

**Original Article**

## Pattern of allergy in Asthmatic patients by skin prick test at tertiary care center: An Observational Study

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**Abstract**

Allergy is a common disorder in world and it is increasing day by day due to pollution and other environmental factors. Allergy pattern is different in various parts in the world and it is important to have local allergy pattern data for selection of allergy testing antigens and treatment of allergy.

Aim and objective of this study is to get data of allergy pattern in local population in barabanki district, uttar Pradesh.

**Material and Method:** we included patients of allergy history of allergic rhinitis, asthma, urticaria, and allergic conjunctivitis etc. Total 67 subjects were selected for allergic testing. Total 104 antigens were used for skin prick test. Pattern of allergy was assessed and distribution of various allergy causing antigen obtained by skin reactivity.

**Conclusion:** allergy pattern of this study showed that Dust mite is an important allergy causing factor, grain dust and house dust is very common and in insect's cockroach male followed by house fly are allergen showing maximum allergies in patients.

**Keywords:** Allergy, Asthma, Dust mite, Skin prick test.

**Introduction**

Asthma is a major cause of chronic morbidity and mortality throughout the world that is characterized by paroxysmal spasmodic

narrowing of the bronchial airway due to inflammation of the bronchial tree and contraction of the bronchial smooth muscle.<sup>1</sup> Allergy is a type I hypersensitivity disorder characterized by wheel

and flare reaction to skin prick test. Skin prick test is most sensitive method for allergy testing. There is paradigm of Th1-Th2 responses seen in pathophysiology of CD4 helper T cells. A Th1 response results in activation of macrophages and natural killer cells and plays a role in complement binding and opsonisation. Th1 and Th2 synergistically promote inflammation and airway hyperresponsiveness. Allergic rhinitis and other allergic disorders like asthma, allergic conjunctivitis and urticaria are associated with IL-4, IL-5, IgE production and INF- $\gamma$  production is associated with airway hyperreactivity and skin reactivity to allergens. Both bronchial asthma (BA) and allergic rhinitis (AR) frequently co-exist and are now thought to be a continuum of inflammation involving one common airway.<sup>2</sup> Allergic rhinitis is an inflammatory condition of the nasal mucosa characterized by the symptoms of pruritus, sneeze, discharge, and stuffiness induced by an immunoglobulin-E (IgE) - mediated response.<sup>3</sup>

The types of aeroallergens, however, differ widely depending on localities and even varies both within and between countries.<sup>4</sup> So it is important to know the local allergy pattern atleast in patients of allergy and asthma. Allergy testing can be done by blood and skin prick test. Skin prick testing has been found to be more sensitive and specific than radio-allergosorbent test (RAST).<sup>5</sup> Respiratory allergy is a major form of allergy and change in environment may be the reason for increased prevalence of nasobronchial allergy throughout the world as well as in India.<sup>6</sup>

Allergy is common disorder in world. Patients of allergy and asthma are increasing day by day because of pollution and genetic predisposition. About 20% to 30 % population is suffering from one or many allergy in India. 30 years ago a study showed around 10% allergic rhinitis and 1% asthma in 1964. Later reports showed 20 to 30% of population suffering from allergic rhinitis and 15% asthma.<sup>7,8</sup> Studies also found association of Indore and out Dore pollution level in childrens.<sup>9</sup> In case of food allergy there is a lack of

perception between perceived allergy and actual food allergy.<sup>10</sup> Skin prick test reactivity usually depends on three separate factors. 1. intact immunity. 2. presence of IgE mediated mast cells which releases mediators after exposure to antigens. 3. skin that can respond to inflammatory mediators and show erythema and induration. However environmental exposure is an important contributory factor for the manifestation of skin test reactivity. Allergy can occur because of various environmental factors like dust, pollen, moulds, insects, danders and food. In this study we selected patients of allergy asthma along with allergic rhinitis and did allergy testing by skin prick method. Induration and erythema seen and compared with control (buffer) and divided patient in mild to severe grade in 1+ to 4+. Patients were separated in male and female and to see the allergy pattern in urban and rural population we compared all type of allergy in urban and rural.

#### **Aims and objective**

To study allergy pattern at a tertiary care center.

#### **Material and Methods**

**Study Type:** Prospective observational study.

**Study period:** 1 January 2015 to 31 December 2015 (1year)

**Sample Size:** Total 62 patients

**Inclusion Criteria:** Patients with history of allergy and asthma, there was no age limit criteria included in this study.

