

Allergic Evaluation of *Cynadon Dactylon*, L. Among Keralites

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Abstract

Aerobiological studies conducted in Kerala (India), revealed the incidence of pollen grains of *Cynadon dactylon*, L. belonging to the family Poaceae as common airborne pollen member. Previous clinical studies conducted in different parts of the world also proved its allergic potentiality among human beings. Present study concerned with the clinical, studies of this particular airborne pollen type among Keralites. 1500 patients having the history of respiratory complaints were selected for the allergy evaluation study. Results showed that this particular pollen type is highly potent allergen and the degree of reactivity is depends the locality in which the patients inhabits.

Keywords: *Cynadon dactylon*, L., Poaceae, Pollen Allergy

Introduction

Human beings are familiar with the allergic manifestations caused by the inhalation of various substances. Allergy and its associated manifestations are considered to be the most ancient but relevant health diseases of human beings. An allergic reaction refers to an exaggerated reaction by our immune system in response to the contact with certain foreign substances. It is exaggerated because these foreign substances are usually seen by the body as harmless and no response occurs among non-allergic group. The concept of allergy was originally introduced during 1906-1907 by the Viennese pediatrician, Clemens Von Pirquet, after he noticed that some of his patients were hypersensitive to normally innocuous entities such as dust, pollen grains or certain food substances. He called this phenomenon "allergy" and the term was derived from the ancient Greek words "allos" meaning different or changed and "ergon" meaning work or action.

Studies conducted around the globe indicate that about 20% of world population suffers from one or other forms of allergic disorders. This include rhinitis, bronchial asthma, allergic alveolitis, rhino sinusitis, conjunctivitis, atopic dermatitis and food or drug allergies (Barkin and Mc Govern, 1966; Haahleta, 1979; Gravesen, 1979; Singh *et al.*, 1994). In India, statistics of the allergic conditions state that about 10% of the population has been estimated to suffer from allergic disorders (Viswanathan, 1964).

The State of Kerala is situated at the southern region of India, between 8.02° and 12.08°N latitude and 74.08° and 77.05°E longitudes. This state can be geographically made

distinct into Coastal belt, Midlands and Highlands. The highland is the abode of the Tropical Rain forests of India. There is a vast diversity in the flora of highlands, midlands and coastal belt of this tropical belt which eventually contributes enormously to the variation in the quality and quantity of aerospora. As a result, possibility of the incidence of pollinosis and allergy due to pollen grains in the population is very high. In a comprehensive community survey of nearly 10,000 people in urban and rural Kerala, Ravindran (1999) estimated that 20% of the urban and 16% of the rural population have nasal allergy. The prevalence of asthma in urban areas is 10.92% and in the rural areas it is 13.28%. Similarly in Kerala, 24.25% of the school children suffer from allergic respiratory illness of which 16-20% have wheezing episodes. Allergic rhinitis and asthma are higher among females than males at 13 to 18% and 9 to 13% respectively.

Kerala state is characterized for its diversity in flora and fauna. Despite this diversity no study is conducted which involve the characterization of different pollen types present in the environment. The aerobiological survey of Kerala carried out at the Department of Respiratory Medicine has yielded data on the common airborne pollen types in the state (Prakashkumar, 1992; Prakashkumar *et al.*, 1989; Gopi *et al.*, 1992, 1990; Ravindran *et al.*, 1986, 1988) which became the foundation for the present study.

The present work concerns the antigenic extraction and allergy evaluation by intradermal skin testing of the pollen grain types of *Cynadon dactylon*, L. Analysis of allergenic response among a sample of 1500 patients who reported at the allergy and Applied Immunology clinic of the Department of Respiratory Medicine, Medical College, Thiruvananthapuram. It is expected that the study bring forth results relevant to the signal areas of diagnosis and clinical management of allergic diseases.

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Materials and Methods

Of the innumerable species of plants whose pollen grains are allergenic, only those which are wind pollinated are clinically significant. In order to cause the disease, such plants should be abundant in the environment and also must produce large quantities of pollen grains. Considering the above facts, pollen grains of *Cynadon dactylon*, L. belonging to the family Poaceae was selected for the present study.

