Aero Allergens – Environment Bio-Pollutants

Virender Kumar Misra
Associate Professor in Botony,
K. M. Agrawal College (University of Mumbai)

Email Id: vkmleo11@gmail.com

Abstract. Atmosphere contains and carries a series of microparticles of living and non living origins. The microparticles of living origins are of various types such as pollen grains, fungal spores, viruses, bacteria, mites, detached plant parts, algal materials, body parts of insects etc. Collectively they are called as aerosols. The scientific discipline which includes the study of these aeromicrobioparticles and their dissemination is known as 'Aerobiology'. Many of these aeromicrobioparticles are responsible for causing various allergic ailments like rhinitis, nasobronchial allergies, conjunctivitis, dermatitis, urticaria etc in sensitive human population. Hence these particles are referred as aero-allergens because an allergen is a substance which causes allergy. Knowledge of their prevalence in air is helpful for patients to avoid them. It is also helpful to allergologists in diagnosis and treatment of allergic diseases.

Key words: Aero-allergens, Hypersensitivity (Allergy)

1 Introduction

The atmosphere is an important and unavoidable part of our ecosystem. Whether indoor or outdoor, we are necessarily and continuously exposed to atmosphere. It is directly associated with our health as well it also affects us in various other ways directly or indirectly. Apart from its own constituents, it may contain various types of chemical pollutants in gaseous forms which are harmful to our health. Other than chemical pollutants, the atmosphere also contains and carries a series of micro sized animate particles, which are of various kinds such as pollen grains, fungal spores, viruses, bacteria, mites, detached plant parts, algal materials, body parts of insects, animal danders etc. All these bioparticles are collectively termed as 'aerosol'(Gregory 1952)

The scientific discipline, which includes the study of aeromicrobioparticles and their dissemination is known as 'Aerobiology'. It was coined by Meier in 1930s. According to I.U.B.S. commission on Aerobiology, it has been defined as "Aerobiology is a scientific discipline focussed on the transport of organisms and biologically significant materials by the atmosphere". Jacobs

(1951) broadened the implication of this term to include the insertion of bacteria, viruses, fungal spores, pollen grains and insects and their impact on all forms of life of plants and animals.

These aero-biosols affect us adversely in various ways. They may cause infectious diseases and poisoning in humans, spoilage of various items and various types of allergies etc. Fungal spores are known to destroy paintings, library items, decompose cellulose, destroy stored grains and are distinguished plant pathogens. Pollen grains, fungal spores, mites, body parts of insects, animal danders etc are well known allergens. They are responsible for causing various allergic ailments like rhinitis(hay fever), nasobronchial allergies, conjunctivitis, dermatitis, urticaria etc in the sensitive human population. Hence the qualitative as well as quantitative knowledge of the prevalence of aerial microbioparticles is essential for allergenic patients. This is because it is considered to be a beneficial aid for proper testing, detection of casual agent, diagnosis and treatment, besides other valid and potential uses. Therefore Aerobiological studies have gained a great significance in recent times. Aerobiologists in the country have carried out detailed study of air-borne pollen grains, fungal spores, mites etc specially to provide information of prevalence of these aeromicrobioparticles in a particular locality.

2. Materials and Methods To Study Aero-Sols

Study of air-borne pollen grains, fungal spores etc is carried out by volumetric air samplers such as Anderson sampler, Burkard sampler, Tilak's sampler, Rotorod sampler etc. In this method air is sucked inside the sampler where micro bioparticles get stuck on a sticky substance or in rotorod sampler, sticky substances are rotated on arms of sampler. The air borne particles which comes in contact get stuck to sticky substances. These are then screened under microscope to identify the air borne pollen grains, fungal spores etc. Fungal spores and mites are studied by culturing them in suitable medium. These are then studied by their morphological structure in microscopic studies

Some of the Common Aero-Allergens

SRNO.	POLLEN GRAINS	FLOWERING PERIODS
1	Abutilon indicum	June-August
2	Acacia arabica	June-August
3	Acacia auriculiformis	March-December
4	Achyranthes aspera	July-September
5	Aegle marmelos	April-June