**Exclusion Criteria:** Patients having other associated significant bronchopulmonary disease like:

1. Pulmonary tuberculosis.
2. COPD
3. Bronchiectasis
4. Pyogenic Pneumonia
5. Bronchogenic carcinoma
6. known HIV positive
7. Patient taking Immunomodulating drugs

Patients having past history of severe life threatening episodes of exacerbations were also excluded.

### Method

- ❖ Patient were informed about the study and study protocol
- ❖ After review of clinical history, physical examination along with all investigations, patients were finally included or excluded from the study.

Following methods were employed for study

#### 1. Detailed Clinical History

- ❖ Name, age, sex, residence, occupation, socioeconomic status, marital status, date of birth, phone number.
- ❖ History of Smoking.
- ❖ History of significant respiratory illness in childhood.
- ❖ History of significant family history.
- ❖ Past and present medications.
- ❖ Presence of Respiratory symptoms.

All the patients were administered a questionnaire regarding the presence of respiratory complaints. These include cough, expectoration, breathlessness, wheezing, chest pain, hemoptysis, stridor and hoarseness of voice. Only the patients with one or any of these symptoms were included in detail.

- ❖ Duration of onset of respiratory symptoms.
- ❖ Duration between onset of respiratory symptoms and first visit to physician.
- ❖ What was the progression of Symptoms.

In how many patients cough was the initial symptom, which was followed by breathlessness and vice-versa. The number of patients in whom fever was the initial symptom followed by cough and breathlessness / breathlessness and cough was studied.

#### 2. Clinical Examination

- ❖ General Examination  
Mainly looked for pallor and clubbing.

- ❖ Respiratory Examination  
For the presence of rhonchi and crackles.
- ❖ Systemic Examination

#### 3. Investigations

As far as possible all the investigations were performed on all patients.

- ❖ Hamogram
- ❖ Serum biochemistry
- ❖ Sputum for acid fast bacilli
- ❖ Chest radiograph
- ❖ Spirometry

It was performed using koko PFT Spirometer (Ferraris Respiratory-Europe Ltd.). Forced Expiratory volume in first second (FEV1), Forced-Vital Capacity (FVC) and FEV1/FVC were taken into consideration for analysis. Diffusion capacity of the lung for co was not tested as the facilities were not available at our hospital. Interpretation

Normal pattern FEV1/FVC ratio >70% and FVC predicted >80%

Obstructive pattern FEV1/FVC ratio <70% and FVC predicted >80%

Restrictive pattern FEV1 /FVC ratio >70% and FVC predicted <80%

Mixed pattern FEV1/FVC ratio <70% and FVC predicted <80%

#### ❖ Skin Prick Test

Skin prick test done in patients forehead with 104 antigens, along with histamine and control (buffer)

Result was interpreted in after 20 minutes.

