

Research Article

STUDY OF AEROMYCOSPORA IN TWO DIFFERENT LOCATIONS OF JODHPUR, RAJASTHAN

***K. Naruka and J. Gaur**

Department of Zoology, Jai Narain Vyas University, Jodhpur

**Author for Correspondence*

ABSTRACT

Fungi are ubiquitous in air and their presence is often associated with asthma and other allergic manifestations. In the present study, outdoor airborne fungal concentration at two different locations, J.N.Vyas University campus (JNVUC) and Rajiv Gandhi colony (RGC) representing slum area in Jodhpur, Rajasthan were investigated during winter season. A total of seven fungal genera were isolated from these two locations among which *Cladosporium* sp. and *Alternaria* sp. were dominated. Presence of various fungus and their spores in air can be a potential health hazard to all people residing around.

Key Words: Airborne, Colony forming units, Asthma, *Cladosporium*, *Alternaria*

INTRODUCTION

Fungi are ubiquitous in air but their proportion varies according to environmental condition and locations. Airborne fungi are present in both outdoor and indoor environments, sometimes occupying 70% of total microflora of air (D'Amanto *et al.*, 2000). Fungal conidia and spores are liberated in air from plants, animal, soil, decaying organic material and can remain airborne for long time. Airborne fungus and their spores are potential to create health hazards and associated with dermatitis and respiratory diseases along with allergic manifestation in human beings (Burge, 1985). Now day's allergic respiratory diseases have become so common that it affects over 25% of total population in the world (Kurup *et al.*, 2002).

Many genera of fungi can cause allergic responses, but particularly important are some species of *Cladosporium*, *Alternaria*, *Penicillium* and *Aspergillus*. *Cladosporium* and *Alternaria* are frequent and predominant genera present mainly in the outdoor air (Akerman *et al.*, 2003). Some moulds also produce mycotoxins and some species become particularly toxigenic by producing dangerous volatile compounds (D'Amanto *et al.*, 2000). Nowadays thousands of people spend several hours studying and working in enclosed spaces every day and where microbiological quality of indoor air can influence their health and physical condition. Various studies have suggested that outdoor air is the primary source of indoor air mycoflora thus, monitoring of outdoor air is necessary for the estimation of indoor air quality. Therefore, present study aim to investigate quantitative and qualitative analysis of airborne fungi at two different locations of Jodhpur, Rajasthan.

MATERIAL AND METHODS

In the present study, two sampling locations were selected, J.N. Vyas University campus (JNVUC), which represents the institutional area encompassed with educational institutions and good plantation and Rajiv Gandhi Colony (RGC) comprises slum area. Air samples were collected once a month for four months in the winter season (November to February) using the settle plate methods. Duplicate plates containing Potato dextrose agar (PDA) were used for the isolation of fungi. Each plate was exposed at a height of 1.5m from the floor (human breathing zone) for a period of 30 minutes. The plates were incubated at 25°C for 5-7 days. After incubation, the total number of colony forming unit (CFU) for the fungi was enumerated and converted to colony forming unit per cubic meter (CFU/m³) of air. Identification of fungi was initially based on colonial appearance and then a wet mount preparation of each fungal colony was prepared by using Lactophenol-cotton-blue solution. Spore and hyphal characteristics of these stained preparations examined microscopically (Frey *et al.*, 1979 and Watnabe, 2002).

