Original Research Article

# Skin Sensitivity of Various Pollen Allergens in Bronchial Asthma Patients in Desert and Non-Desert Area of Rajasthan

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## Abstract

**Aim:** This study was conducted to know the pattern of skin prick tests to various pollen allergens causing bronchial asthma in Rajasthan. **Material and methods:** A Total of 100 adult participants with the age group of 16 to 55 years were enrolled for this study who were diagnosed as Bronchial Asthma based on GINA Guidelines in Department of Respiratory Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur Rajasthan. **Results**: In present study 84% cases are positive with pollen allergen and profile of various pollen allergens with skin test positivity from ascending to descending order are ProsopisJuliflora 45% followed by PennisitumTyphoides 43%, Amaranthus Spinosus 40%, Suaeda Fruticosa 37%, Argemone Maxicana 36%, Holoptetia Integifolia 35%, Parthentum Hysterophorus 32%, Ricinus Communis 31%, Impereta Cylindrical 30%, Casia Siamea, Giynandropis Gynandra and Brassic Campestris 28% CyodonDactylon 27% Azudurirechtha Indica 25%, Albizzia Lebbek, ChemopodiumAlbum 21% each.**Conclusion**:The common allergen in both desert and non-desert area are ProsopisJuliflora. The conclusion of this study will definitely help clinicians in not only to know the avoidance of allergen but also in minimizing the number of allergens for skin prick test in patients of asthma residing in Rajasthan.

**Keywords:** brochial asthma, pollen allergen, skin prick tests.



## Introduction

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath. Chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [1] It is a chronic inflammatory disease of the airways that affects people of all ages which imposes a substantial burden on patients, their families, and the community. Asthma is one of the common and an important cause for long term non-communicable diseases (NCDs) and also causes a substantial disability and death worldwide. [2]Aero allergens are important in pathogenesis of bronchial asthma. Several allergens such as pollens, dusts, fungi and insects are now being recognized as important trigger factors. Allergens are present in environment both outdoor as well as indoor. The detailed information on diurnal, annual, seasonal variation of allergens is an essential pre-requisite for effective diagnosis and therapy.Skin prick test provide a rapid and sensitive means of presence of allergen specific IgE mediated antibodies. [3-6] When minimal amount of standardized allergen is introduced into the epidermis or dermis, it produces a wheal and flair reaction which can be quantified. Many allergens can be simultaneously tested by this method as the reaction is localized to the area of testing.

The problem of allergic disorder varies from place to place due to variable environmental condition and presence of various aeroallergens. In routine practice skin allergy test is done by clinician with large number of allergens due to paucity of literature regarding knowledge of regional allergenic environmental allergens. In view of these facts, this study was conducted to know the pattern of skin prick tests to various pollen allergens causing bronchial asthma in Rajasthan.

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**Material & Methods**

A Total of 100 adult participants with the age group of 16 to 55 years were enrolled for this study who were diagnosed as Bronchial Asthma based on GINA Guidelines in Department of Respiratory Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur Rajasthan from December 2015 to November 2016.

All the individuals underwent thorough evaluation of medical history and all needed investigation like TLC, DLC, Chest X-ray, spirometry and PEFR were done. All the parameters and clinical details were recorded in a well prepared Performa. All the patients were evaluated using SPT were done. Data analyzed done by using SPSS version 20 and primer software and the qualitatively data were expressed in proportion and percentages and expressed as mean and standard deviation.

**Results**

In our study, out of 100 cases of bronchial asthma, 59 patients are males and 41 are females and majority of patients (92%) are below 45 years of age group. 68% cases are from urban area and 32% cases are from rural residence of Rajasthan. Most of bronchial asthma patients (59%) were having night exacerbation, followed by early morning 24% and minimum in day 6% and only 11% showed no diurnal variation of symptoms. Atopy history was present in 54% patients and 53% patients were having both perennial and seasonal exacerbation followed by 28% in seasonal and 19% in perennial pattern.

