



World News of Natural Sciences

An International Scientific Journal

WNOFNS 26 (2019) 29-35

EISSN 2543-5426

A study on respiratory allergy problems among local people of Serampore sub-division of West Bengal, India, during spring season

**Salma Sermin¹, Dipanwita Koley¹, Ankita Ganguly²,
Nandini Ghosh³, Partha Talukdar^{1,*}**

¹Department of Botany, Serampore College, Serampore, University of Calcutta,
William Carey Road, Hooghly, West Bengal – 712201, India

²Department of Distance Education, Vidyasagar University, Paschim Medinipur – 721102, India

³Department of Microbiology, Vidyasagar University, Paschim Medinipur – 721102, India

*E-mail address: parthatalukdar4@gmail.com

ABSTRACT

Allergic overburden increases at an alarming rate worldwide. In India allergy becomes a major health problem from last decade with increasing urbanization. The study is aimed to know the allergic problems among the common people of Serampore sub-division of West Bengal, India. A survey was conducted on 100 randomly selected people of the study area. The allergic patients were asked about their time of onset of allergy, duration, symptoms, etc. Most of the patients were found to suffer from allergy mostly at spring season. In the study area, *Moringaoleifera* and *Buteamonosperma* plants were found in large numbers. The antigenic extracts from pollen grains of these plants were prepared and specific IgE against these allergens in the patient sera were determined. Most of the patients showed high IgE titre against the pollen antigen of *Moringaoleifera*. This is a potent aero-allergen in the study area.

Keywords: Pollen grains, allergy, sensitization, questionnaire, ELISA

1. INTRODUCTION

Incidence of allergy is increasing day by day. Pollen grains are the most common cause of allergies among atopic population. Almost 30% of world population is suffering from pollen mediated allergic symptoms, with India being not an exception [1]. Due urbanization and industrialization change in climate was observed. These climatic changes might be responsible for the change in pollination season, amount of pollen release, etc. [2]. In addition to that, increased pollution changed the allergenic properties of some pollen grains as well decreased the immunity among general population making them susceptible for different types of allergies. Studies were performed at different parts of the world, including India to know the seasonal periodicities of allergic outbreak and causal allergens. Pollen calendar was prepared for Kolkata and surroundings to know air-borne pollen grains and their pollination season [3].

The current study was conducted during the spring season as most of the allergy related hospitalization occurred during this time in India. In the study area, *Moringaoleifera* and *Buteamonosperma* bloom during spring time. *MoringaOleifera* was also reported to be present in the air in previous reports. The aim of the present study was to see the prevalence of allergic sensitization among the common people of Serampore sub-division of West Bengal, India, and the effect of said pollen grains on them.

2. MATERIALS AND METHODS

A) Study population

This survey was conducted among the people who are currently living at Serampore sub-division of West Bengal, India. Among these people, hundred were randomly selected for the questionnaire survey. The survey group belonged to the age group between 18-50 years. Detailed information regarding the study protocol, as well as the questionnaire survey, was also provided to the study population. This entire work was completed with the written consent of the people.

B) Questionnaire Based Study

A set of allergy questionnaire was used in this survey work [4]. This work was done in two parts. One part consisted of questions on whether people are either suffering from allergy due to change in environmental conditions or from childhood. Questions were also asked regarding the information that if allergy occurs at a particular season or specific time of the day. If the recorded response of the patients was observed to be positive then part II of the questionnaire should be followed. Queries were also made about family history, the time of onset of the allergic reaction and its types, as well as symptoms, duration, etc.

C) Sera Collection

The blood samples were collected from the patients enrolled in the study with their written consent.

D) Selection of the Pollen Grain and Protein Extraction

During the spring season the pollen grains were collected from two plants, i.e. *Moringa oleifera* and *Butea monosperma* at their blooming stage (**Fig. 1**). Pure pollen grains from these plants were collected from mature anthers of the fresh flowers during the time period of 15th March to 15th April. This was the peak flowering period of the plants growing around the city and for this reason collection of pollen grains was done during this time period. Another vital reason of choosing this time period of sample collection was that majority of the patients was found to suffer from allergy during this time. Information was needed on whether these pollen grains were responsible for the allergic reaction or not. Total pollen protein was extracted in 20 mL of 0.1 M phosphate buffer (PB), pH 7.2. Then it was precipitated by salting out with 95% ammonium sulfate [5].