1+ Mild

2+ Moderate

3+ Severe

4+ Very severe

Result

Table 1: Frequency distribution

Parameters	Normal	Total Positive	+1	+2	+3	+4
	N (%)	N(%)	N (%)	N (%)	N (%)	N(%)
Lady Finger	62 (100)	0	0(0)	0(0)	0(0)	0(0)
Onion	61(98.4)	1(1.6)	1(1.6)	0(0)	0(0)	0(0)
Orange	48 (77.4)	14(22.6)	10.(16.1)	4(6.5)	0(0)	0(0)
Papaya Ripe	57(91.9)	5(8.1)	1(1.6)	4(6.5)	0	0
Peas	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Potato	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Radish	56(90.3)	6(9.7)	5(8.1)	1(1.6)	0(0)	0(0)
Tomato	56(90.3)	6(9.7)	5(8.1)	1(1.6)	0(0)	0(0)
Apple	60(96.8)	2(3.2)	1(1.6)	1(1.6)	0(0)	0(0)
Banana	57(91.9)	5(8.1)	3(4.8)	1(1.6)	1(1.6)	0(0)
Beans	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Cabbage	60(96.8)	2(3.2)	1(1.6)	1(1.6)	0(0)	0(0)
Citrus (Lemon)	44(71.0)	18(29)	3(4.8)	13(21.0)	2(3.2)	0(0)
Dhania (Leaves)	54(87.1)	8(12.9)	2(3.2)	6(9.7)	0(0)	0(0)
Drum Stick	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Garlic	60(96.8)	2(3.2)	1(1.6)	1(1.6)	0(0)	0(0)
Razma	58(93.5)	4(6.5)	1(1.6)	3(4.8)	0(0)	0(0)
Rice	55(88.7)	7(11.3)	6(9.7)	1(1.6)	0(0)	0(0)
Soyabean Flour	58(93.5)	4(6.5)	1(1.6)	3(4.8)	0(0)	0(0)
Tamrind	44(77.0)	18(29)	9(14.5)	9(14.5)	0(0)	0(0)
Tea	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Turmeric	58(93.5)	4(6.5)	3(4.8)	1(1.6)	0(0)	0(0)
Walnut	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Wheat	57(91.9)	5(8.1)	1(1.6)	4(6.5)	0(0)	0(0)
ground nut	55(88.7)	7(11.3)	0(0)	5(8.1)	2(3.2)	0(0)
kabuli chana	53(85.5)	9(14.5)	3(4.8)	4(6.5)	2(3.2)	0(0)
Lobia	60(96.8)	2(3.2)	2(3.2)	0(0)	0(0)	0(0)
Milk	52(83.9)	10(16.1)	0(0)	5(8.1)	5(8.1)	0(0)
Mush room	56(90.3)	6(9.7)	0(0)	5(8.1)	1(1.6)	0(0)
Muttur	61(98.4)	1(1.6)	1(1.6)	0(0)	0(0)	0(0)
Pista	58(93.5)	4(6.5)	1(1.6)	3(4.8)	0(0)	0(0)
Prawn	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Chocolate	58(93.5)	4(6.5)	1(1.6)	2(3.2)	1(1.6)	0(0)
Dal Arhar	60(96.8)	2(3.2)	2(3.2)	0(0)	0(0)	0(0)
Dal Masoor	57(91.9)	5(8.1)	1(1.6)	4(6.5)	0(0)	0(0)
Dal Moong	59(95.2)	3(4.8)	2(3.2)	1(1.6)	0(0)	0(0)
Dal Moth	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)
Dal urd	40(64.5)	22(35.5)	3(4.8)	14(22.6)	5(8.1)	0(0)
EGG White	49(79.0)	13(21)	1(1.6)	5(8.1)	7(11.3)	0(0)
Fish	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Cardamom - Larg	45(72.6)	17(27.4)	4(6.5)	12(19.4)	1(1.6)	0(0)
Cardamom - Small	57(91.9)	5(8.1)	2(3.2)	3(4.8)	0(0)	0(0)
Cashew -nut	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)
Cinamon	60(96.8)	2(3.2)	2(3.2)	0(0)	0(0)	0(0)
Coconut	60(96.8)	2(3.2)	0(0)	2(2.3)	0(0)	0(0)
Coreander	59(95.2)	3(4.8)	1(1.6)	1(1.6)	1(1.6)	0(0)
Cofee Beans	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Chicken	59(95.2)	3(4.8)	1(1.6)	1(1.6)	1(1.6)	0(0)
Black Pepper	58(93.5)	4(6.5)	1(1.6)	3(4.8)	0(0)	0(0)
Bengal Gram	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)
Bakers Yeast	54(87.1)	8(12.9)	2(3.2)	5(8.1)	1(1.6)	0(0)
Bajra	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)
Almond	60(96.8)	2(3.2)	1(1.6)	1(1.6)	0(0)	0(0)

Table 2

Parameters	Normal N (%)	Total Positive	+1 N (%)	+2 N (%)	+3 N (%)	+4 N(%)
Parthenium Leaves	60(96.8)	2(3.2)	0(0)	1(1.6)	1(1.6)	0(0)
Pigeon Feathers	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Wool Mixed	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Sheep Wool	54(87.1)	8(12.9)	1(1.6)	5(8.1)	2(3.2)	0(0)
Kapok wool	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)

