moisture availability and nutrition present in the kitchen environment.

Keywords: Airborne fungi, Kitchen, Jabalpur, Intramural, Extramural.

INTRODUCTION

Fungi are eukaryotic microorganism that colonizes dead organic material in outdoor and indoor environment. The species that are able to colonize indoor environment can utilize nutritional source available in indoor materials and moisture is the most important factor controlling fungal growth (Burge, 1992). Mold grows at room temperature, so mold constantly thrive and related allergy flourishes in house. The airborne fungal spores will find an appropriate place to live and grow in kitchen because it contains adequate food and moisture (Strachan, 1988 and Platt et al. 1989).

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Examination and characterization of fungal distribution in air of a particular region can be helpful in identifying associations between domestic fungal species profiles and clinical diagnosis and prevention of seasonal allergic diseases (Wu et al. 2000).

The main objective of this study is to determine the qualitative and quantitative aspects of indoor and outdoor fungal load of Kitchen environment of Jabalpur and identification and preservation of fungal isolates and also to determine the relationship between indoor and outdoor aerofungi of study area.

MATERIAL AND METHODS

Air sampling was carried out fortnightly using Anderson two stage sampler (Anderson, 1958) during the period from January 2012 to Deccember 2012. Present study was conducted for the qualitative and quantitative evaluation of different fungal colonies in indoor and outdoor environment of selected residential sites. Sample were collected from different

residential areas and situated in different locations and environments of Jabalpur (M.P.). Air sample were collected from indoor kitchen area and outdoor environment of the house. Sabourands Dextrose Agar Medium (Chowadhry, 2000) was used for isolation of fungi. The culture plates were incubated in inverted position at 28°C for 3 to 5 days depending upon the growth of colonies. Colonies were counted and identified. The total number of colony forming units (CFU) per plates was calculated. The pure culture was maintained at 4 ºC and identified with help of standard literature (Clements and Shear, 1954; Barnett 1960; Ellis, 1971; Subramanium, 1971;Dennis and Cramer, 1978; Tilak, 1989 and Schubert et al. 2007).

The slide culture technique (Johnson, 1946)is used to observe morphological characteristics of molds without disturbing the arrangement of spores and conidial ontogeny over a period of time in a given area of the preparation.

