

# **INTRODUCTION**

## INTRODUCTION

Aerobiology is a branch of biology which deals with study of organic particles, viz. bacteria, fungal spores, minute insects and pollens grains, which are passively transported by the air (Spieksma, 1991). It is the science of study of the atmospheric dispersion of biological materials and their impact on the environment and other organisms. Therefore, aerobiology covers many fields of basic and applied sciences. The study of phytopathogenic spores, was one of the applications of aerobiology, together with the study of pollinic aeroallergens. Scientists practised use of aerobiology in medicine more than 60 years ago. At the moment, aerobiology could help agriculture in different ways. It can be used in disease forecasting and estimate productivity of crop field. Aerobiology helps to estimate and quantify aeromicrobiota, which would be helpful in solving the problems of gaseous pollutants.

The indoor environmental analysis has helped to focus attention on the deleterious effects of fungal spores and bacteria as these impact on various substrates. The indoor hazardous bioparticles, which remain suspended in air, is also a cause of concern to workers in the closed environment. A regular monitoring network has to be established, to assess the possible harmful effects of biopollutants and meteorological factors. It helps the patients, suffering from allergic disorders. Aerobiological tools provide ecological information which is helpful to understand the distribution of biota and protection against their harmful impact on healthy environment. Modern aerobiology had made significant contributions in the study of respiratory allergic disorders, particularly those of occupational origin.

The study of biological particles in the atmosphere was reviewed, long back in the 1<sup>st</sup> century B.C. Various workers have studied the airspora of hospital, market, dairy, road, crop field, poultry, library etc. Noble and Clayton (1963), carried out the aerobiological survey of hospital wards by using slit sampler method. Campbell (1974), studied actinomycoses, nocardiosis, blastomycosis, candidiasis, coccidioidiomycosis, cryptococcosis, histoplasmosis and other mycoses in the airspora of hospital. Hammerman, Powell and Tosh (1974), reported primary and secondary mycoses infections in hospital. Talib. et al. (1980), carried out survey of

allergenic fungal spores inside the hospital wards in Government Hospital, Aurangabad and described 65 different types of fungal spores.

Aerobiological investigations can be broadly distinguished as outdoor or extramural and indoor or intramural observations. The study of contamination in a closed systems like buildings, hospitals, glass houses or industrial environments with reference to airborne microbial contaminants, is known as indoor aerobiology. It is also concerned with the survey of biological materials in open spaces like fields and forests.

**Fields of aerobiology:** The various implications of aerobiology are as follows-

**1) Botanical and fungal aerobiology:** It deals with dispersal of microorganisms causing plant diseases, dispersion of pollens causing allergic reactions on animals or human beings (Allergology). Indoor botanical aerobiology deals with the dispersion of microbes in green houses, caves, glass houses, grain storage godowns and library buildings etc.

**2) Medical aerobiology:** includes the influence of pollens, spores, mites, and dusts on human beings and animals (Allergology) as well as transmission of bacteria and viruses.

**3) Technical or industrial aerobiology:** It is concerned with the influence of air pollutants on the environment. It also deals with the effect of dust on human beings.

**4) Experimental aerobiology:** This branch of aerobiology deals with the fundamental concepts like mathematical formulations, development of methods, instrumentations and methods of modeling of aerobiological systems. Most of the practices of the experimental aerobiology have been carried out in indoors or in wind tunnels.

Aerobiology comprises two major branches-

**1) Palynology:** It is concerned with study of airborne pollens-

- 2) **Aeromycology:** This branch is concerned with airborne fungal spores and allergy caused due to airborne pollens and fungal spores, is a common cause of respiratory disease throughout the world.

Singh (2007), has categorized the indoor environment into two types –

- a) Industrial work places and b) Non Industrial work places.

**The industrial work places:** The environments including the cinema halls, rice mills, paper mills, bakery, cowshed etc.

**The non-industrial work places:** The areas including hospital wards, poultry farms, libraries, pig farms, stored printed-paper material, state archives, hotel kitchens, grain godowns, potato storage chambers etc.

