

## Status of fungal and insects allergy in patients of rhinitis with or without asthma reporting from the desert area

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### Abstract

**Background:** The most effective diagnostic test to detect IgE mediated type I allergic reactions like allergic rhinitis, atopic asthma, acute urticaria, food allergy, etc. is skin prick test (SPTs). SPTs are performed to check allergic sensitivity and functional for devising immunotherapy as the therapeutic modality.

**Methodology:** Present study was performed in the Department of TB and Respiratory Diseases, S.P. Medical College, Bikaner (Rajasthan). A total of 118 patients suffering from allergic rhinitis with and without bronchial asthma were included in this study. SPT was performed to check reactivity against fungal and insect allergens in the desert areas.

**Results:** Suggested that maximum cases (3/4<sup>th</sup>) were having both rhinitis and asthma. Around (3/4<sup>th</sup>) were belonging to rural area. Maximum cases (95%) were belonging to 15-45 years of age group. In fungal group max positivity was seen with *Alternaria*, *Curvularia* and *Aspergillus fumigatus*. In insects group cockroach reactivity was most common.

**Conclusions:** Comparative analysis showed that maximum reactivity was seen with insect allergens than fungal allergens. Among which maximum reactivity was seen against cockroach male. There was significant relief in the severity of symptoms, medication intake with the help of allergen immunotherapy.

**Keywords:** Allergic rhinitis; Asthma; Fungal allergy; Insect allergy; Immunotherapy.

### Introduction:

Rhinitis is the common allergic condition usually associated with bronchial asthma in clinical practice & widely prevalent globally. Naso-respiratory allergic disorders are prevalent in desert part of Rajasthan. Thar desert of India is spread mainly in the western and north western part of Rajasthan having an area of 15000 Sq. Km. Prevalence of respiratory allergies among all populations is increasing trend all over the world. India, with the teeming population of more than one and half billion and with the divergent geographical backdrop ranging from upland plain (Deccan Plateau) in south, flat to rolling plain along the Ganges, deserts in west, Himalayas in the north, has a rich aerobiological diversity. This diversity is further enhanced with the climate, which varies from tropical monsoon in south to temperate in north. The latter part of the 20<sup>th</sup> century has seen an increase in the prevalence of allergic diseases, implicating changing environment and lifestyle as significant causes [1]. With the alarming increase in allergic disorders, such as allergic rhinitis, bronchial asthma and atopic dermatitis covering as high as 30% of the population world over, there is an increasing interest in the fungal and insect allergens responsible for the same.

### Materials and Methods:

This study was conducted with total 118 patients residing in desert area and reported for rhinitis and with or without asthma. In all clinically suspected cases of rhinitis with or without asthma, skin prick test was done

with various groups of pollen, dust, fungal & insect allergens. Present study was performed in the Department of TB and Respiratory Diseases, S.P. Medical College, Bikaner (Rajasthan). An ethical committee approval was taken and consent was obtained from all subjects.

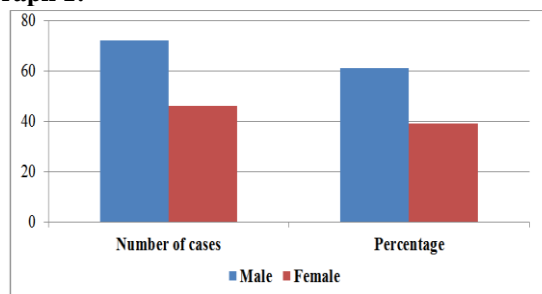
### Results:

Total 118 cases were included in this study, among which 72 were male and rest 46 were female. The age and disease wise distribution of the study participants is shown in the table 1 and 2.