Collection of Pollen grains and antigen extraction.

The pollen were collected in bulk, air dried and sieved to remove the debris. Purity of pollen grains was checked and samples with more than 95% purity were used for the study. Antigenic extraction of these pollen grains were made in Phosphate Buffered Saline (Sheldon *et al.*, 1967).

Allergy Evaluation

Allergy evaluation was done based on the procedure of Chai *et al.* (1975). Skin testing was done among a group of 1500 patients who were registered with the Respiratory Allergy and Immunology Clinic, Medical College, Thiruvananthapuram. The patient selection was made according to the inclusion exclusion criteria. Patients between a range of 10 and 49 years and with a history of respiratory allergy were selected for the study. Patients suffering with chronic asthma for 10 years or above, patients on daily steroids and those with other complicating diseases were excluded.

Intradermal skin test (ID)

The antigenic extract of 1:500 dilution was used for skin testing. Phosphate buffered saline (PBS) and histamine phosphate (100µg/mL) were used as the negative and positive controls respectively. Intradermal skin testing was performed on the volar aspect of the fore arm by injecting 0.02mL of the antigen using 1.0mL tuberculin syringe. The degree of reactivity was calculated by measuring the wheel size after 20 minutes and interpreted based on Chai *et al.* (1975) (Table 1).

Results and Discussion

Study on hypersensitivity reactions due to pollen grains is one of the major areas of research around the world. Intensity of hypersensitivity reactions can be determined by various diagnostic tools, among which intradermal skin testing is considered to be the most relevant and accepted procedure.

The incidence to the skin test response to *Cynadon dactylon*, L. antigen among the patients is presented in table 02. Among the 1500 patients subjected to intradermal skin test with the pollen antigen of *Cynadon dactylon*, L., 992 patients (66.13%) reacted positively. Among this a group of 684 patients (45.60%) showed significant reactivity in the skin test (Table 2) (Fig: 01).

When individual reactions were taken into consideration, highest positivity of 2+ reactivity was shown by 453 patients (30.20%). Among the total positive patients, 308 patients (20.53%) showed 1+ reactivity whereas 194 (12.93) and 37 (2.47%) patients responded with 3+ and 4+ reactivity as well.

Over all present investigation recorded an average of 66.13% of total reactivity among the patients suffering from respiratory ailments. During 1990s two independent studies conducted by Prakashkumar among the people of Kerala recorded a total reactivity of 38.4% and 38.8% respectively which is very low when compared with the present results. This also indicate the increased incidence of hypersensitivity during last ten years in Kerala. Moreover the absence of non-allergic components in the pollen antigenic extract may be one of the possible reasons for the increased skin test results

In present study, allergic patients, whose hypersensitive activity was studied, hailed from different localities and regions in Kerala. A group of approximately five hundred patients from each locality such as highlands, midlands and coastal belt were selected for the study. Considering the individual pollen antigen reactivity, it was observed that for those pollen types, which are airborne in localities and regions, the reactivity to those patients from the respective

Table 1. Proximity Matrix (Dissimilarity matrix)

Control (mm)	±	1+	2+	3+	4+ & above
2	3 – 4	5 – 7	8 - 10	11 – 14	Above 14
3	4 – 5	6 – 8	9 – 11	12 – 45	Above 15
4	5 – 6	7 – 9	10 – 12	13 – 16	Above 16
5	6 – 7	8 – 10	11 – 13	14 – 17	Above 17
6	7 – 8	9 – 11	12 – 14	15 – 18	Above 18
7	8 – 9	10 – 12	13 – 15	16 – 19	Above 19

Table 2. Incidence of Intradermal Skin test reactions to *Cynadon dactylon*, L. pollen antigen

Reactivity	No.	%
-ve	508	33.87
1+	308	20.53
2+	453	30.20
3+	194	12.93
4+	37	02.47
Total Positivity	992	66.13
Total Significant Positivity	684	45.60