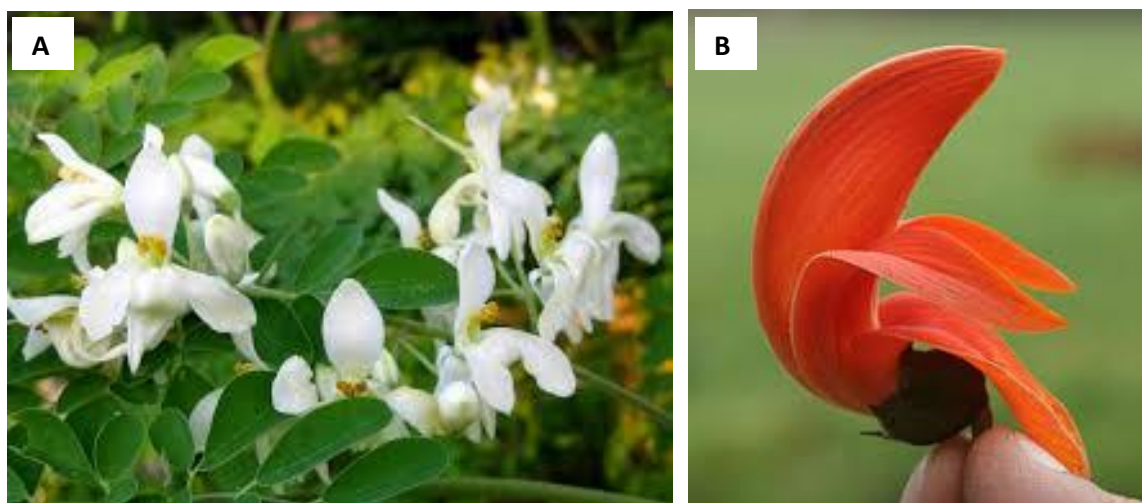


Fig. 1. A. *Moringa oleifera*, **B.** *Butea monosperma*

E) Specific IgE ELISA

Specific IgE in patient sera against pollen antigens were measured by the indirect ELISA method [6]. Microtiter plated (Nunc, Thermo) were coated with crude antigen (100 ng/ μ L) of pollens in 0.1 M PB (pH 7.2) and incubated at 4 °C. After repeated washing and blocking with 1% bovine Serum Albumin (BSA), wells were incubated with individual patient sera (1:1000 dilution) and Anti-human IgE tagged with alkaline phosphatase was used as a secondary antibody. After that colour was developed with para-Nitro Phenyl Phosphate (pNPP). This reaction was then stopped by adding 3 N NaOH and absorbance was measured at 405 nm. An individual serum having P/N value [ratio between mean OD₄₀₅ of patient sera (P) and the healthy control (N)] more than 2.5 were considered as having high specific IgE titre.

3. RESULTS

3. 1. Population based questionnaire based survey on allergy

In this survey, 100 people living in Serampore sub-division were randomly selected. Among them, 20% of people were allergic. They suffered from various symptoms like allergic rhinitis, bronchial asthma, urticaria, cough, and cold, etc. The per cent of patients suffering from

various symptoms is represented in **Fig. 2**. Most of them were atopic. They experienced allergic problem either from childhood or due to change in their workplace or home environment, and in few patients allergic reactions occurred suddenly. Majority of them suffer from allergy during spring season. The demographic features of the patients are presented in **Table 1**.