Figure 1

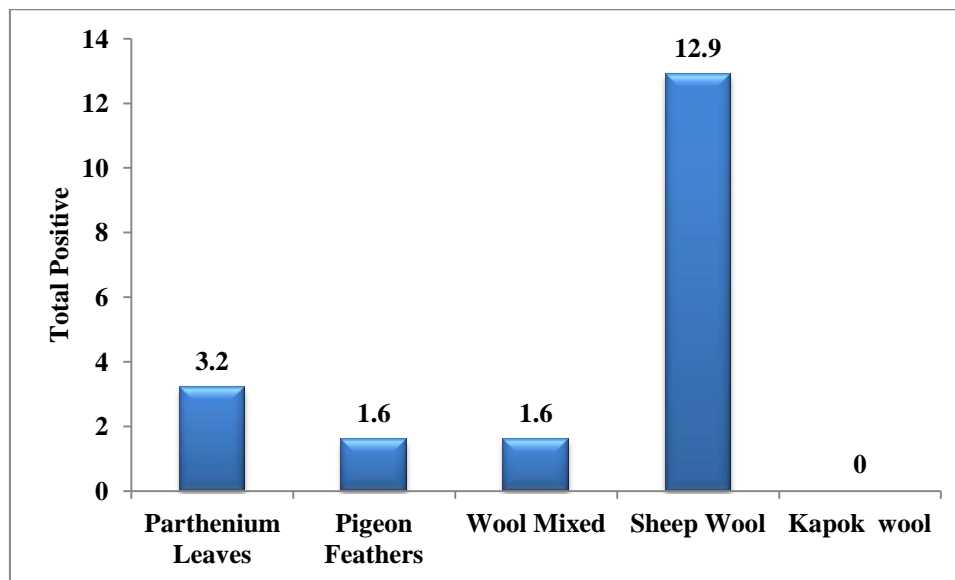


Table 3

Parameters	Normal N (%)	Total Positive	+1 N (%)	+2 N (%)	+3 N (%)	+4 N(%)
Horse Dander	61(98.4)	1(1.6)	0(0)	1(1.6)	0(0)	0(0)
Dog Dander	57(91.9)	5(8.1)	2(3.2)	1(1.6)	2(3.2)	0(0)
Cow Dander	58(93.5)	4(6.5)	0(0)	3(4.8)	1(1.6)	0(0)
Cat Dander	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)

Figure 2

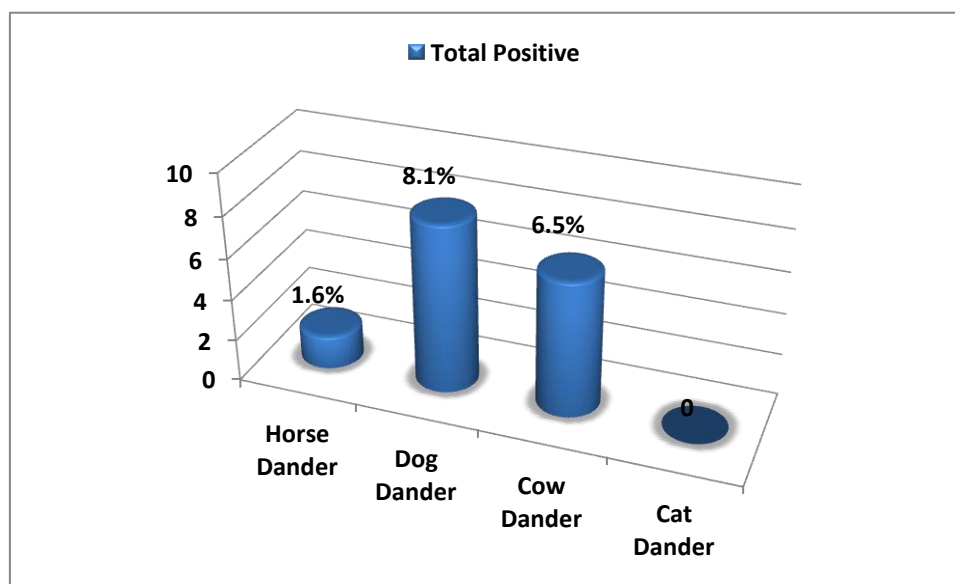


Table 4

Parameters	Normal	Total Positive	+1	+2	+3	+4
	N (%)		N (%)	N (%)	N (%)	N(%)
Paper dust	51(82.3)	11(17.7)	3(4.8)	8(12.9)	0(0)	0(0)
House Dust	43(69.4)	19(30.6)	0(0)	5(8.1)	12(19.4)	2(3.2)
Hay Dust	59(95.2)	3(4.8)	0(0)	3(4.8)	0(0)	0(0)
Grain Dust Wheat	42(67.7)	20(32.3)	0(0)	7(11.3)	13(21.0)	0(0)
Cotton Mill Dust	59(95.2)	3(4.8)	0(0)	3(4.8)	0(0)	0(0)