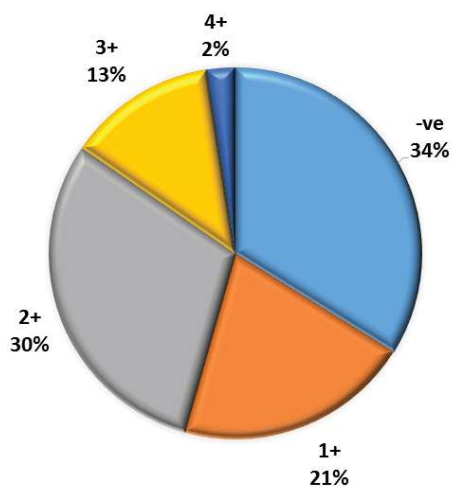


Figure 1. Incidence of Intradermal Skin test reactions to *Cynadon dactylon*, L. pollen antigen

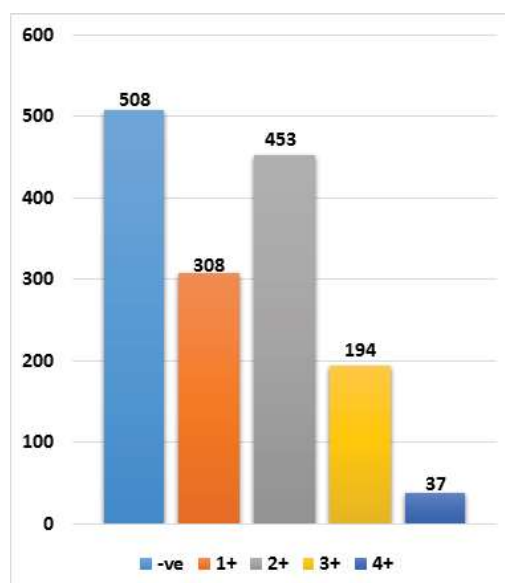


Figure 2. Incidence of Intradermal Skin test reactions to *Cynadon dactylon*, L. pollen antigen

region is found to be high.

The aerobiological survey revealed a higher percentage of distribution of the pollen grains of *Cynadon dactylon*, L. among the midlands and coastal belt of Kerala and similar picture was revealed in the skin test results also. When the total significant reactivity was taken into consideration, patients from coastal belt showed the maximum reactivity (61.6%, n= 308) followed by midlands. This show that *Cynadon dactylon*, L. pollen cause more allergic problems to people inhabiting coastal belt and midlands where its aerial presence was also detected high. These results indicate that the presence of a particular pollen type in a given area has significant influence on the allergic conditions of the patients inhabiting in such localities.

Similar finding was reported by other workers also from different parts of the world. Vobrazkova *et al.* (1986) noticed that allergic reactions are highly influenced by the locality where the patients inhabit. Workers like Paul *et al.* (1975) and Seitz *et al.* (2008) reported that the locality in which the patient inhabits has a significant influence in eliciting allergic manifestations among them. Obtulowicz *et al.* (1996) studied the allergic reactions in two localities namely a polluted urban and unpolluted rural area of Poland. They observed that there is a marked increase in allergic reactions among the people belonging to the urban area, irrespective of their family history of allergic diseases. But in the rural area, the allergic reactions developed only among those patients with a previous history of allergy. It was also stated that a proper analysis of the aerospora of the surrounding environment will be helpful in designing a proper immunotherapy schedule for the allergic reactions.

Conclusion

The present study has proved that the pollen grains of *Cynadon dactylon*, L. which are aeri ally dominant in the atmosphere of Kerala state were potent allergens to the human beings. It is also understood that locality of patient had a high influence on eliciting hypersensitive reactions among human beings. So further investigations are needed to reveal the chemical fractions which make this plant species a potent allergen. This will be useful in future to develop better therapeutic methods for managing hypersensitive reactions caused due to these two pollen allergens.

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