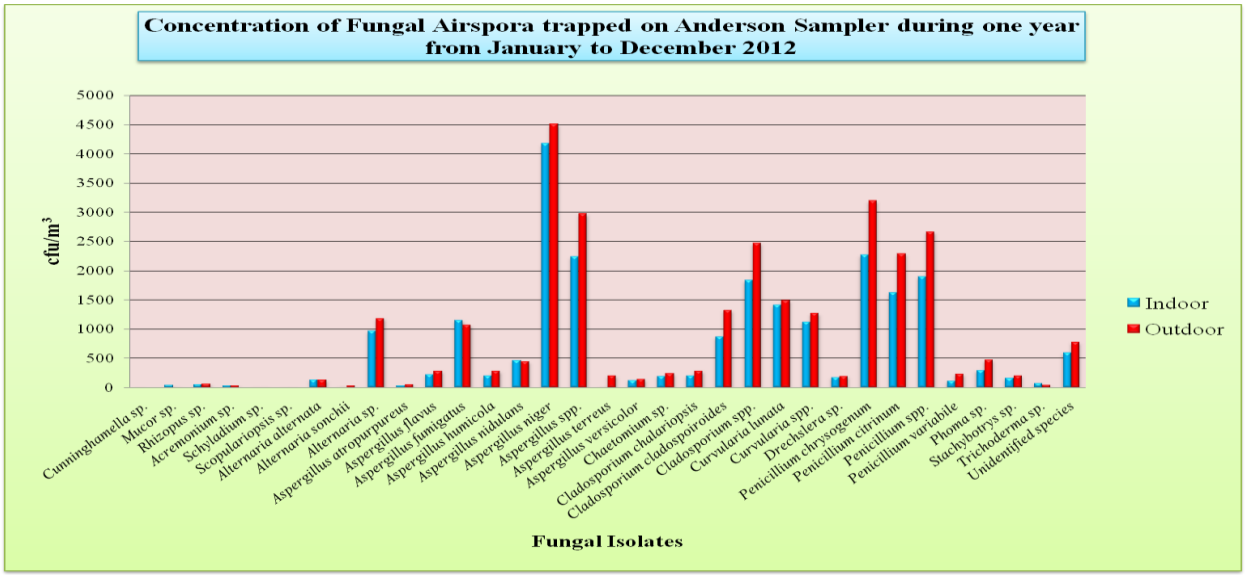
RESULT AND DISCUSSION

Fungi are found worldwide and reproduce rapidly. The distribution of aeroallergens changes from country to country and even within regions of the same country. Indoor fungi are a mixture of those which have entered from outdoors and those which readily grow and multiply indoors. *Aspergillus* and *Penicillium* are less common outdoors and are usually considered the major indoor fungi (Burge, 1985 and Licorish et al. 1985).

Great concern has been expressed about potential health hazards to humans, with a special focus on allergenic or toxigenic fungi and their association with air quality (Horner et al. 1995). As a result of these investigation altogether 33 types of fungal cultures were isolated using Anderson two stage sampler belonging to 6 different genera, out of 6, 3 belonging to Zygomycotina, and 3 belonging to Ascomycotina, 27 belonging to Deuteromycotina. Verma et al. (2009) also found 20 different type of fungal spores during the survey of kitchen environment from which 3 type of fungal isolates were identified in Zygomycetes, 3 from Ascomycetes, and 14 in Deuteromycetes. During the study period a total of 33 fungal species belonging to 16 genera were observed. *Aspergillus*specieswere recorded the maximum (9) followed by 4 species of *Penicillium*.

Refer Appendix -1. **For Table 1: Concentration of fungal airspora of different Kitchen of Jabalpur (Jan. to Dec. 2012)**

Fig. 1: Concentration of Fungal Airspora trapped on Anderson Sampler during one year from January to December 2012



Fairs et al. (2010) also found that *Aspergillus /Penicillium*-type (Asp/Pen-type) spores were common indoors and exceeded outdoor levels, with the highest concentrations detected in properties over 90 years old (P=.006) and terraced properties (P=.003).

In the present study *Aspergillusniger* was found to be most dominant in all fungal forms and occurred with 16.829%, followed by *Penicilliumchrysogenum* 10.599%, *Cladosporium* spp. 8.35%, and *Curvularialunata*5.635% was prevalent in both indoor and outdoor environment. Similarly in another study, the genus *Aspergillus* showed the highest concentration in winter and another peak concentration in summer (Su et al. 2001) andMushtaq et al. (2011) also found that most frequently isolated fungal genera were *Alternaria, Aspergillus, Cladosporium, Fusarium*and *Penicillium* in study area.

During this study highest numbers of fungal colonies were recorded in month of March 2012. This result suggested that month of March is suitable for growth of these fungal spores in both indoor and outdoor environment. It has also been reported by Ebner et al. (1989) that *Aspergillus* concentrations also increased substantially in March and August.

CONCLUSION

This study concludes that there is rich fungal biodiversity in the environment. Indoor air quality is essential for indoor survival as majority time spent indoors. In this present studies it was found that fungal level of kitchen can vary to large extent, due to both environmental and anthropogenic reasons. Monthly variation also recorded due to slight differences in meteorological parameters in different months. It will be helpful in establishing correlation between fungal allergen in air and kitchen environment, thus achieving effective management of allergic disorder. Lifestyle differences and indoor allergen exposure increases, due to high temperature existing indoor and humidity have been suggested to be the potential cause of fungal allergy. Thus increasing the ventilation rate by means of mechanical or natural system can play a key role in improving the kitchen air quality.

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