Research Article

RESULTS AND DISCUSSION

Figure 1 shows the average levels of total count of airborne fungi for two different locations during the study period (November to February) which varied in the range of 30 to 62.5 CFU/m³. Numerous studies have shown that concentration of airborne fungi in urban air influenced by population density and other anthropogenic activities (Zheng, 2009 and Kumar *et al.*, 2011). In the present study higher concentration of fungi at RGC shows that this may be due to more human activity or crowding at this location. The higher counts of most of the fungus may also be due to garbage heaps which provide safe breeding ground for them (Sunita *et al.*, 2011). In addition to this, lower airborne fungal concentration in outdoor air of university campus has also been observed which represents better cleanliness and good environmental conditions at this location. This observation is in agreement with the study of Filipiak *et al.*, (2004). A total of seven fungal genera which comprises, *Cladosporium* sp., *Aspergillus* sp., *Alternaria* sp., *Helminthosporium* sp., *Fusarium* sp., *Rhizopus* sp., and *Yeast* were isolated from both locations. The present study reports that so called “outdoor mould” *Cladosporium* sp. and *Alternaria* sp. were dominated at both sampling locations (Table.1), which is in agreement with results of previous studies (Fang *et al.*, 2004 and Bugajny *et al.*, 2005). The dominance of these two fungus may be due to their nature of conidia, as they both produce dry conidia in chains easily carried through air (Katial *et al.*, 1997).

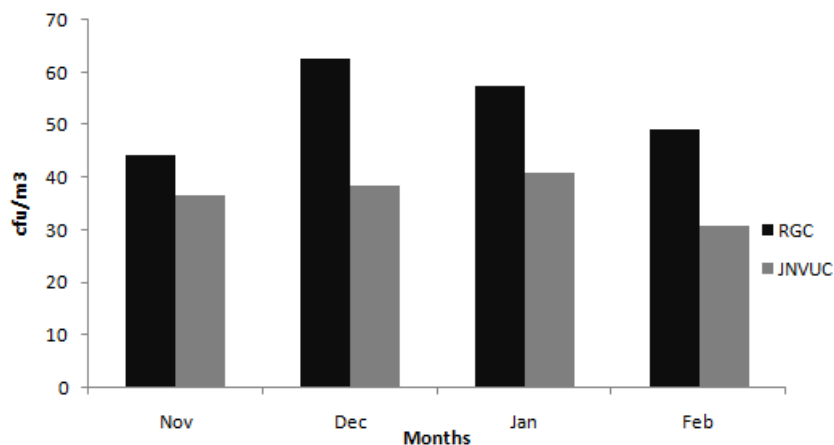


Figure: 1 Total count of airborne fungal concentration at two different locations of Jodhpur

Table: 1 % Frequency of each fungal isolate at two different locations of Jodhpur

Fungal Genera	% Frequency at RGC	% Frequency at JNVUC
<i>Cladosporium</i>	30.89	22.73
<i>Alternaria</i>	17.96	21.02
<i>Aspergillus</i>	14.45	18.75
<i>Helminthosporium</i>	15.62	16.48
<i>Fusarium</i>	16.01	12.50
<i>Rhizopus</i>	5.07	0
<i>Yeast</i>	0	8.52

Exposures to airborne fungi are often associated with asthma and other allergic respiratory symptoms. In the present study, fungal genera such as *Cladosporium*, *Alternaria* and *Aspergillus* were observed in the air which exert adverse effects on the respiratory tract of exposed people. However, this fungus may cause allergic reactions if present in high concentration (Horner *et al.*, 1995). Fungus like *Cladosporium*, *Alternaria* and *Aspergillus* cause diseases like asthma or cystic fibrosis which develop a chronic allergic reaction with cough. Not only the occurrence of asthma but also its persistence and severity have also

Research Article

been strongly associated with sensitization and exposure to *Cladosporium* sp. and *Alternaria* sp. (Salo *et al.*, 2006 and Li, 2010). *Aspergillus* sp. also poses a risk to people exposed to it repetitively, as it is associated with a life threatening disease Allergic Bronchopulmonary Aspergillosis (ABPA).

Conclusion

Present study shows the airborne fungal concentration at two different locations of Jodhpur. Higher airborne fungal concentration was observed at RGC than JNVUC. Among isolated fungi there were also strongly allergenic and toxic species of genera such as *Cladosporium*, *Alternaria* and *Aspergillus* which poses health risk to people residing around. Regular monitoring of fungus and their spores may provide better knowledge of specific group of fungi causing various health hazards to human being. Therefore, it is necessary to carry out regular air monitoring at various outdoor locations.

