

Isolation of aeromycoflora in the indoor environment of chawri bazar metro-railway station, Delhi, India

Arshi Nafis¹ and Kavita Sharma²

¹Research Scholar MATS University, Raipur (C.G.) India

²Arts and Commerce Girls College, Raipur (C.G.) India

Abstract

Air almost always contains spores, but the number and type of spores depend on the time of day, weather, season and geographical location. The aim of the study was to evaluate the prevalent species of airborne fungi in the indoor environment of the Chawri Bazar Metro-Railway Station, Delhi, India. Air sample was collected for four months within the interval of two weeks by means of gravitational settling method via Petri dishes with Potato Dextrose Agar (PDA) culture media. Those fungi colonies that formed after an incubation period of 3 to 5 days at 25 to 28°C were determined on the basis of micro and macro morphological characteristics. During the investigation period *Aspergillus*, *Penicillium*, *Curvularia*, *Cladosporium*, and *Fusarium* are reported as dominant fungal types. In this investigation, among fourteen spore types, *Aspergillus niger* was the most prevalent fungal genera followed by *Aspergillus flavus* and *Penicillium* sp. The results of this investigation appeared to be quite significant for taking corrective measures.

Keywords: Aeromycoflora, fungal spore, metro-railway station.

INTRODUCTION

Airborne microfungus propagules are found in large numbers in indoor and outdoor environments and are widely distributed in nature in general. Some of them have the potentiality to cause allergies, spoilage of foods and many other adverse health effects, namely, bronchial asthma, allergic rhinitis and atopic dermatitis (Burge and Rogers, 2000; Terui et al., 2000; Akiyama, 2001). The effect of threshing operations on the fungal spores of farm air was studied with the culture plate method (Uddin and Chakraverty, 1994). People continuously come in contact with these airborne fungi often intake such air through respiration. Different studies indicate that fungal extracts can cause allergic rhinitis and bronchial asthma in indoor dwellings (Al-Suwaine et al., 2001; Su et al., 2001). The environment may possess both beneficial and harmful fungal flora. In the case of beneficial fungi, they could be cultured in laboratories and could be used for producing valuable substances. On the other hand, in the case of harmful fungi, their effects could be studied more critically.

MATERIALS AND METHODS

The site selected for the present study was the Chawri Bazar Metro - Railway Station, Delhi, India. Chawri Bazar (Hindi: चावड़ी बाज़ार) is an underground station located on the Yellow Line of the Delhi Metro. It is located in the Chawri

Bazaar locality of Old Delhi and was inaugurated on 3rd July, 2005. Chawri Bazar is the deepest station of the Delhi Metro network and is situated about 30 metres (98 ft) below ground level (The Hindu, 2004 & 2005). The microflora studies of this particular place have never been reported. So, information about the airborne sample in the metro-railway station is largely lacking. Although the environment of the entrance of the metro-railway platform is more or less equivalent to a natural outdoor environment, the underground platform has a closed environment system. For this purpose, Potato Dextrose Agar (PDA) medium, containing peeled potato, agar and dextrose in distilled water, was prepared aseptically. Then the liquid media was poured into sterile Petri dishes using aseptic techniques. The media was allowed to solidify and then the junctures of the Petri dishes were sealed by sellotape. The Petri dishes were taken to the selected site to trap the fungal composition and were exposed in four different sites of the metro-railway station, namely Entry, North, Centre and South. The samples were collected at two weeks intervals between the months of January to April, 2009. The Petri dishes were exposed to the air for 10 min (Uddin, 2004). Four Petri dishes were used for each day. The Petri plates containing the samples were incubated for 3 to 5 days at room temperature (25 to 28°C). The species were identified on the basis of micro and macro morphology; and reverse and surface coloration of colonies grown on the PDA media. The fungi were identified up to genus level and in some cases up to species level (Cooke, 1963).

RESULT

Fifteen different fungal species were found in this work. The dominance of *A. niger*, *A. flavus*, *Penicillium*, *Alternaria* had been found through this investigation. The members of Anamorphic fungi has shown maximum contribution throughout the study period. During the investigation period maximum percentage contribution was showed by *Aspergillus niger* (25.00%),

Received: Jan 12, 2012; Revised: Feb 15, 2012; Accepted: March 10, 2012.

*Corresponding Author

Arshi Nafis

Research Scholar MATS University, Raipur (C.G.) India

Tel: +91-9716216838

Email: drktsharma@gmail.com

Cladosporium sp I (13.5%), and *Aspergillus Scalrotium* (16.00%) and *Aspergillus fumigates* (09.50). Moderate percentage contribution was showed by *Aspergillus versicolor* (04.50%), and *A. oryzae* (03.50%). While minimum percentage contribution (0.50%) were observed for *Arcemonium, Cladosporium sp. II* and for *Trichoderma viride* (Figure1).