6	Ageratum conyzoides	July-September
7	Ailanthus excelsa	February
8	Albizzia lebbek	May-June
9	Amaranthus gracilis	March-April
10	Amaranthus spinosus	March-April
11	Areca catechu	May-July
12	Argemone mexicana	February-May
13	Artocarpus heterophyllus	February-May
14	Azadiracta indica	March-April
15	Borassus flabellifer	March-April
16	Caesalpinia pulcherima	June-September
17	Calotropis gigantea	Throughout the year
18	Carica papaya	March- May
19	Casuarina equisetifolia	April-June
20	Cassia alata	January-March
21	Chenopodium album	March-April
22	Cocos nucifera	Throughout the year
23	Croton bonplandianum	Throughout the year
24	Cucurbita maxima	Throughout the year
25	Cyperus rotundus	Throughout the year
26	Cynodon dactylon	July-September
27	Datura metel	July-October
28	Eclipta alba	July-September
29	Eleusine coarcana	July-October
30	Eragrostis pilosa	July-October
31	Eucalyptus	February-March
32	Euphorbia hirta	Throughout the year
33	Heliotropium indicum	Throughout the year
34	Hibiscus rosa sinesis	July-September
35	Holoptelia integrifolia	February-March
36	Ipomoea paniculata	September-December
37	Lathyrus sativus	December-Janauary
38	Lantana camara	Throughout the year

39	Leucas aspera	August-December
40	Mangifera indica	January-March
41	Michelia champaka	March-June
42	Mimosa pudica	May-August
43	Morus alba	February-March
44	Nymphae stellata	April-June
45	Oryza sativa	April-September
46	Oscimum sanctum	September-November
47	Panicum repens	July-December
48	Parthenium hysterophorus	Throughout the year
49	Phoenix sylvestris	April-June
50	Polyalthia longifolia	March-June
51	Polygonum barbatum	June-August
52	Prosopis juliflora	April-May
53	Putranjiva roxburghii	March-May
54	Ricinus communis	December-March
55	Rumex dentatus	January-March
56	Saccharum officinarum	February-March
57	Salvadora persica	February-April
58	Setaria glauca	September-October
59	Tamarindus indicus	May-September
60	Tinospora cordifolia	July-September
61	Tylophora indica	July-September
62	Typha augustata	Throughout the year
63	Vinca rosea	Throughout the year
64	Xanthium strumarium	August-October
65	Zea mays	August-September

FUNGAL SPORES

1. Alternaria spp.
2. Aspergillus spp.
3. Candida spp.
4. Cladosporium spp.

5. Curvularia spp.
6. Drechslera sps.
7. Epicoccum
8. Fusarium spp.
9. Helminthosporium
10. Mucor
11. Neurospora
12. Paecilomyces
13. Penicillium spp.
14. Phoma spp.
15. Rhizopus
16. Trichoderma

MITES

1. Dermatophagoides pteronyssinus
2. D.culinae
3. D.farinae

Others

1. Animal danders
2. Epithelia
3. Feathers
4. Sheep's wool

3. Conclusion

Among the common aero-allergens pollen grains and moulds are the most important ones. Pollen grains and fungal spores are present abundantly and share a major portion of the environment (Agarwal and shivpuri 1974 and Chanda and Mandal 1986). In a particular type of allergy the

information regarding the concentration of particular allergen in the atmosphere to allergic patients is very important. It helps them to avoid such allergens. Even for the diagnosis by skin testing, knowledge of prevalence of local allergens in the atmosphere is helpful to clinicians.

4. References

Agarwal, M.K. and Shivpuri, D.N.1974. Fungal spores, their role in respiratory allergy. Advances in pollen spore research 1:78

Chanda, S and Mandal, S. 1986. Aerobiology in Eastern India. In Airborne pollen, spores and other plant materials- A survey .Ed. by P.K.K.Nair, et.al.188

Gregory, P.H.1952. Spore content of the atmosphere near the ground. Nature 170:475

Jacobs, W.C. 1951. Aerobiology in compendium of Meteorology. American Meteorological Society, Boston pp.1103

Meier, F.C, Stevenson, J. A and Charles, V.K.1933 spores in upper air. Phytopath 23:23

Meier, F.C 1935. Collecting micro organisms from two arctic atmosphere. Sci. Mo. New York 40:5