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A Study of Sensitisation Pattern to Various Aero-Allergens by Skin Prick Test in Patients of United Airway Disease (UAD) in Bhopal, Madhya Pradesh, India.

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ABSTRACT

Aero-allergens play a major role in pathogenesis of respiratory allergic diseases, particularly asthma and rhinitis. Present study was undertaken to identify the common allergens at Bhopal and surrounding, which are responsible for inducing united airway disease (UAD) in subjects, as no study has been done in this central geographical part of the India in the recent past. Skin Prick Testing (SPT) was performed on 89 patients with clinical manifestations of UAD, from April 2013 to March 2014, with 120 different allergen extracts. The testing kit included 50 pollen antigens, 20 fungi, 20 insects, 12 from dust group, 06 types of danders, 6 types of fabrics and feathers and 1 dust mite. The dominant pollen allergens identified were, Cynodon dactylon (53.93%), Cenchrus ciliaris (47.19%), Carica papaya (40.44%), chenopodium murale(37.07%), Gynandropis gyandra(37.07%), Cyprus rotundus,(35.95%), Canabis sativa(35.95%), Amaranthus spinosus(34.83%), Cassia occidentalis(34.83%), Cassia siamega(33.70%), Ehetia laevis(32.58%), Ageratum conyzoides(30.33%) and Brassica campestris(33.33%).Among fungus Aspergillus versicolor (21.3%) was most common sensitizer followed by A.tamari (19.1%), A.flavus (16.85%,) and A.fumigatus (13.48%). Locust male(53.93%) and locust female (53.93%) were the most common sensitizers among insect allergens. House dust showed marked positive reaction in 67.41% of patients. Wheat dust (53.9%) was also significant sensitizer. Among danders, cat dander (19.10%) and dog dander (19.10%) were most common sensitizers. House dust mite extract showed marked positive reaction in 74.15% of patients. Since there are geographical differences in the prevalence of allergens there is need to carry more such studies in different regions at regular intervals to know existence and change in trend of prevalence of allergens and respiratory allergy.

Keywords: Nasobronchial allergy, aeroallergens.

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INTRODUCTION

In both developed and developing countries, prevalence of allergic disorder worldwide is rising dramatically. These disorders include asthma, rhinitis, anaphylaxis, drug, food allergy, insect allergy, urticaria, angiodema and eczema [1]. It has been observed that allergic diseases are increasing steadily with about 30-40% of world population affected by one or more allergic disorders [2]. At present between 10-30% of population is affected by Allergic rhinitis [3].

Between 20 to 30% of the Indian population suffers from allergic rhinitis and 15% develop bronchial asthma [4]. A link between rhinitis and asthma leading to a definition of united airway disease (UAD) have been suggested by epidemiological evidences as well as clinical and experimental observations [5].

A major role is played by aero-allergens in pathogenesis of respiratory allergic diseases, particularly asthma and rhinitis. Previous studies from different cities of India have identified air borne pollens, spores and other particles responsible for allergy [6,7], and observed incidence of allergic manifestations and positivity rates for various allergens on skin prick testing (SPT) [8,9].

Present study was planned to identify these common allergens, probably responsible for inducing UAD in subjects, as no study has been done in the recent past, in this central geographical part of the country, at Bhopal and surrounding area.

MATERIAL AND METHODS

Subjects

A total of 89 patients with clinical manifestations of UAD attending the Respiratory clinic OPD, from April 2013 to March 2014, having raised total serum IgE (atopy) were included in the present study. Pregnant and lactating females were excluded from study. All the study subjects were subjected to detailed history and clinical examination, TLC, DLC, total serum IgE, stool examination, CXR PA view, spirometery (pre and post bronchodilator) and detailed ENT examination including X-ray of paranasal sinuses . The diagnosis of allergic rhinitis and/or bronchial asthma was made according to ARIA and GINA guidelines respectively.

Skin sensitivity testing

Allergen extract for skin prick test (SPT) obtained from ALCIT India Pvt Ltd (New Delhi). SPT was performed with 115 allergen extracts on all 89 patients. The testing kit included 50 pollen antigens, 20 fungi, 20 insects, 12 of dust group, 06 types of danders, 6 types of fabrics and feathers and 1 dust mite (D. Farinae).

Guidelines advocated by S N Gaur et al [(10)] were followed for performing skin sensitivity testing. Long acting antihistaminics like cetrizine, and loratidine were

discontinued for 1 month prior to skin test. Short acting antihistaminics were discontinued for 3 days. A gap of more than 12 hours was kept from bronchodilators and steroids.

A drop of allergen extract of 1:10(w/v) concentration was kept on volar aspect of forearm or skin of back and 26 no. G hypodermic needle was inserted about 0.5 mm through the extract and then lifted slightly to allow adequate entry of antigen beneath stratum corneum. The skin reactions were graded 15 to 20 mins later, according to criteria given in guidelines for practice of allergen immunotherapy [10]. Results were graded as negative, +1, +2 ,+3 and +4 reactions. All +2,+3 and +4 reactions were collectively labeled as positive reactions and any reaction less than that was considered as negative.

