



Abundance of aeroalgal allergens in the atmosphere of Aurangabad city in Maharashtra

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Abstract

While studying airborne algal flora in the atmosphere of Aurangabad city, 23 aeroalgal allergens were recorded. These aeroalgal allergens were recorded as allergenic to human beings by earlier workers. An algal cells known to contain protein in high concentration and it is of considerable importance with reference to allergic reactions in sensitive individuals. These aeroalgal allergens have been considered to cause bronchial allergy in human beings. Hay fever, allergic asthma, allergic rhinitis, allergic cough and cold are other diseases caused by aeroalgal allergens in sensitive individuals. During present study algal aeroallergens such as *Chlorococcum humicola*, *Chlorella vulgaris*, *Nitzshia palea*, *Aphanothece nidulans*, *Phormidium jenkelianum*, *Microcoleus acutissimus*, *Nostoc muscorum* and *Plectonema gracillimum* were found dominant.

INTRODUCTION

In the atmosphere different types of bioparticales are present. Airborne algae is one of the bioparticales found abundant in the atmosphere. It remains viable in the atmosphere in the form of spores and filaments. The relevance of fungal spores and pollen grains present in the atmosphere with human respiratory allergy has been well established. Except few reports, very rare attention has been paid towards airborne algae and its impact on human health, although Indian climate is most favourable for algae to become airborne and subsequent spread through air. It is an established fact that algal cells contain protein in high concentration and it is of considerable importance with reference to allergic reactions in sensitive individuals. These aeroalgal

allergens have been considered to cause bronchial allergy in human beings. Hay fever, allergic asthma, allergic rhinitis, allergic cough and cold are other diseases caused by aeroalgal allergens in sensitive individuals. While studying diversity and abundance of airborne algae in the atmosphere of Aurangabad city in Maharashtra, 23 aeroalgal taxa were isolated and recorded which have been already recorded as aeroallergens by earlier workers. Woodcock (1948) postulated algae as the cause of respiratory difficulties. Heise (1949) demonstrated that the allergenicity of algae was responsible for hay fever and asthma. Present work deals with aeroalgal allergens in the atmosphere of Aurangabad city and its impact on human health.

MATERIALS AND METHODS

Aeroalgal samples were collected at weekly interval by using petriplates containing agarized Bold's basal medium for two consecutive years i.e. from August 2014 to July 2016. Petriplates were exposed in college campus of Sir Sayyed college, which is located in densely populated area. On college terrace, which is 45 feet above the ground level petriplates were exposed normally for two hours. The frequency of exposure was once in week. Exposed petriplates were incubated under tubelights having 1000 to 1500 lux capacity in algal culture chamber. Liquid nutrient medium was poured into the plates at the time of keeping those for incubation and frequently supplemented with the same. This encouraged the growth of the algal organisms, besides avoiding drying. Upon visualizing the

growth as discrete colony forming units (CFU), they were picked up and identified under research microscope.

RESULTS AND DISCUSSTION

In present study 23 aeroalgal allergens were isolated, cultured and identified from the atmosphere of Aurangabad city (Table 1). These aeroalgal allergens have been reported allergenic to human beings by earlier researchers. Bernstein and Safferman (1966, 1973) tested allergenicity of green algae. Beniam Pinto (1972) observed airborne algae as a possible etiologic factor in respiratory allergy. Agarwal et.al. (1977) studied immunological role of algae in chronic obstructive lung diseases in Delhi. Mittal *et al.* (1979) performed intradermal skin tests on 400 patients suffering from nasobronchial allergy.

Table 1: Aeroalgal allergens and their occurance in the atmosphere of Aurangabad city.

Sr. No.	Name of aeroalgal allergens	Occurance of aeroalgal allergens
I	Chlorophyceae	
1	<i>Chlorococcum humicola</i>	++++
2	<i>Trebouxia humicola</i>	+++
3	<i>Chlorella vulgaris</i>	++++
4	<i>Ankistrodesmus falcatus</i>	+++
II	Bacillariophyceae	
1	<i>Nitzschia palea</i>	++++
III	Cyanophyceae	
1	<i>Gloeocapsa rupestris</i>	+++
2	<i>Gloeothece palea</i>	++
3	<i>Aphanothece nidulans</i>	++++
4	<i>Myxosarcina burmensis</i>	++
5	<i>Phormidium abronema</i>	+
6	<i>Phormidium fragile</i>	+
7	<i>Phormidium jenkelianum</i>	++++
8	<i>Phormidium molle</i>	+++
9	<i>Phormidium tenue</i>	+
10	<i>Microcoleus acutissimus</i>	++++
11	<i>Nostoc commune</i>	+
12	<i>Nostoc linckia</i>	+++
13	<i>Nostoc muscorum</i>	++++
14	<i>Nostoc punctiformae</i>	+++
15	<i>Plectonema gracillimum</i>	++++
16	<i>Plectonema hansgirgi</i>	+
17	<i>Scytonema bohneri</i>	++
18	<i>Scytonema schmidtii</i>	++

+ = Minimun, ++ = Moderate, +++ = Maximum, ++++ = Abundant.

Gadewar and Tarar (1997) observed that the airborne algae in indoor environment were held primarily responsible for bronchial allergy. In the earlier investigation Jadhav and Quazi (2010) recorded allergenic airborne algae from the atmosphere of Aurangabad. Aeroalgal allergens have been reported as causal agents for various allergic responses which includes bronchial allergy, hay fever allergic asthma, allergic rhinitis and allergic cough and cold (M.C. Elheny *et al.* 1962, Goyal, 1976 and Jadhav, 1995). During present investigation 23 aeroalgal allergens were isolated and cultured from the atmosphere of Aurangabad city, of these *Chlorococcum humicola*, *Chlorella vulgaris*, *Aphanothece nidulans*, *Phormidium jenkelianum*, *Microcoleus acutissimus*, *Nostoc muscorum* and *Plectonema gracillimum* were found dominant (Table1). Evidently Cyanophyceae group was the most predominant group in the present study. Hence it is concluded that atmosphere of Aurangabad city contains variety of aeroalgal allergens and have potentiality in causation of allergic diseases in sensitive individuals. The present findings have important health implications. This work will be helpful to the physicians and allergicians for effective mode of treatment of various allergic diseases in human beings.

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