**Table 1: Gender wise distribution of cases**

Sex	No. of cases	Percentage
Male	72	61.02
Female	46	38.98
Total	118	100.00

**Graph 1:**

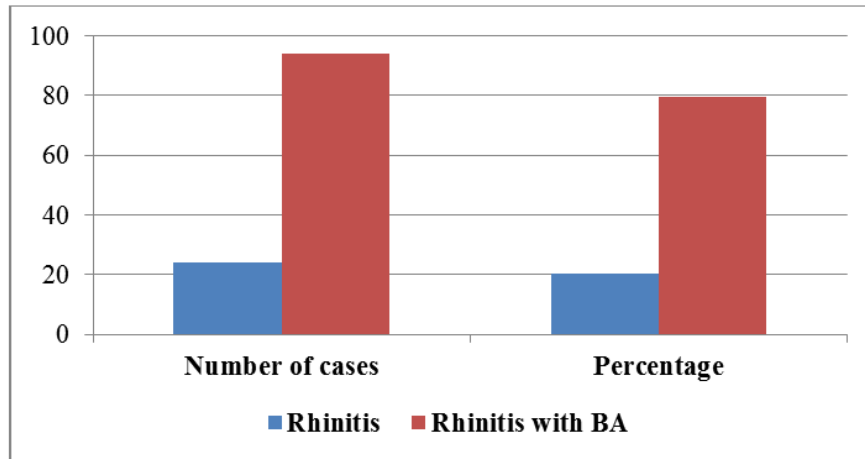


**Table 2: Disease wise distribution of cases**

Disease	No. of cases	Percentage
Rhinitis	24	20.34
Rhinitis with BA	94	79.66
Total	118	100

Maximum cases were belonging to rhinitis with bronchial asthma.

**Graph 2:**

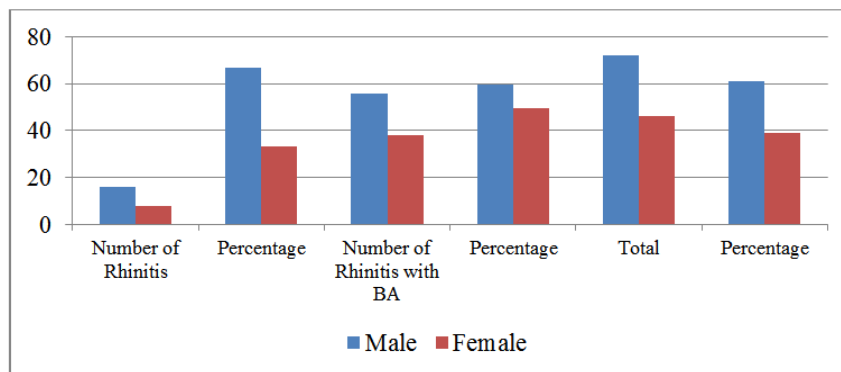


**Table 3: Gender v/s. disease wise distribution of cases**

Gender	Rhinitis		Rhinitis with BA		Total	
	No.	%	No.	%	No.	%
Male	16	66.67	56	59.57	72	61.02
Female	8	33.33	38	49.43	46	38.98
Total	24	100	94	100	118	100

Gender wise distribution of disease showed that allergy cases of rhinitis with and without bronchial asthma were maximum in male than female.

**Graph 3:**

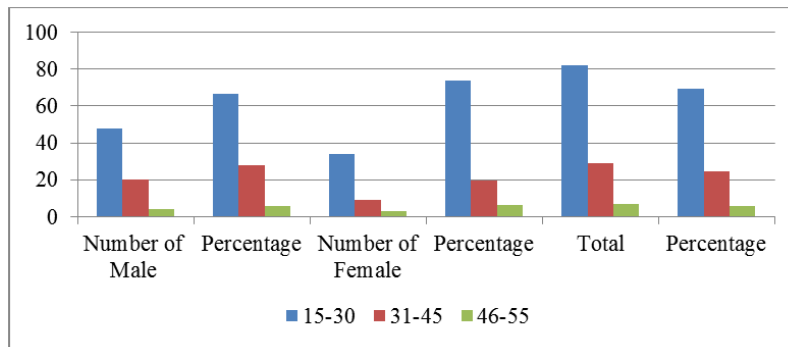


**Table 4: Age and gender wise distribution of cases**

Age group	Male		Female		Total	
	No.	%	No.	%	No.	%
15-30	48	66.67	34	73.91	82	69.49
31-45	20	27.77	9	19.57	29	24.58
46-55	4	5.56	3	6.52	7	5.93
Total	72	100	46	100	118	100

In both male and female maximum cases were recorded of age group 15-30 years.

