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Incidence of fungal spores around garbage depot of Mulund with reference to health hazards

Jadhav Anjali S and Yeragi SS

K. J. Somaiya College of Science & Commerce, Vidyavihar, Mumbai 400 077.

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ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print) Air pollution is due to the presence of particulate matters e.g. varying mixtures of soot, ash, pollen grains, fungal spores, microscopic plant & animal fragments, dust etc. Aerobiologists have traditionally been involved in the measurement & reporting of airborne pollen & fungal spores as a service to allergy sufferers. Aerobiology, according to modern concept is a scientific multidisciplinary approach concerned with the source of the organisms, their release, dispersion, deposition and impact on human and animal systems. Many human allergic disease & seasonal allergic rhinitis are attributed to inhalation of airborne fungal spores. In garbage area due to decomposition caused by bacteria and fungus there is possibility of spreading spores in and around the human habitat.

Aerobiological study to analyze airborne fungal spores around garbage depot of Mulund was conducted from January 2015 to December 2015. Identification of fungal spores was done using Gravity Slide Technique and Culture Plate Count Technique. The major fungal spores identified with this technique were *Cladosporium,Alternaria, Curvularia, Aspergillus* etc.

Key words : Allergy, Airborne, Garbage, Fungal spores

INTRODUCTION

Now a days major cities are facing great problem of air pollution due to industrialization. Atmosphere contains bio-particulates such as pollen grains, fungal spores, algae, bacteria, mites, protozoa etc. Fungal spores have special significance due to the fact that they are the main cause of some form of human allergic disorders such as allergic rhinitis, allergic bronchial asthma, hay fever and itchy eyes. Aerobiology studies the biological constituents in relation to the various meteorological factors. Aerobiology is a scientific multidisciplinary approach focused on the transport of organism and biologically significant materials (Edmonds and Benninghoof, 1973). Many human allergic disease and seasonal allergic rhinitis are attributed to inhalation of airborne fungal spores and pollen grains (Shivpuri, 1971). From health perspective, aerobiology is an important field because a number of agents of disease can be carried through air. Learning about how these particles move can help to establish methods which can be used to control the spread of disease.

Aerobiology deals with two major phenomena: the first is the dispersal of biological substances and second is qualitative and quantitative estimations of the dispersed substances on biological systems.

Aerobiological investigations can be broadly distinguished as outdoor or extramural aerobiology and indoor or intramural aerobiology (Tilak, 1998).

The present investigation is focused on garbage depot of Mulund. The objective of this investigation is to find out and record dissemination pattern of the airborne fungal spores and it's effect on meteorological factors such as rainfall, temperature, relative humidity on their incidence around the garbage depot.

This aerobiological survey is useful to the allergenic patients and the medical practitioners in understanding and diagnosis of their patients. With the help of this survey it is also possible to prepare fungal spore calendar.

METHODOLOGY

Two techniques have been employed in this survey 1) Gravity slide technique 2) Culture plate technique.

1) Gravity slide technique:

Gravity Slide Sampler was used for the present study. Slides (75mm x25 mm) smeared with a thin film of safranin glycerin jelly were exposed daily to the atmosphere in the gravity slide sampler of about 5-8 meters from the ground level for a period of one year. A coverslip of 18mm x 18mm size was placed on each exposed slide after addition of drop of molten fresh jelly. Counting of the fungal spores on the slides was done in a constant area of 3.24 sq.cm.

2) Culture plate technique:

Petriplates of Rose-Bengal-Streptomycin agar (R.B.S.) medium were exposed once in a fortnight for 3 minutes, at height of 5-8 meters from the ground level at 07 a.m. and 01 p.m. respectively. The petriplates after exposure were incubated at temperature of about 28^o- 30^o C in an

inverted position for 4-5 days and the developed colonies were counted and identified. Identification was confirmed by referring to the standard books and monographs pertaining to the different genera.

During the period of investigation monthly records of temperature, relative humidity and rainfall were recorded.

RESULTS AND DISCUSSION

The bulk of tons of garbage collected every day by the Municipal Corporation are simply dumped at the dumping sites, where it gives rise to lots of problem such as contamination of water, soil and air. Among the health hazards sneezing and coughing, skin rashes, asthma, eye irritation, infection of skin etc are predominant.

Analysis of gravity slide technique revealed 18 fungal spore types. The spores of *Cladosporium* contributed the highest percentage to the total air-spora. The other major fungal types identified with this technique were *Alternaria, Curvularia, Helminthosporium, Bispora* etc. The highest percentage contribution was of *Cladosporium* (24.16%).

The culture plate technique helped to isolate and identify about 30 fungal types. This technique revealed *Cladosporium, Aspergillus, Curvularia* as major colonies followed by *Nigrospora, Penicillium*, *Bispora, Helminthosporium* etc.

The concentration of *Cladosporium* was maximum in monsoon season followed by winter and summer. This indicates that the high relative humidity, moderate temperature and rainfall favour the sporulation and growth of this fungus. The peak period of fungal spore count around the garbage depot of Mulund was from August to October.

The spores of *Aspergillus, Penicillium*, etc. cannot be identified upto their generic levels on the exposed slides. Therefore while studying the exposed slides these spores having almost similar shape and size were included under the small round spores category. In order to identify these spores to their generic level the gravity slide technique was supplemented by simultaneous exposure of culture plate technique.



Fig. 1: Month waise variations in the Total Air Spora by gravity slide Technique -2015



Fig. 2: Variation in the annual fungal spore catch





Agarwal and Shivpuri(1974) in Delhi atmosphere observed that just after the rainy season the fungal spore concentration of the atmosphere gradually increased and reached to its maximum in the months of September and November.

The vast and diverse geographical region essentially demands the preparation of a list and calendar of allergenic pollen and fungal spores, since the allergens differ to certain extent from region to region (Tilak,1982). Knowledge of air-spora is important to agriculture and medicine (Gregory, 1952).

The allergic disorders observed were maximum at the sites which were near to the garbage depot but gradually decreased with increasing distance.

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