RESULTS

Out of 89 patient 50 were males and 39 were females. All the patients were between 14 to 55 years. Among asthmatic group 70% patients had associated allergic rhinitis, while 55% of allergic rhinitis patients also had associated bronchial asthma. Out of 89 patients all the patients gave various grades of positive SPT to 1 or more allergen. The result of SPT is shown in respective tables.

Table 1: Result of skin prick test with pollens allergens (n=89)

1	*Cynodon dactylon*	53.93%
2	*Cenchrus cilliaris*	47.19%
3	*Carica papaya*	40.44%
4	*Chenopodium murale*	37.07%
5	*Gynandropis gynandra*	37.07%
6	*Cyprus rotundus*	35.95%
7	*Cannabis sativa*	35.95%
8	*Amaranthus spinosus*	34.83%
9	*Cassia occodentalis*	34.83%
10	*Cassia siamea*	33.70%
11	*Ehetia laevis*	32.58%
12	*Ageratum conyzoides*	30.33%
13	*Brassica campestris*	30.33%
14	*Artemisia scoparis*	17.97%
15	*Chenopodium album*	15.73%
16	*Parthenium hysterophorus*	15.73%
17	*Pennusetum typhoides*	15.73%
18	*Eucalyptus teretiornis*	14.60%
19	*Amaranthus hybridus*	14.60%
20	*Broussonetia papyrifera*	13.48%
21	*Asphodelus tenuifolius*	11.23%
22	*Putranjiva roxburghil*	8.98%
23	*Maerua arenaria*	8.98%
24	*Rannunculus sceleratus*	8.98%
25	*Salvadora persica*	8.98%
26	*Ailanthus excels*	8.98%
27	*Cassia fistula*	7.86%
28	*Argemone Mexicana*	6.74%
29	*Azadirachta indica*	5.61%
30	*Adhatoda vasica*	5.61%
31	Dodonea viscose	5.61%

32	*Albiziz lebbeck*	4.49%
33	*Melia azedarach*	4.49%
34	*Sorghum vulgare*	4.49%
35	*Kigelia pinnata*	4.49%
36	*Ricinus communis*	3.37%
37	*Xanthum strumarium*	3.37%
38	*Cocos nucifera*	3.37%
39	*Zea mays*	3.37%
40	*Morus alba*	3.37%
41	*Saueda fruticosa*	3.37%
42	*Prosopis juliflora*	3.37%
43	*Rumex dentatus*	3.37%
44	*Typha augusatata*	3.37%
45	*Holoptelia integrifolia*	3.37%
46	*Ipomoea fistulosa*	1.12%
47	*Lawsonia inermis*	1.12%
48	*Crataeva nurvala*	-
49	*Clerodendrum phlmoides*	-
50	*Imperata cylindrical*	-

Table 2: Result of skin prick test with fungi allergen (n=89)

1	*Aspergillus versiclor*	21.3%
2	*Aspergillus tamari*	19.1%
3	*Aspergillus flavus*	16.85%
4	*Aspergillus fumigates*	13.48%
5	*Alternaria fenniae*	13.48%
6	*Candida albicans*	12.35%
7	*Cladosporum herberum*	12.35%
8	*Rhizopus nigricans*	12.35%
9	*Helmintho sporium*	11.23%
10	*Phoma betae*	10.11%
11	*Acrothesium*	8.98%
12	*Neospora sitophila*	7.86%
13	*Nigrospora*	7.86%
14	*Botrytis cinerea*	6.74%
15	*Aspergillus niger*	6.74%
16	*Curvularia lunata*	5.61%
17	*Mucor mucida*	5.61%
18	*Penicillium*	5.61%
19	*Fusarium solaria*	4.49%
20	*Trichoderma species*	4.49%

Table 3: Result of skin prick test with insects allergen (n=89)

1.	Locust male	53.93%
2.	Locust(female)	53.93%
3.	Cockroach male	51.68%
4.	Grass hopper	51.68%
5.	Dragon fly	51.68%
6.	Ant	50.56%
7.	Cockroach female	49.43%
8.	Cantheroid beetle	38.20%
9.	Butter fly	34.83%
10.	Jassids	34.83%

11	Rice weevil	34.83%
12	Bubble bee	34.83%
13	Mosquitoes	33.70%
14	Honey bee	33.70%
15	Cricket	32.58%
16	Aulaco phora	32.58%
17	Hornet	28.08%
18	Yellow wasp	20.22%
19	Moth	10.11%
20	Housefly	7.86%

Table 4: Result of skin prick test with dust allergen group (n=89)

1.	House dust	67.41%
2	Grain dust wheat	53.93%
3	Grain dust rice	38.20%
4	Cotton mill dust	34.83%
5	Grain dust bajra	32.58%
6	Grain dust jawar	32.58%
7	Paper dust	28.08%
8	Hay dust	28.08%
9	Threashing dust wheat	20.22%
10	Flex fibre dust	13.48%
11	Flex fibre bajra	8.98%
12	Straw dust	1.12%