**Graph 4:**

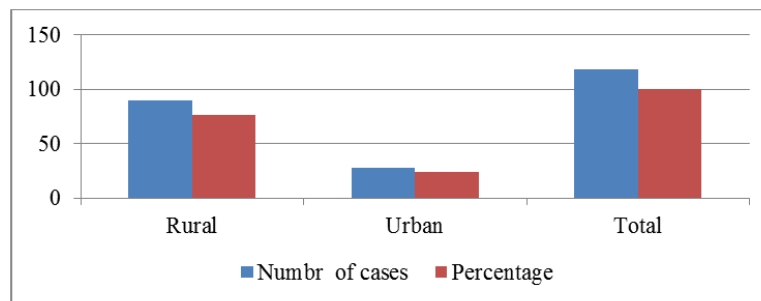


**Table 5: Rural and urban wise distribution of cases**

Residence	No. of cases	Percentage
Rural	90	76.27
Urban	28	23.73
Total	118	100

Maximum cases were recorded in rural area followed by urban.

**Graph 5:**

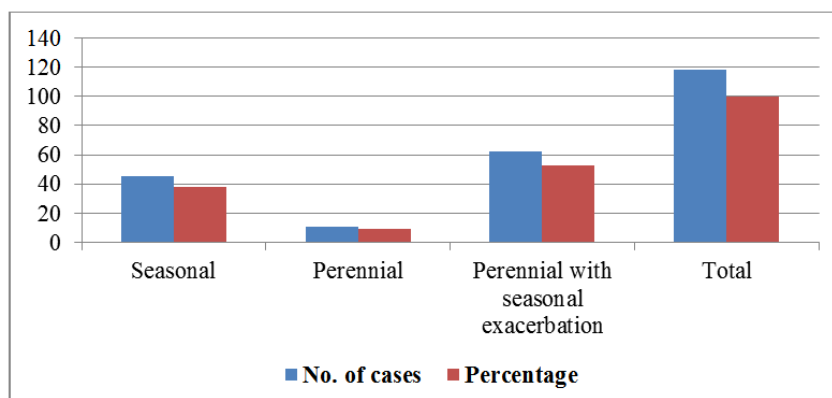


**Table 6: Seasonal distribution of cases**

Pattern	No. of cases	Percentage
Seasonal	45	38.14
Perennial	11	9.32
Perennial with seasonal exacerbation	62	52.54
Total	118	100

In case of seasonal distribution, maximum cases were recorded in perennial with seasonal exacerbation.

**Graph 6:**

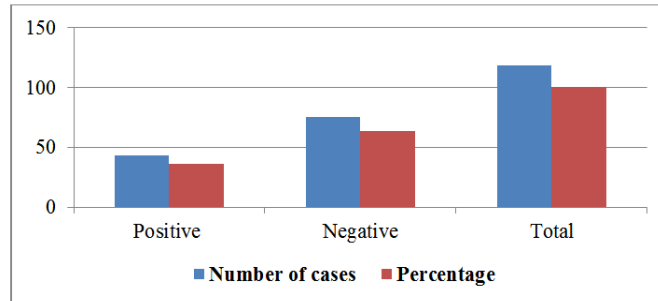


**Table 7: History of atopy in family**

History of atopy	No. of cases	Percentage
Positive	43	36.44
Negative	75	63.56
Total	118	100

Maximum cases of negative history of atopy in family observed.

**Graph 7:**

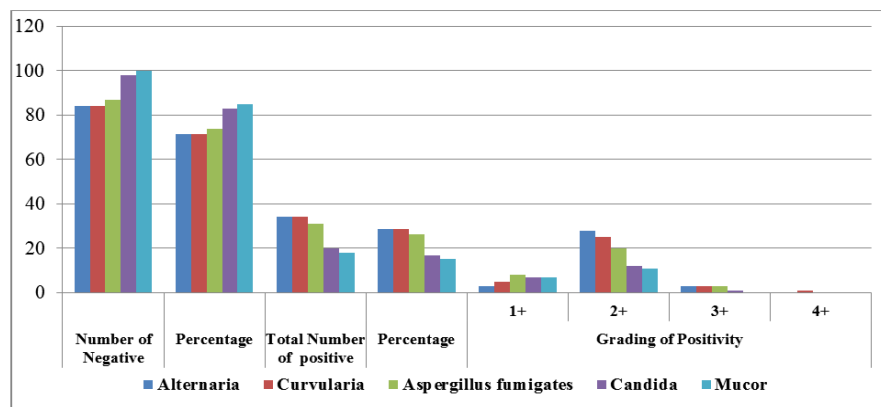


**Table 8: Pattern of skin positivity with fungal allergens (1 to 4+)**

S.No.	Name of Allergen	Negative		Grading of Positivity				Total positive	
		No.	%	1+	2+	3+	4+	No.	%
1	<i>Alternaria</i>	84	71.19	3	28	3	0	34	28.81
2	<i>Curvularia</i>	84	71.19	5	25	3	1	34	28.81
3	<i>Aspergillus fumigates</i>	87	73.73	8	20	3	0	31	26.27
4	<i>Candida</i>	98	83.05	7	12	1	0	20	16.94
5	<i>Mucor</i>	100	84.75	7	11	0	0	18	15.25

Maximum reactivity was observed with *Alternaria* and *Curvularia* fungal allergen followed by *Aspergillus fumigates*.