ACKNOWLEDGEMENT

The authors are thankful to Head, Department of Zoology, Jai Narain Vyas University, Jodhpur for providing necessary facilities to carry out the work.

REFERENCES

- Akerman M, Valentine-Maher S, Rao M, Tanning G, Khan R, Tuysugoglu G and Joks R (2003). Allergen Sensitivity and Asthma Severity at an Inner City Asthma Center. *Journal of Asthma* **40**(1) 55-62.
- Bugajny A, Knopkiewicz M, Piotraszewskapajak A, Sekulska-Stryjakowska M, Stach A and Filipiak M (2005). On the microbiological quality of the outdoor air in Poznań, Poland. *Polish Journal of Environmental Studies* **14** 287-293.
- Burge HA (1985). Fungus allergens. *Clinical Reviews of Allergy* **3** 319-329.
- D'Amanto G, Liccardi G, Russo M and D'Amanto M (2000). On the interrelationship between outdoor air pollution and respiratory allergy. *Aerobiologia* **16** 1-6.
- Fang Z, Ouyang Z, Hu L, Wang X, Zheng H and Lin X (2005). Culturable airborne fungi in outdoor environments in Beijing, China. *Science of the Total Environment* **350** (1-3) 47- 58.
- Filipiak M, Piotraszw WPA, Stryjakowska SSM, Stach A and Silny W (2004). Outdoor and indoor air microflora of academic buildings in Poznań. *Progress in Dermatology and Allergology* **21**(3) 121-127.
- Frey D, Oldfield RJ and Bridger RC (1979). A colour Atlas of Pathogenic Fungi. Wolfe Medical Publications Ltd. Holland.
- Horner WE, Reese G and Lehrer SB (1995). Identification of the allergen Psi c 2 from the basidiomycete *Psilocybe cubensis* as a fungal cyclophilin. *International Achieve of Allergy and Immunology* **107** 298-300.
- Katial PK, Zhang Y, Jones RH and Dyer PD (1997). Atmospheric mould spores count in relation to meteorological parameters. *International Journal of Biometeorology* **41** 17-22.
- Kumar P, Mahor P, Goel AK, Kamboj DV and Kumar O (2011). Aero-microbiological study on distribution pattern of bacteria and fungi during weekdays at two different locations in urban atmosphere of Gwalior, Central India. *Scientific Research and Essays* **6**(25) 5435-5441.
- Kurup VP, Shen HD and Vijay H (2002). Immunobiology of Fungal Allergens. *International Achieve of Allergy and Immunology* **129** 181-188.
- Li Li, Chao L and Zhi-Gang Liu (2010). Investigation of air borne fungi in different altitudes in Shenzhen University. *Natural Sciences* **2**(5) 506-514.
- Salo P, Arbes S, Sever M, Jaramillo R, Cohn R, London S and Zeldin D (2006). Exposure to *Alternaria alternata* in US homes is associated with asthma symptoms. *Journal of Allergy and Clinical Immunology* **118**(4) 892-898.
- Sunita K, Gond DK, Samuel CO and Abbasi P (2011). A comparative study of aeromycospores in different localities of Gorakhpur, U.P. *Indian Journal of Scientific Research* **2**(4) 51-55.

Research Article

Watnabe T (2002). Pictorial Atlas of Soil and Seed Fungi. Morphologies of cultured Fungi and Key to species, 2nd edition CRC Press London.

Zheng Z, Xie X, Ouyang Y, Wang C, Zeng H and Chen Y (2009). Characteristics of the airborne microbe's dominant population and spatio-temporal variation in urban agglomeration of the Pearl River Delta, Guangdong. *Geographical Research* **28**(3) 625-633.