Satara is situated at the western limit of the deccan tableland. It lies between  $17^{\circ} 31'$  north latitude and  $74^{\circ} 3'$  east longitudes (Bahulekar, 1984). It has an area of 876.24sq.km. On the West, it has the Sahyadrian scrap. River Krishna is draining from Northwest to Eastern parts. The main hill features in the Satara tract are Ajinkyatara or Satara fort and Yevteshwar, Pateshwar and Jarandeshwar hills etc.

Generally, on the basis of climatic conditions, the year is divided into number of seasons. The rains shower from seventh of June to the end of September to the middle of November. The cold season starts from the middle of November up to the end of January, and a dry hot time in which easterly winds prevail, from the beginning of February up to the end of March. The hot weather period begin from the beginning of April up to the first week of June. Annual rainfall of Satara ranges between 43cm to 176cm/ anum and 80% of it comes from June to September. Temperatures in the cool months of season range from  $20^{\circ}\text{c}$  to  $29^{\circ}\text{c}$ , relative humidity in the morning is recorded from 31% to 82% and at evening 21% to 79% and average humidity in rainy season (July-August) is 100%. In general climate of Satara is cool and warm (Table: 1 and Histogram: 1).

Krantisinha Nana Patil, General Hospital, Satara was established in 1840 by Appa Sahib, the Raja of Satara. It is having a separate building within whose, walls are included for, distinct departments; a general hospital for the sick patients who are

supported free of charge, a police hospital for the sick members of the district police force, a ward reserved for the treatment of female patients etc. The hospital is under the supervision of the civil surgeon. In Satara district, Krantisinha Nana Patil, General Hospital, Satara is the main government hospital at the headquarters. It is owned, staffed, financed and operated by state government.

The Civil Hospital, Satara, is situated on the main road on the eastern side of the town i.e. Sadarbazar area. It is an old type structure with an accommodation for 75 beds. It is well equipped one. There is an X-ray machine room, a fairly well equipped laboratory, an out patient department with separate blocks for male and female patients, and a dispensary. There is also a maternity ward and wards for Lunatics and Tetanus patients. The patients, suffering from the infectious diseases are kept separately in the segregation ward outside the hospital compound, at a distance of about 100 meters away in the campus. There is also a T.B. Ward of 10 beds.

The dermatophytes, is a group of closely related fungi, that have the capacity to invade keratinized tissue (skin, hair, and nails) of human and other animals. They produce infections as dermatophytosis, dermatitis, mycoses etc. commonly referred as ringworms. Infection is generally cutaneous and restricted to the nonliving cornified layers. The fungus is unable to penetrate in the deeper tissues and organs of immunocompetent hosts. Reactions to a dermatophyte infection may range from mild to severe depends on the nature of the fungus, the virulence of the infecting strains, the anatomical location of the infection, and the local environmental factors.

Diseases of skin, allergy and asthma are of common occurrence accounting for a great deal of misery, suffering, pain and a great economic loss. There is no statistical data available to prove the exact frequency of skin diseases in this country. It is a common experience that, the people attending the hospitals, near about 10% of them suffer from skin diseases. So, the medical mycology is an integral and important part of general mycology.

Hospital is, an important indoor environment responsible for the spread of airborne pathogens (Riley, 1974; Parker 1973; Winkler 1970). It serves as a reservoir of pathogens with individuals infected with number of micro-organisms and these may potentially transmitted to other individuals including patients, hospital staff personnels, and visitors. From one patient, same may be subsequently carried over to other patients. Hospital environment is thus, responsible both for indoor and outdoor

community. For effective diagnosis and treatment of bioagents or bioallergens, detailed information on their types, species composition and its concentration or density in a specific environment, is of paramount importance. The survey of mycopollutants inside and outside the hospital is of immense importance. Therefore, in the present investigation, the aerobiological studies of Krantisinha Nana Patil, General Hospital, Satara has been selected and was carried out from October 2006-September 2007, continuously. The study was concentrated on the different mycopollutants in the hospital and their correlation with the patients, visited.

The study will definitely help in correlating the % of the specific pathogenic spores with patients visited. The study of cutaneous, keratinophilous, skin diseases along with allergenic disorders, asthma and their relation with OPD will be carried out and the information will be used for final conclusion.