**Graph 8:**

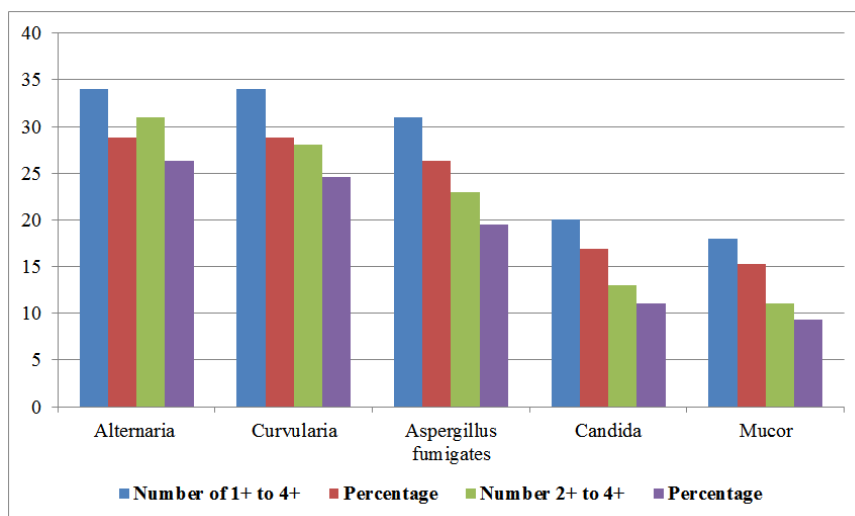


**Table 9: Definite skin reactivity with various fungal allergens (2 to 4+)**

S.No.	Name of allergen	1+ to 4+		2+ to 4+	
		No.	%	No.	%
1	<i>Alternaria</i>	34	28.81	31	26.27
2	<i>Curvularia</i>	34	28.81	28	24.57
3	<i>Aspergillus fumigates</i>	31	26.27	23	19.49
4	<i>Candida</i>	20	16.94	13	11.01
5	<i>Mucor</i>	18	15.25	11	9.32

Maximum skin reactivity was observed with *Alternaria* and *Curvularia* followed by *Aspergillus fumigates* i.e. 28.81%, 28.81% and 26.27% respectively.

Graph 9:



Graph 10:

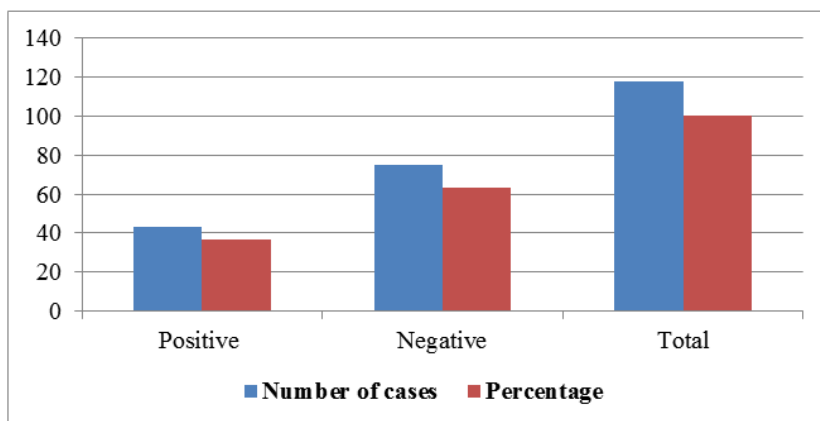


Table 10: Pattern of skin positivity with insect allergens (1 to 4+)

S.No.	Name of allergen	Negative		Grading of positivity				Total positive (1 to 4+)	
		No.	%	1+	2+	3+	4+	No.	%
1	Cockroach male	43	36.45	6	56	10	3	75	63.55
2	Cockroach female	47	39.84	5	54	11	1	71	60.16
3	House fly	55	46.62	6	47	10	-	63	53.38
4	Mosquito	51	43.23	11	43	12	1	67	56.77
5	Yellow wasp	62	52.55	4	42	8	2	56	47.45

Among the insect allergens maximum reactivity was seen with Cockroach male followed by Cockroach female and mosquito i.e. 63.55%, 60.16% and 56.77% respectively.