Table 5: Result of skin prick test with dander group of allergen (n=89)

1.	Cat	19.10%
2.	Dog	19.10%
3.	Buffalo	16.85%
4.	Cow	10.11%
5.	Horse	6.74%
6.	Human	-

Table 6: Result of skin prick test with fabric and feather group of allergen (n=89)

1.	Sheep wool	5.61%
2.	Jute	1.12%
3	Kapok cotton	1.12%
4	Silk raw	-
5	Wool mixed	-
6	Pigeon feather	-

Table 7: Result of skin prick test with house dust mite extract allergen (n=89)

1	Dermatophagoides farinae	74.15%

DISCUSSION

An important role is played by allergens; in some atopic respiratory disorders hence it is essential to identify them for diagnosis and proper treatment of these disorders. Pollens and other allergens are variable in different ecozones, hence it is important to identify them in a particular geographical area, for diagnosis and immunotherapy. The presence of

positive SPT to relevant allergens has also been the standard for definition of allergic sensitization and atopy in various large epidemiological studies.

"All India Coordinated Project on aero-allergens and human health" sponsored by Ministry of Environment and Forest, Goverment of India , reported a total 43 types of different allergens were from northern India zone [12]. Dominant types were Holoptelea, Poaceae, Eucalyptus, Cauarina, Putranjiva, Cassia, Quercus, Pinus, and Cedrus. In the present study most of the above pollens were skin tested to evaluate sensitization. The dominant allergens identified were, Cynodon dactylon (53.93%), Cenchrus ciliaris (47.19%), Carica papaya (40.44%), chenopodium murale(37.07%), Gynandropis gyandra (37.07%), Cyprus rotundus,(35.95%), Canabis sativa(35.95%), Amaranthus spinosus (34.83%), Cassia occidentalis(34.83%), Cassia siamega(33.70%), Ehetia laevis (32.58%), Ageratum conyzoides(30.33%) and Brassica campestris (33.33%). Our study does not have much agreement with previous study done at Bhopal by Dr. S.N. Sharma (unpublished data-postgraduate thesis submitted and accepted by Barkatullah university Bhopal in 1976), where positive skin test found in descending order of frequency were with Asphodelous (24%), Cannabis (21.4%), Cenchurus (15%), Argemone (16.6%), Artemesia (14.3%), Brassica imperata (14%), Prosopia(10%), Salvadora (9%), and Sorghum (8.5%). In an atmospheric pollen survey at Bhopal (1978) by D M Tripathi et al [13] dominant types found were from Poaceae, Asteraceae, apocynaceae Rosa, Cicer, Ricinus, Ailanthus, Holoptelea, Chenopodium, Amaranthus and Cyprus. Among them only Chenopodium (37.07%), Cyprus(35.95%) and Amaranthus(34.83%) were found to be significant sensitizer in our study. Differences in these studies and our study can be attributed to enormous change in the vegetation cover and climatic condition at Bhopal in past 30 years.

Among the fungi, in our study Aspergillus genus dominated the table, but aspergillus versicolor (21.3%) being the most common sensitizer followed by A.tamari (19.1%), A.flavus (16.85%,) and A.fumigatus (13.48%). Alternaria tenniae (13.48%) and Candida albicans (12.35%) were also significant sensitizers. Aspergillus fumigates had been identified as a major fungal allergen in the study of Prasad et al [8] and Agrawal et al [9].

High rate of positive skin reaction were shown by the insect allergens in our study. Locust male (53.93%) and locust female (53.93%) were the most common sensitizers. This was similar to study done by Prasad et al [8]. Cockroach male (51.68%), grosshopper (51.68%), and dragon fly (51.68%), ant (51.68%) as well as Cockroach female (50.56%) were also among most common sensitizers.

In the present study skin prick test with house dust showed marked positive reaction in 67.41% of patients, followed by wheat dust (53.9%) which was second most significant sensitizers. This observation is similar to study of Agrawal et al [12]. It correlated well with studies done Prasad et al [11] and acharya et al [15].

Among danders cat dander (19.10%) and dog dander (19.10%) were most common sensitizers. Similar results were shown by studies of Agrawal et al [9], Wiqar A Shaikh [6], Prasad et al [11]. Our study differed from these studies, as Buffalo danders also found to be a significant sensitizer with 16.85%.

Sheep wool (5.61%) was the most common sensitizer in fabric antigens. No other fabric and feathers were significant sensitizers in our study.

In the present study house dust mite (D. Farinae) extract showed marked positive reaction in 74.15% of patients similar to studies of agrawal et al [9] and Mahesh Goyal et al [14].

There is need to carry more such studies in different regions at regular intervals to know change in trend of prevalence of allergens, as there are geographical differences in the prevalence of allergens in different areas. It will probably help in planning management of allergic disorders in the area.

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