Figure 3

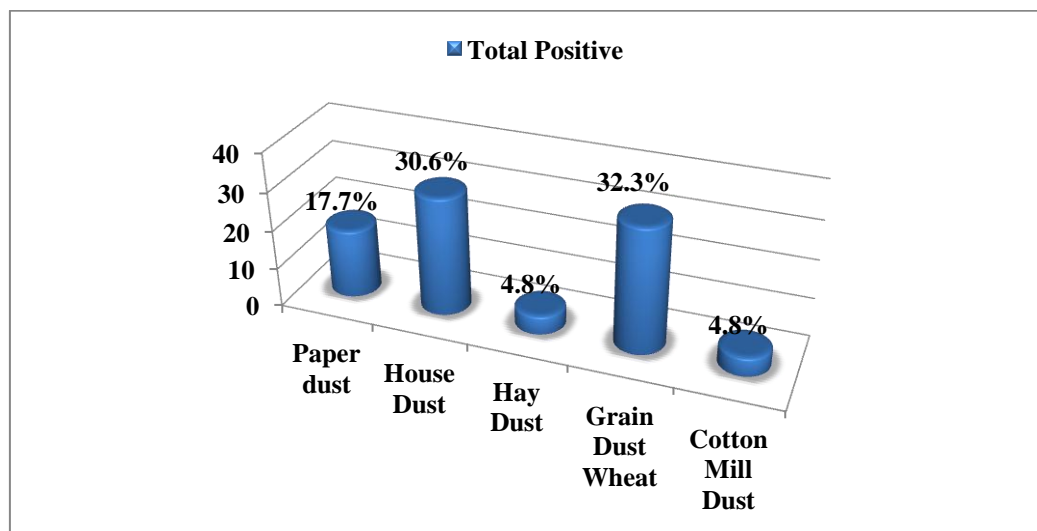


Table 5

Parameters	Normal	Total Positive	+1	+2	+3	+4
	N (%)		N (%)	N (%)	N (%)	N(%)
Yellow Wosp	58(93.5)	4(6.5)	2(3.2)	1(1.6)	1(1.6)	0(0)
Moth	61(98.4)	1(1.6)	1(1.6)	0(0)	0(0)	0(0)
House Fly	56(90.3)	6(9.7)	0(0)	6(9.7)	0(0)	0(0)
Honey Bee	58(93.5)	4(6.5)	1(1.6)	2(3.2)	1(1.6)	0(0)
Cricket	59(95.2)	3(4.8)	1(1.6)	2(3.2)	0(0)	0(0)
Cockroach Male	36(58.1)	26(41.9)	1(1.6)	12(19.4)	12(19.4)	1(1.6)
Cockroach Female	58(93.5)	4(6.5)	3(4.8)	1(1.6)	0(0)	0(0)
Ant	60(96.8)	2(3.2)	2(3.2)	0(0)	0(0)	0(0)