Graph 11:

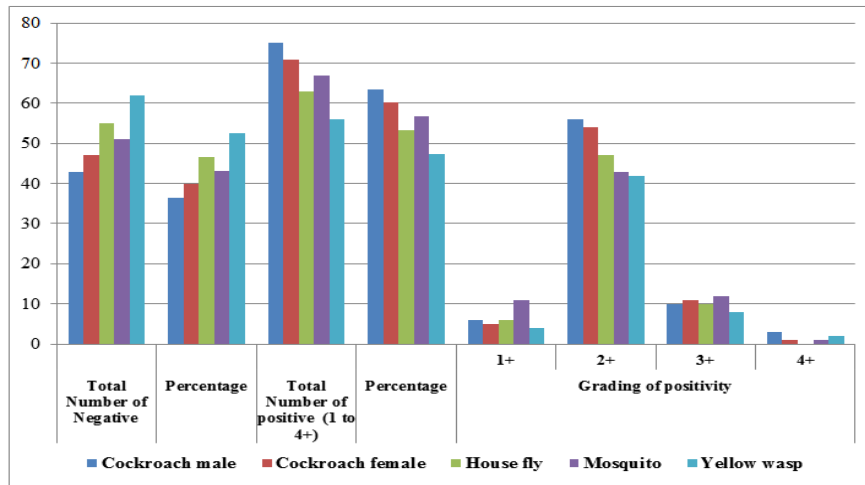


Table 11: Definite skin reactivity with various insect allergens (2 to 4+)

S.No.	Name of Allergen	1+ to 4+		2+ to 4+	
		No.	%	No.	%
1	Cockroach Male	75	63.55	69	58.47
2	Cockroach female	71	60.16	66	55.93
3	House fly	63	53.38	57	48.30
4	Mosquito	67	56.77	56	47.45
5	Yellow wasp	56	47.45	52	44.06

Results of definite skin reactivity showed that among the insect allergens, maximum reactivity was seen against Cockroach male and female i.e. 75% and 71% respectively.

Graph 12:

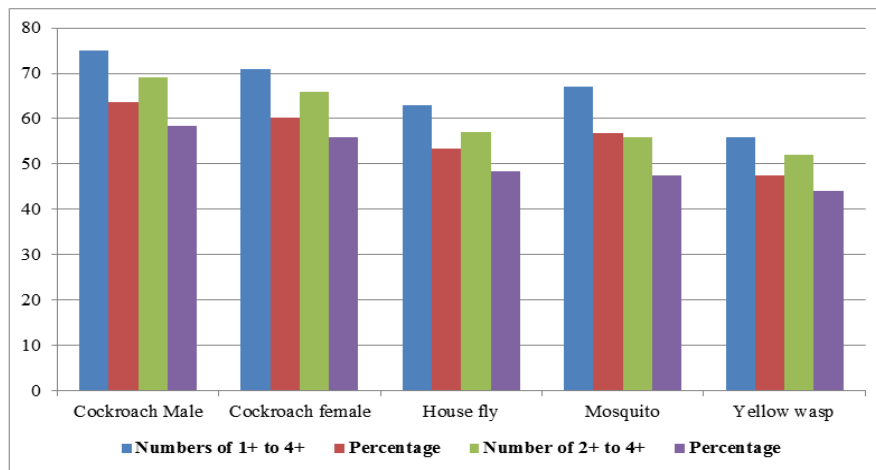
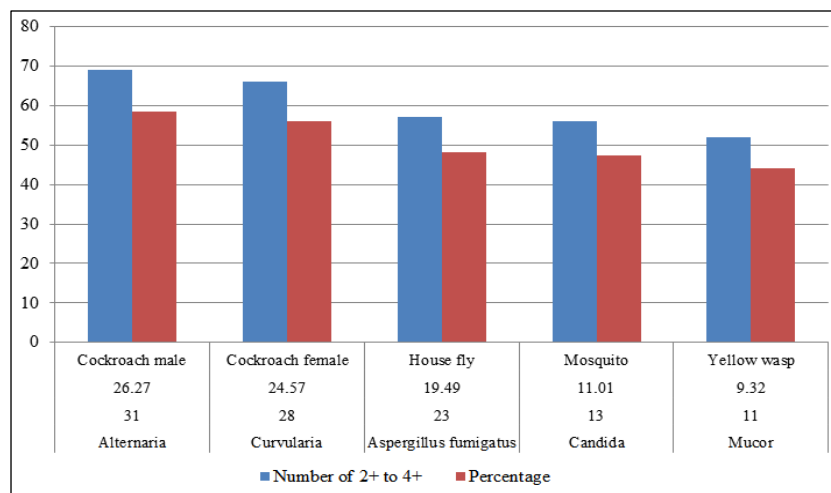