Table 1: shows maximum number of patients in between age of 16 to 25 years followed by 26 to 35 years.
Table 2: Majority of cases 76(37.44%) presented during the period of August to October followed by 56(27.59%) cases in February to April, 38 (18.72%) cases in November to January and 33 (16.26%) cases in May to July months.
Table 3: We include 60% patients from non-desert area while 40% are from desert area.
Table 4: showing that maximum number of cases (77%) of bronchial asthma is associated with rhinitis followed by spring catarrh.
Table 5: Significant skin prick reaction was positive in 89% of patients.In present study 84% cases are positive with pollen allergen and profile of various pollen allergens with skin test positivity from ascending to descending order are Prosopis Juliflora 45% followed by Pennisitum Typhoides 43%, Amaranthus Spinosus 40%, Suaeda Fruticosa 37%, Argemone Maxicana 36%, Holoptetia Integifolia 35%, Parthentum Hysterophorus 32%, Ricinus Communis 31%, Impereta Cylindrical 30%, Casia Siamea, Giynandropis Gynandra and Brassic Campestris 28% Cyodon Dactylon 27% Azudurirechtha Indica 25%, Albizzia Lebbek, Chemopodium album 21% each.
From desert area of Rajasthan, most common pollen allergens are AmaranthusSpinosus 47.5%, followed by CynodonDactylon 42.5%, SuaedaFruticosa 42.5%, ProsopisJuliflora, ArgemoneMexicana 40%, PennisitumTyphoides 37.5%, HoloptеliaIntegrifolia 32.5% while in non-desert area Prosopis Jiuliflora 48.3% is most common pollen followed by Pennisitum Typhoides 46.7%, Holoptelia Integrifolia 36.7%,Argemone Mexicana, Brassica Campestris, Ricinus Communis, Suaeda Fruticosa 33.3%.

**Table 1:Age profile of Bronchial Asthma cases (n=100)**

| Age groups (years) | Number of Persons | % |
|---|---|---|
| 16-25 | 38 | 38 |
| 26-35 | 31 | 31 |
| 36-45 | 23 | 23 |
| 46-55 | 8 | 8 |

**Table2:Monthly profile of Bronchial Asthma cases (n=203)**

| Manifesting season | Number of persons | % |
|---|---|---|
| February to April | 56 | 27.59 |
| May to July | 33 | 16.26 |
| August to October | 76 | 37.44 |
| November to January | 38 | 18.72 |

**Table 3:Profile of Non-desert and Desert area (n=100)**

| Habituation | Number of persons | % |
|---|---|---|
| Non-desert | 60 | 60 |
| Desert | 40 | 40 |

**Table 4:Profile of associated disease and bronchial asthma cases (n=100)**

| Associations | No. of cases | % |
|---|---|---|
| Bronchial Asthma | 20 | 20 |
| Bronchial Asthma with Rhinitis | 77 | 77 |
| Bronchial Asthma with Spring catarrh | 36 | 36 |
| Bronchial Asthma with skin/Ear disease | 6 | 6 |

**Table 5:Profile of allergens reactivity of allergen with skin prick test (SPT) in Bronchial Asthma cases**

| Score Positiveness | Cases (n=100) | % |
|---|---|---|
| Negative | 11 | 11 |
| Significant positive (2+ to 4+) | 89 | 89 |

**Discussion**

This study includes 100 diagnosed patient of bronchial asthma between 15 to 55 years of age and mostly male. Highest numbers of asthma cases (92%) are in below 45 year of age and more than 3/4$^{th}$ of cases were having rhinitis associated with bronchial asthma followed by 1/3$^{rd}$ are also having spring catarrh. Mathuret al. [7], Demoly et al. [8], Guerra et al. [9] Oneair [10], and Riniar[11] studies also report higher association of rhinitis ranging from 70-80%. About 2/3$^{rd}$ of asthma cases are showing bimodal peak during month of August to October and February to April. This could be possibly due to with change of season, a high pollen count in environment as reported in the literature. [12-16]Aeroallergen is most important trigger factor in pathophysiology of allergicdisease. They stimulate various cells like eosinophil, mast cell, neutrophils etc which lead to production of several cytokines and interleukins followed by symptoms of naso-bronchial allergy, conjunctivitis, bronchial asthma, eczema/allergic dermatitis, urticarial, angioedema. There are several types of pollen allergen present in our environment which identification and avoidance is very important for disease prevention and treatment. Skin prick test is “in vivo” important test for the identification of different types of pollen allergens. This study shows 89% of cases has definite skin test positivity (2+ to 4+) while 11% had negative reaction to SPT. Similar result were found in study by Prasad et al[17]In present study maximum number of cases 84% are positive with pollen allergen followed by insects 71%, dust 52%, 44% house dust mite, and 38% fungal allergen. In India, first atmospheric survey for airborne particles was done in Calcutta by Anningham in 1873. [18] The work on Pollen allergy was initiated by Shivpuri [19] in Delhi in 1950, Later, Kasliwal [20] and colleagues reported important pollen allergens of Jaipur. In our study the dominant allergen showing maximum significant (84%) positivity in asthma cases is pollen. Other studies by Roy et al. [21] from Varanasi (81.66%), Subhakar et al. [22] from Andhra Pradesh (86.11%) reported similar positivity, while lower results were shown in Western studies by Handrick et al. [23], Michela et al. [24] (55.3%) and from India lower positivity seen by Matah et al.[25] (70%), Prasad et al.[17] from Lucknow (7.8%), Kumar et al.[26] from Delhi pollens (weed 21.79; tree pollen 15.14%; grass 7.73%).The reason for high positivity is, in our study of we took various group of allergens in comparison to other study reported and could be possibly due to proper and judicious selection of patients highly suspecting clinical allergic etiology before considering them for SPT.Most common pollen allergen, in our study is Prosopis Juliflora 45%, followed by Pennisitum Typhoides 43%, aranthus Spinosus 40%, Suaeda Fruticosa 37%, ArgemoneMexricana 36%, Holoptelia Tegrifolia 35%, PartheniumHysterophorus 32%, Ricinus