Figure 4

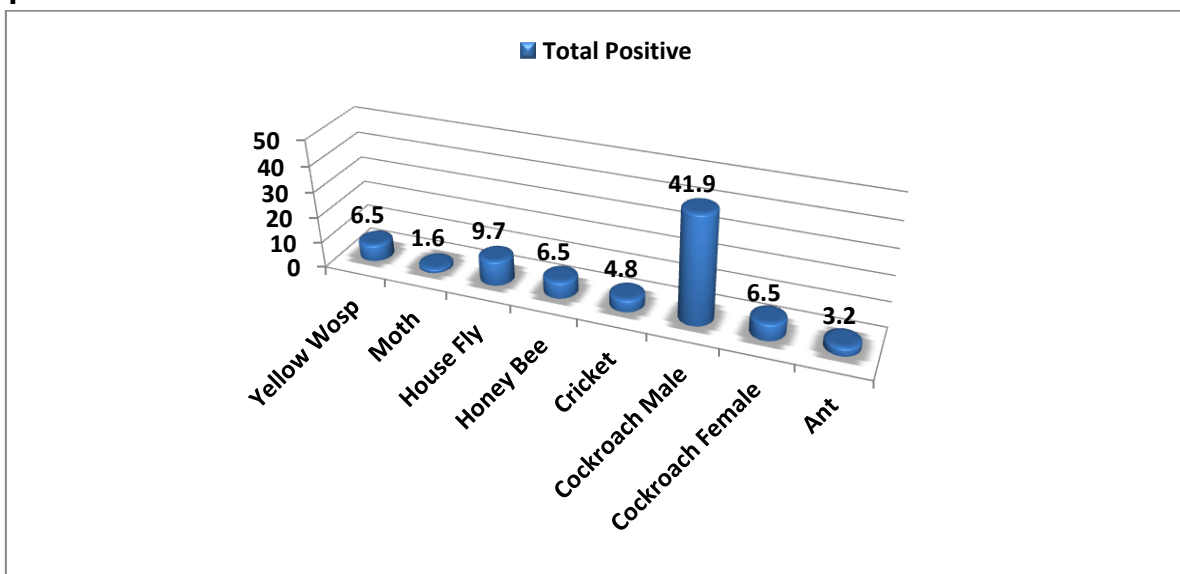




Table 6

Parameters	Normal N (%)	Total Positive	+1 N (%)	+2 N (%)	+3 N (%)	+4 N (%)
Trichoderma Spp	60(96.8)	2(3.2)	2(3.2)	0(0)	0(0)	0(0)
Penicillium Spp.	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Mocor Mucedo	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Curvularia Lunata	58(93.5)	4(6.5)	2(3.2)	2(3.2)	0(0)	0(0)
Candida Albicans	60(96.8)	2(3.2)	1(1.6)	1(1.6)	0(0)	0(0)
Aspergillus Versicolor	51(82.3)	11(17.7)	4(6.5)	6(9.7)	1(1.6)	0(0)
Aspergillus Tamarll	61(98.4)	1(1.6)	1(1.6)	0(0)	0(0)	0(0)
Aspergillus Niger	58(93.5)	4(6.5)	1(1.6)	3(4.8)	0(0)	0(0)
Aspergillus Femigatus	46(74.2)	16(25.8)	7(11.3)	7(11.3)	2(3.2)	0(0)
Aspergillus Flavus	56(90.3)	6(9.7)	2(3.2)	3(4.8)	1(1.6)	0(0)
Alterneria Tenius	61(98.4)	1(1.6)	1(1.6)	0(0)	0(0)	0(0)

Figure 5

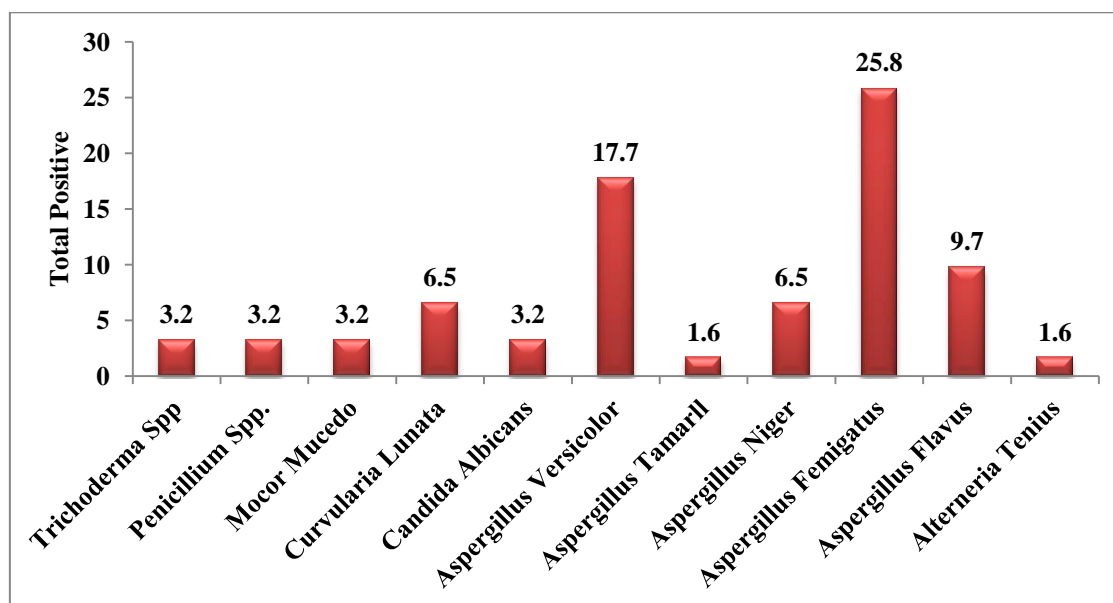
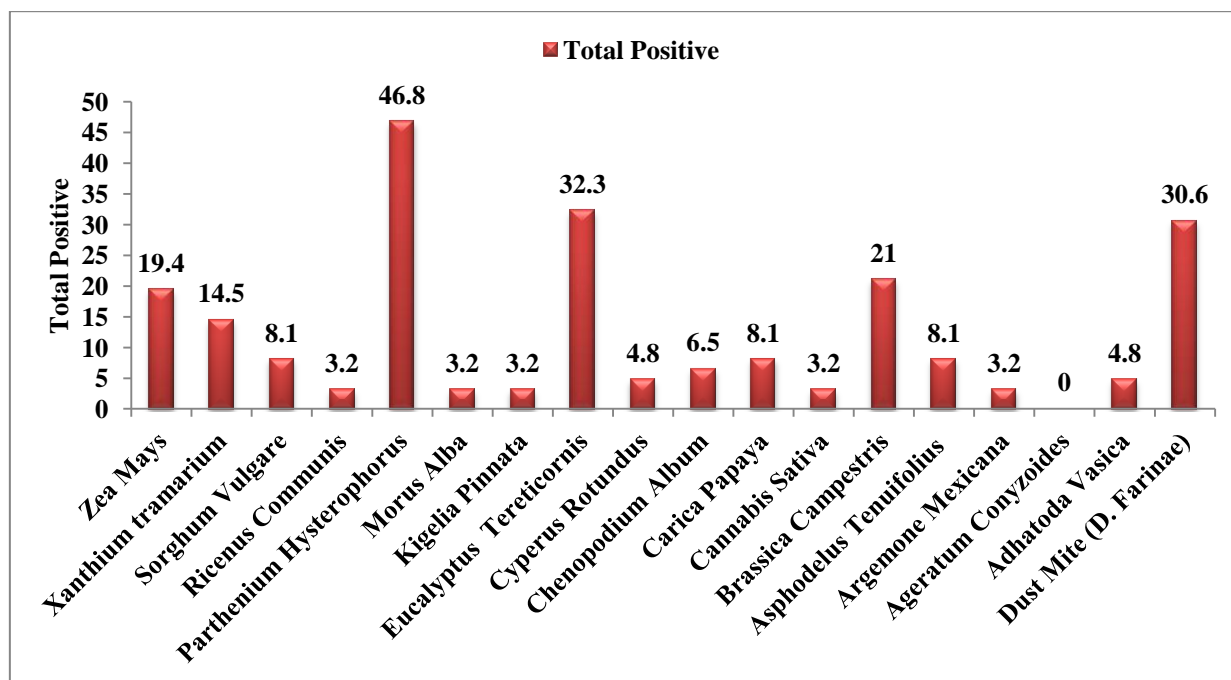