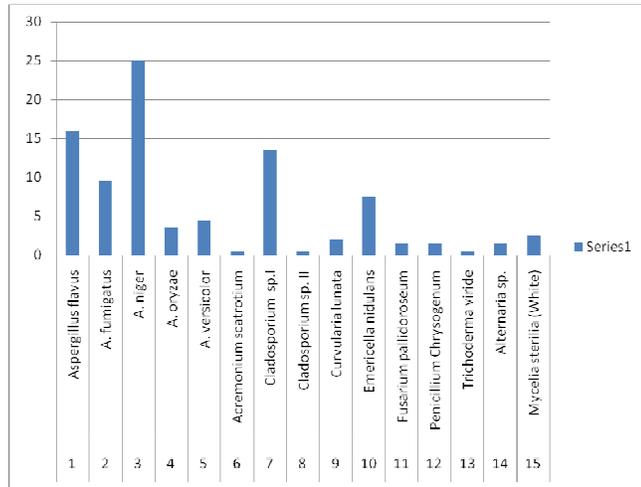


Fig 1. Percentage contribution of isolated fungi

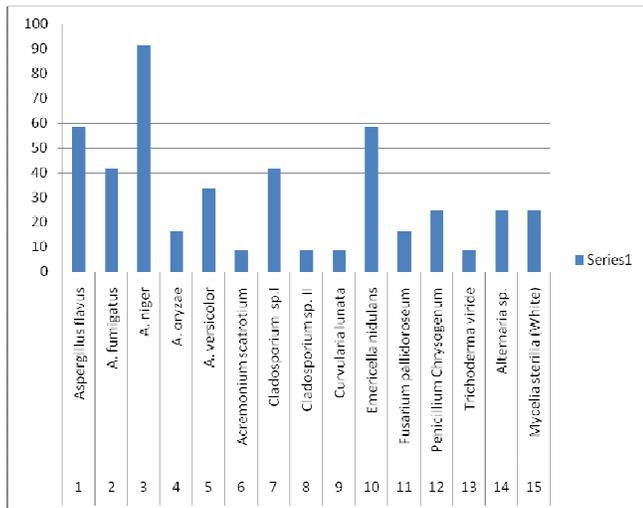


Fig 2. Percentage frequency of isolated fungi

Frequency is the main parameter which helps to know the distribution of individual species in a particular area. During investigation period maximum percentage frequency was reported for *Aspergillus niger* (91.66%) (Figure2). Generally, fungal count is high in outer polluted environments but in this study, the high number of colony forming fungi in the site was due to lack of efficient maintenance probably. The working area also contains aero-allergenic fungal spores. The present study was aimed at determining the fungal flora, their identification, concentration and diversity in the Chawri Bazar Metro-Railway Station. At the end of the work, it was proven that a good number of fungal spores were found, that is, the indoor air of the metro-railway station had never

been free of fungal spores. The percentage of some airborne fungal viability is in higher concentration.

From the information of reference studies, it was found that *Aspergillus flavus*, *Aspergillus fumigatus*, *Alternaria alternata*, *Cladosporium*, *Curvularia pallescens* demonstrated greater than 60% positive reactions in skin prick tests in many experimental cases. There were many reports for the aflatoxin production in the *Aspergillus* spp. (Bennett and Goldblatt, 1973; Hesseltine et al., 1970; Schroeder, 1966). So the negligence of proper cleaning and maintenance of this site became a good source of the deteriorative and detri-mental effect of the mould which may cause a potential health hazard.

REFERENCES

- [1] Akiyama K 2001. Fungal allergy-clinical aspect. Nippon. Ishinkin. Gakkai. *Zasshi*, 42: 109-111.
- [2] Al-Suwaime AS, Bahkali AH, Hasnain SM 2001. Airborne viable fungi in Riyadh and allergenic response of their extracts. *Mycoses*, 44: 401-404.
- [3] Bennett JW, Goldblatt LA 1973. The isolation of mutants of *Aspergillus lousii* and *A. parasiticus* with altered aflatoxin producing ability. *Sabouraudia*, 11: 235-241. Burge HA, Rogers CA (2000). Outdoor allergens. *Environ. Health. Perspect.*, 108: 653-659.
- [4] Cooke WB 1963. A laboratory guide to fungi in polluted waters, sewage, and sewage treatment systems; their identification and culture. PHS Publ., 999-WP-I., Cincinnati.
- [5] Hesseltine CW, Shotwell L, Smith M, Ellis JJ, Vandegrift E, Shanon G 1970. Production of various aflatoxins by strains of the *Aspergillus flavus* series. In: Herzberg M (eds) *Proceedings of the First U.S Japan Conference on Toxic Microorganisms*, Washington: Government Printing Office, pp. 202-210. John PU (1985).
- [6] Schroeder HW 1966. Effect of cornsteep liquor on mycelial growth and aflatoxin production in *Aspergillus parasiticus*. *Appl. Microbiol.*, 14: 381-385.
- [7] Su HJ, Wu PC, Lin CY 2001. Fungal exposure of children at homes and schools: a health perspective. *Arch. Environ. Health*, 56: 144-149.
- [8] Terui T, Makino Y, Hashimoto A, Tagami H 2000. Learning from fungus allergy in atopic dermatitis patients. Nippon. Ishinkin. Gakkai. *Zasshi*, 41: 157-60.
- [9] Uddin N 2004. Airspora studies over a rice (high yielding variety) field inrabi season in the state of West Bengal, India. *Aerobiologia*, 20: 127-134. Uddin N (2005). Estimation of aeromycoflora in jute fields. *Aerobiologia*, 21: 75-80
- [10] Uddin N, Chakraverty R 1994. Airborne fungal load in agricultural environment during threshing operations. *Aerobiologia*, 127: 145-149. Verma KS, Chile S (1992). Studies in fungal allergy in Jabalpur area part I. *Indian J. Appl. Pure Biol.*, 7: 91-94.
- [11] Metro creating a marvel in Walled City" The Hindu. 2004-01-08. Retrieved 2010-09-27.
- [12] Technological marvel set to unfold on July 2. The Hindu. 2005-06-29. Retrieved 2010-09-27.