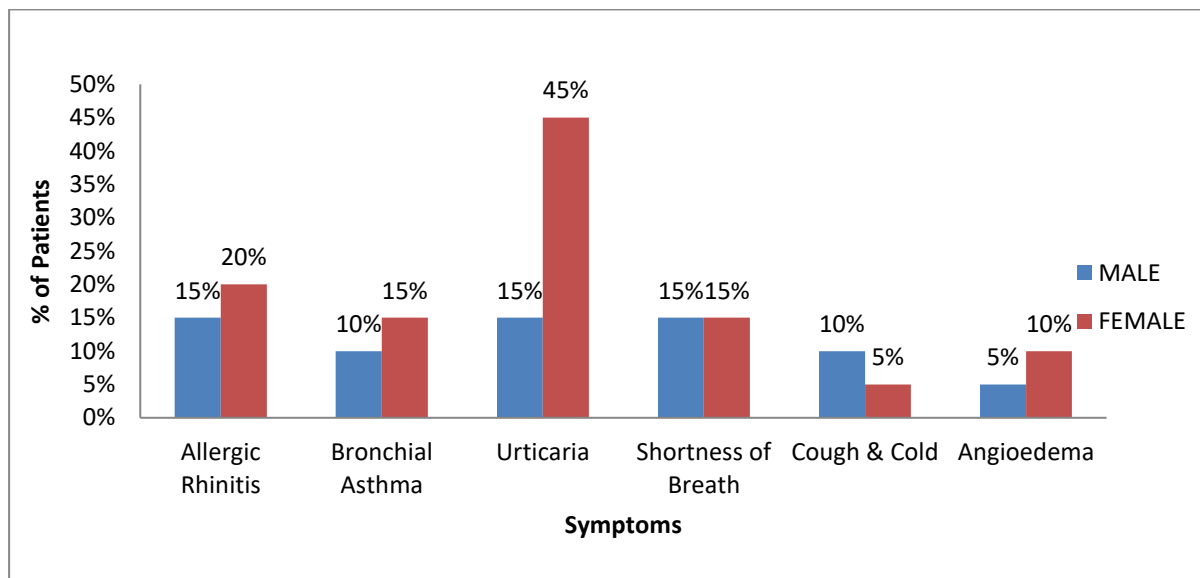


Fig. 2. Relative percentage of different allergy symptoms among patient population

Table 1. Demographic features of the patients enrolled in the study

Patient No.	Age	Sex	Symptoms	Time of onset	Maximum occurrence (season)	Family history	<i>Moringa Oleifera</i>	<i>Butea mono-sperma</i>
1	24	Female	Urticaria	Suddenly	April	N	2.5	1.52
2	23	Female	Urticaria	After changing home at the age of 15	March to April	Y	2.84	1.41
3	31	Male	Urticaria	childhood	March to April	Y	4.16	1.52
4	31	Female	Urticaria	childhood	Dec - Mar	Y	2.59	1.63
5	26	Female	Allergic rhinitis, Bronchial Asthma, Urticaria, Shortness of breath, Cough and cold, Angioedema	childhood	All season	Y	3.59	1.55
6	53	Female	Urticaria	After changing workplace	All season	Y	2.74	1.32

7	33	Female	Urticaria	After changing home after marriage	All season	N	2.89	1.89
8	9	Male	Allergic rhinitis, Cough and cold	childhood	Feb-Mar	Y	2.65	1.85
9	22	Female	Bronchial Asthma, Shortness of breath	childhood	All season	Y	3.12	1.36
10	27	Male	Bronchial Asthma, Urticaria, Shortness of breath, Cough and cold, Angioedema	childhood	Feb- Mar	Y	4.05	1.35
11	34	Male	Shortness of breath	Suddenly	March to Apr	Y	3.1	1.22
12	28	Male	Bronchial Asthma, Urticaria, Shortness of breath	childhood	All season	Y	2.51	1.22
13	30	Male	Allergic rhinitis	Suddenly	All season	N	2.04	1.42
14	23	Female	Allergic rhinitis	Suddenly	All season	N	2.53	1.32
15	50	Female	Allergic rhinitis, Bronchial Asthma, Shortness of breath	After changing workplace	Oct to Mar	Y	4.1	1.84
16	32	Female	Urticaria	After changing home after marriage	Apr	Y	2.51	1.33
17	47	Female	Urticaria	childhood	Mar	N	2.65	1.5
18	34	Male	Allergic rhinitis	childhood	Mar	Y	3.02	1.22
19	23	Female	Allergic rhinitis	Suddenly	All season	N	3.21	1.25
20	23	Female	Urticaria	After changing workplace	Mar	Y	2.58	1.02

3. 2. Allergic sensitization profile of *Moringa oleifera* and *Butea monosperma*

Moringa oleifera and *Butea monosperma* bloomed during spring season. According to previous reports *Moringa* pollen grains were also found in the air during spring season. In this study the sensitization potential of the pollen grains of these two plants were examined by specific IgE ELISA. Most of the patients showed high IgE titre against *Moringa oleifera*, but low titre against *Butea monosperma* (**Fig. 3**). This signifies the allergenic potential of *M. oleifera*. *B. monosperma* did not have sensitization potential even among atopic population.