Table 7

Parameters	Normal N (%)	Total Positive	+1 N (%)	+2 N (%)	+3 N (%)	+4 N (%)
Zea Mays	50(80.6)	12(19.4)	0(0)	9(14.5)	3(4.8)	0(0)
Xanthium tramarium	53(85.5)	9(14.5)	0(0)	5(8.1)	3(4.8)	1(1.6)
Sorghum Vulgare	57(91.9)	5(8.1)	0(0)	4(6.5)	1(1.6)	0(0)
Ricenus Communis	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Parthenium Hysterophorus	33(53.2)	29(46.8)	2(3.2)	13(21.0)	14(22.6)	0(0)
Morus Alba	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Kigelia Pinnata	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Eucalyptus Tereticornis	42(67.7)	20(32.3)	0(0)	14(22.6)	6(9.7)	0(0)
Cyperus Rotundus	59(95.2)	3(4.8)	1(1.6)	2(3.2)	0(0)	0(0)
Chenopodium Album	58(93.5)	4(6.5)	1(1.6)	2(3.2)	1(1.6)	0(0)
Carica Papaya	57(91.9)	5(8.1)	0(0)	4(6.5)	1(1.6)	0(0)
Cannabis Sativa	60(96.8)	2(3.2)	0(0)	2(3.2)	0(0)	0(0)
Brassica Campestris	49(79.0)	13(21)	2(3.2)	5(8.1)	6(9.7)	0(0)
Asphodelus Tenuifolius	57(91.9)	5(8.1)	0(0)	3(4.8)	2(3.2)	0(0)
Argemone Mexicana	60(96.8)	2(3.2)	1(1.6)	1(1.6)	0(0)	0(0)
Ageratum Conyzoides	62(100)	0(0)	0(0)	0(0)	0(0)	0(0)
Adhatoda Vasica	59(95.2)	3(4.8)	1(1.6)	1(1.6)	1(1.6)	0(0)
Dust Mite (D. Farinae)	43(69.4)	19(30.6)	0(0)	2(3.2)	12(19.4)	5(8.1)