Table 12: Comparison of definite skin reactivity with various fungal and insect allergens

Name of fungal allergen	2+ to 4+		Name of insect Allergen	2+ to 4+	
	No.	%		No.	%
Alternaria	31	26.27	Cockroach male	69	58.47
Curvularia	28	24.57	Cockroach female	66	55.93
Aspergillus fumigatus	23	19.49	House fly	57	48.30
Candida	13	11.01	Mosquito	56	47.45
Mucor	11	9.32	Yellow wasp	52	44.06

Comparative analysis showed that maximum reactivity was seen with insect allergens than fungal allergens. Among which maximum reactivity was seen against cockroach male.

Graph 13:



### Discussion:

Aeroallergens affect the peoples in various settings, both at home and at work. Fungi and insects are ubiquitous airborne allergens and are important causes of human diseases, especially in the upper and lower respiratory tracts. Allergy is one form of human disease which affects about 20% of the population. A number of allergens associated with various forms of allergy have been reported from all over the world [2,3]. Fungal antigens and insects play an important role in the causation of respiratory allergies. Fungi disseminate their spores in the environment through air, water, insects, man and animals [4]. Air borne fungal spores have been implicated as causative factor in respiratory allergies particularly asthma [5].

In the present study main sensitivity towards fungus seen from *Alternaria*, *Curvularia* and *Aspergillus fumigates*, in insects group cockroach reactivity was most commonly seen. In 2003 study, most common fungal spores with significant skin reaction were *Mucor* (2.05%), *Aspergillus fumigates*, (2.05%), *Rhizopus* (1.75%), and *Fusarium* (1.75%) [6,7].

The mould spores are small in size (3-10 µm) and penetrate deeply into the respiratory tract. They can provoke rhinitis as well as asthma. For unknown reasons, children are more often sensitised to mould than adults [8].

Basidiomycetes and Ascomycetes spores are found in large quantities in the atmosphere and were found to be allergenic in patients with asthma and rhinitis [9,10] but their role as an atmospheric allergen is still difficult to define. Occupational allergy to superior fungal spores has been described [11].

In addition to this, inhalation of insect waste can induce an IgE immune response and respiratory allergies. In this case, IgE is directed against the protein fragments of insects, which become airborne. However, allergen concentration must be very high to induce

sensitisation. Certain allergens such as haemoglobin of Diptera have been identified [12,13].

In certain hot and humid regions of the United States [14,15] or tropical areas [16, 17, 18], allergies to cockroaches are as frequent as, or even more frequent than, allergies to *Ambrosia* pollen or to house dust mites. However, cockroaches are also prevalent in many European countries [19, 20, 21]. Cockroaches are particularly important in low income housing “inner city”) where they cause severe asthma [22]. Cockroach allergen is found in gastrointestinal secretions as well as on the chitin shell. The allergen is distributed in large particles that do not become airborne. Cockroaches tend to cluster in hiding places and forage after dark. Seeing cockroaches during the day suggests that they are present in very large numbers. The allergen is usually distributed throughout an infested home [23].

Thus many insect and fungal allergens have different sensitivity towards individuals. Allergy response varies according to age and gender. Proper sanitation and minimal exposure to related allergens can reduce the consequence hence the associated complications.

### Conclusions:

Maximum cases (3/4<sup>th</sup>) were having both rhinitis and asthma. Around (3/4<sup>th</sup>) were belonging to rural area. Maximum cases (95%) were belonging to 15-45 years of age group. In fungal group max positivity was seen with *Alternaria*, *Curvularia* and *Aspergillus*. In insects group, cockroach reactivity was most common.

**Conflicts of Interest:** None declared

**Acknowledgements:** None

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