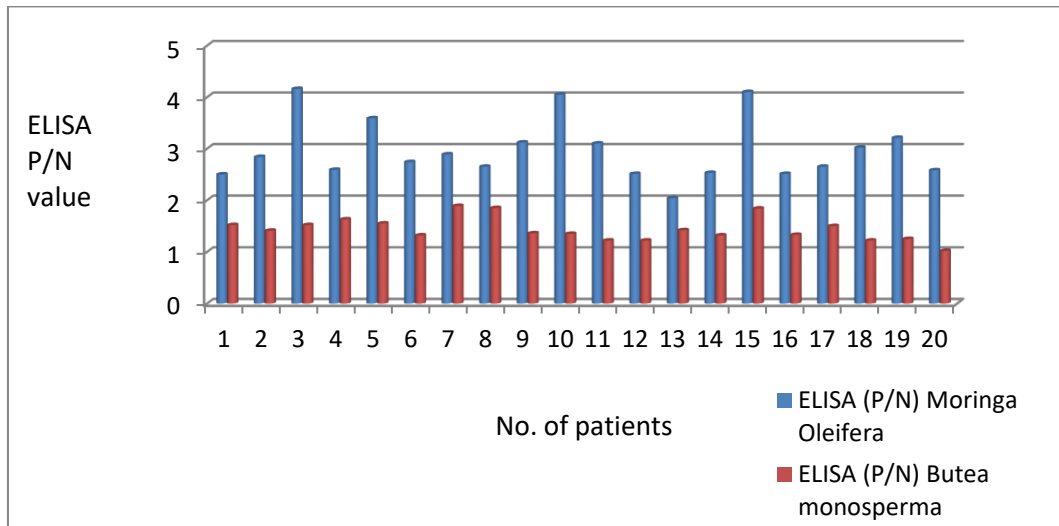


Fig. 3. Specific IgE ELISA against selected pollen grains

4. DISCUSSION

Respiratory allergy is a global problem affecting a large number of people worldwide. It is mainly caused by airborne allergens, like pollen grains, fungal spores or dust mites. Most of the outdoor allergies were caused by pollen grains. In Indian sub-continent, there are several plants whose allergic potential was not known till date. In the present study sensitization potential of two of such plants were investigated. Randomly 100 people were enrolled in the study of which 20 were found to be allergic. Interestingly, most of them suffer from allergy mainly at the end of winter to spring season, which was the flowering period of these two selected plants. The study showed that females were more prone to allergy than males. They suffer from various respiratory, as well as other troubles. Most of the patients suffered from urticaria which is a common problem amongst the allergic patients. Genetic predisposition is one of the major causes of allergy. Here also most of the patient had family history of occurrence of allergy. Generally, over-burden of allergens occurs during spring season; so most of the patients were found to suffer during this time. *Moringa oleifera* was found to be a potent allergen, causing a severe allergy during this season, but *Butea monosperma* did not possess allergenic properties. This may be due to a lesser pollen load of *Butea monosperma* in the air. The closed nature of the flower probably hinders the release of pollen grains in the air. So avoidance of exposure to *Moringa oleifera* pollen grains would help to relief from allergic symptoms in the majority of patients.

5. CONCLUSION

This study gives a valuable information regarding sensitization pattern of the pollen grains of two dominant taxa native to Eastern India and blooming during spring season. This will help further for component resolved diagnosis of respiratory allergens.

Acknowledgement

Authors are thankful to the Head, Department of Botany, Post Graduate section for providing the financial support for the study.

References

- [1] Warner, J.O., Kaliner, M.A., Crisci, C.D., Del Giacco, S., Frew, A.J., Liu, G.H., and Rosenwasser, L.J. (2006). Allergy practice worldwide: a report by the World Allergy Organization Specialty and Training Council. *International archives of allergy and immunology*, 139(2), 166-174
- [2] D'Amato, G., Cecchi, L., D'amato, M., and Liccardi, G. (2010). Urban air pollution and climate change as environmental risk factors of respiratory allergy: an update. *Journal of Investigational Allergology and Clinical Immunology*, 20(2), 95-102.
- [3] Mandal, J., Chakraborty, P., Roy, I., Chatterjee, S., and Gupta-Bhattacharya, S. (2008). Prevalence of allergenic pollen grains in the aerosol of the city of Calcutta, India: a two year study. *Aerobiologia*, 24(3), 151-164.
- [4] Dey, D., Ghosh, N., Pandey, N., and Bhattacharya, S.G. (2014). A hospital-based survey on food allergy in the population of Kolkata, India. *International archives of allergy and immunology*, 164(3), 218-221.
- [5] Mandal, J., Manna, P., Chakraborty, P., Roy, I., and Gupta-Bhattacharya, S. (2009). Clinical and immunobiochemical characterization of airborne *Delonix regia* (Gulmohar tree) pollen and cross-reactivity studies with *Peltophorumpterocarpum* pollen: 2 dominant avenue trees from eastern India. *Annals of Allergy, Asthma & Immunology*, 103(6), 515-524
- [6] Ghosh, N., Sircar, G., Saha, B., Pandey, N., and Bhattacharya, S.G. (2015). Search for allergens from the pollen proteome of sunflower (*Helianthus annuus* L.): a major sensitizer for respiratory allergy patients. *PloS One*, 10(9), e0138992.