Figure 6



**Discussion**

Allergy and asthma are hetrogenous disease due to genetic and environmental factors. Asthma is a chronic disorder having symptoms like recurrent episodes of cough, breathlessness and wheezing. Environmental factor plays important role in development of allergic disorders. Studies showed the pattern of anaphylaxis and role of food allergies important cause of severe allergic reactions in asia.<sup>11</sup> Prevalance of peanut, treenut etc was studied by shek et al in school going children in Singapore and phillipins.<sup>12</sup>

In Ghana, study of food allergy in 1407 school children showed 11% children reporting allergy to foods, 5% children showed a positive SPT mostly directed against peanut and pineapple.<sup>13</sup> Other studies showed most allergies were egg white (3.3%), Peanut (1.9%) and milk (1.9%). Wheat, shoy and fish have been reported common allergens in other studies.<sup>14</sup> In our study table 1: shows allergy pattern of food content in Indian diet. Orange and lemon (citrus) are main allergy sources in fruits 22.6 and 29 % respectively. Tamrind is also allergenic (29%). In dals dal urd is most common 35.5%. Egg white and milk are also important allergy causing factors in food.

In wool category sheep wool is the main contributory factor 12.9%. Table 2, Fig:1.

Mix wool shows very small proportion of allery. and in our study we don't find any patients with allergy with kapok wool. Kapok cotton was positive in 2.18% patients, wool 0.76% and silk in 1.31%.<sup>15</sup> Study reported that kapok was marked positive in 1.76% patients, they did ot test for wool silk and house dust mite.<sup>16</sup> Cynodon 4.10%, pennisetum 2.63% and imperata 2.34% were most common allergic in study done by singal et al. <sup>16</sup> Parthenium leaves are allergy positive only in 3.2% of subjects Table 2, Fig 1. Pigeon feathers are positive only in 1.6% patients Table 2, Fig 1. In dander category most common allergic dander was dog dander 8.1% followed by cow 6.5%. Table 3,fig 2. Horse dander was found positive in only 1.6% of total subjects.

Table 4, fig 3 shows allergy pattern of dust. Grain dust is most common 32.3% followed by house dust 30.6%. paper dust is only allergic in 17.7 % of subjects. proportion of hay dust and cotton mill dust is low in our study. In Kumar et al study dust allergens are important shows wheat dust 8.28% most common, followed by house dust 7.08% and cotton dust 1.63%, least common antigen was paperdust 1.53%.<sup>15</sup> Study done at VPCI showed



that cotton dust 6.47% was the most commonly implicated followed by wheat dust 5.86%, paper dust 3.81% and house dust 1.46%.<sup>16</sup>

Allergenic category of insects Table 5,fig 4, shows most common insect causing allergy is cockroach male 41.9% ,followed by house fly 9.7%. Other insects are not showing ant significant proportion in this study. Study done at VPCI revealed that insects are major allergens house fly was most important 25.21% showing SPT positive reaction. followed by mosquito 21.11%, moth 19.94%, female cockroach 17.59%, male cockroach 9.97%.<sup>16</sup>

Table 6. shows allergy pattern of fungus it includes total 11 fungal antigens. Most common allergy causing fungus is aspergillus fumigatus in our study (25.8%). Second most common fungus is aspergillus versicolor 17.7%. fig 5. Fungal allergens done in singhal and rajkumar showed most common fungal allergy in skin prick test were mucor 2.05%, aspergillus fumigatus 2.05%, rhizopus 1.75% and fusarium 1.75%.<sup>16</sup>

Pollan allergy is also very common and in our study most common pollen associated with skin positivity is Parthenium hysterophorus 46% followed by eucalyptus 32.3% and Brassica campestris 21% and zia mays 19.4% table 7, fig 6. Previous study done at VPCI showed that Brassica (5.27%), Amaranthus spinosus (4.98%), Argemone (4.98%), and Amaranthus H. (3.51%) were the common weed allergens.<sup>16</sup>

In our study dust mite D farinae is positive in 30.6% patients. table 7, fig 6. In a study House dust mite was significantly positive in 12.42% subjects.<sup>15</sup> Study done by Almorgan revealed that most common Indore allergen was house dust mite 77.8% followed by cat dander 33.6% and cockroach 19.2%.<sup>17</sup>

### Conclusion

Allergy pattern may vary from one place to other due to difference in climate and weeds there, dust mite and insects are major contributor in allergic disorders all over, in food egg and milk are important allergic causing factors. Larger study is

required from different places to get correct allergenic pattern in different part of india as well as world.

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