Communis 31%. Shivpuri and Prakash [27] in 1967 observed Prosopis Uuliflora with positive reaction of its pollen in 12% of asthma patients while Kasliwalet al.[28] from Jaipur reported pollens of Amaranthus, Chenopodium, Cnadon, Holoptelia and Prosopis as important allergens in patients having respiratory allergies. Agnihotri and Singh[29] in 1971 from Lucknow found pollen extract of Holoptelia and Prosopis showed skin reactivity in asthma patients while Jain et al.[30] in 1988 reported very high (61.7%) reaction of Prosopis pollens in cases of nasobronchial disease and as a dominant pollen allergen in desert part of Rajasthan. In 2000, All India Coordinated Project on aero-allergens and human health [31], reported the dominant pollen types identified from Northern India were Holoptelia, Poaceae, Asteraceae, Prosopisjuliflora, Ricinus communis, Morus, Mallotus, Alnus, Argemone, Amaranthus and Chenopodium. Arora A and Jain V K[12] in 2001 in anaero-palynological survey from Bikaner reported major pollen as Poaceae (26.20%) followed by Amaranthus-Chenopod (11.50%) and Cyperaceae (10.30%).In Jaipur, a non-desert area of Rajasthan Mahesh et al.[32] foundProsopis Juliflora(16%) most common pollen followed by Ricinus Communis(15%), Holoptelia Integriflora (14%), Amaranthus Spinosus(13%), Cassia Simiae (1220), Cassia Occidentalis (11%), Albizia Lebek(10%), Cynodon Dactylon (9%), Xanthium Stumium, Eucalyptus,Morus(7%) which support our study.

Jain et al.[30]reported pollen allergy with Prosopisj-uliflora (61.7%), Suaedafruticosa(56.38%).Albizzia(50.53%),Zeamays(47.349%) , Amaranthusspinosus and Lawsonia (50%) in patients of nasobro-nchial allergy in desert area. Jain [33] also reported that in desert area of Rajasthan most common allergenic pollen are of Prosopisjuliflora, Suaeda, Albezia, Lawsonia, Cynodon, Cheno-podium, Penisitum and Argemone in patients of respiratory allergy. Compared to our study most commen pollen allergens in Desert area was different but still Amaranthus pollen was sensitive in approx. 50% patient of bronchial asthma as allergen.In our study the commonest pollen allergen causing nasobronchial allergy are Prosopis Juliflora, followed by Penmisitum Typhoides, Amaranthus Spinosus,Suaeda Ruicosa, Argemone Mexicana, Holoptelia Integrifolia,Parthenium Hystero-phorus, Kicimus Communis, Impereta Cylindrica, Cassia Siamea, Gynandropis Gynandra, Drassica Campestris, Cynodon Dactylon, Azadarirechtha Indica, Chenopodium Album and Albizzia Lebek which have been reported in previous studies done in Desert and non-desert areas of Rajasthan and in studies from other part of Northern India.

**Conclusion**

This study is a tertiary care teaching hospital based prospective observational descriptive study of allergen sensitivity of pollen aeroallergens conducted on bronchial asthma patients. The common allergen in both desert and non-desert area are ProsopisJuliflora. The conclusion of this study will definitely help clinicians in not only to know the avoidance of allergen but also in minimizing the number of allergens for skin prick test in patients of asthma residing in Rajasthan.

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