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Original Research Article

Study of common aeroallergens in children with wheeze: a hospital based cross sectional study

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ABSTRACT

Background: Prevention of diseases of the allergic origin depends upon the early identification of aeroallergens. Vaccine for allergy may not be required in all cases. but when treatment is not successful, then there is requirement of the vaccine. Objective of study allergens responsible for inducing recurrent wheezing
Methods: A cross sectional observation study was carried out at Departmetn of Pediatric, Shadan Institue of Medical Sciences, Peerancheru, Hyderabad, Telangana, India from June 2017 to June 2018 among 100 children with recurrent (4 or more episodes of wheezing in past one year) ages between 2 yrs to 10 yrs. Using the guidelines for skin prick test as per the European committee, the skin prick test was carried out. Insulin syringe was used for the intradermal test. It is done using standardized allergen extracts (Creative Diagnostic Medicare pvt ltd) were done for our cases.
Results: Out of 100 children studied, 67 children were found to be sensitive to at least one of the aeroallergen and 33 children were found to be negative for all the aeroallergens. A statistically significant correlation is seen between the age groups and sensitivity (p value 0.025). Out of 67 children with a positive skin prick test, 66 children showed the sensitivity to indoor allergens. The association between the indoor allergens and the wheezing is statistically significant (P value <0.0001)
Conclusion: In children the sensitivity to indoor allergens is more prevalent than sensitivity to outdoor allergens. Sensitivity to pollen was found in older children more than 5 years of age.

Keywords: Common allergens, Prevention, Recurrent wheezing, Treatment, vaccine

INTRODUCTION

Under five children usually have a common complaint of wheeze. Infection of the respiratory tract as well as allergy can lead to wheeze. Allergy refers to a hypersensitivity reaction that occurs on re-exposure to sensitizing allergen, usually a protein molecule, causing release of inflammatory mediators. In the last four decades, asthma prevalence increased. It has been estimated that 4-7% of the worlds people suffer from asthma. The prevalence in the age group of 6-7 years has been estimated to be ranging from 4-32%. The prevalence in the age group of 13-14 years has been estimated to be ranging from 4-32%.[1]

Asthma in children in increasing and it is a chronic condition. It is also leading in the total hospital admission

that take place for the children. It also leads to the more number of abesenttes from the school for the children.[2]

There are multiple risk factors for asthma in the children. Various factors associated with the asthma in the children are lifestyle, environmental factors, location in the geographics, type of the behaviour etc.[3]

There are many studies that have been carried out in relation to asthma in the children in India. But as usual, the validity of these most of the studies remain uncertain. In last decade, it has been said that the number of children living with asthma has doubled. Asthma prevalence in the children in Hyderabad has been shown to be at the level of 8.5%.[4]

The asthma prevalence in children from India varies from place to place from as low as 2.3% to 29.5%. Increasing air pollution, increasing urbanization are causing an increase in the asthma prevalence in children from India. It has been stated that among the children who complain of wheeze, 25% of them are at risk of developing asthma in future life.[5]

One of the most important factors; which contributes to the high prevalence of asthma in children in the aeroallergens. Many studies have confirmed the role of aeroallergens. The differences in the prevalence of asthma in children from place to place can be explained by presence of more or less levels of the aeroallergens in the various places.[6]

Hence it has been postulated that if we can early identify these aeroallergens, then we can take proper measures, to prevent the incidence of the asthma by controlling the aeroallergens by taking a variety of measures.

Present study was done to identify the common allergens, responsible for inducing recurrent wheezing.

METHODS

Cross sectional observation study to study the type of allergic sensitivity in a paediatric population in Hyderabad was carried out at Shadan Institue of Medical Sciences, Study duration from June 2017 to June 2018.

Children with recurrent (4 or more episodes of wheezing in past one year) ages between 2 yrs to 10 yrs. Sample Size: n=100

Inclusion criteria

Frequent wheezers (>4 episodes in past one year) in the age group of 2 to 10yrs.

Exclusion criteria

- Dermatographism or any skin lesions was excluded during the physical examination prior to SPT.
- Patients having SPT positive to one or more aeroallergens but negative to histamine control.
- Refusal of parents to give consent

After thorough medical history and physical examination, a written questionnaire was completed for each patient. Children with recurrent wheeze, who fall in inclusion criteria are subjected to skin prick test for different aeroallergens listed below, the study was approved by the Ethics Committee of our hospital and all patients provided informed consent to participate in the study. In total 100 patients were included in the study if they met inclusion criteria and agreed to participate, data collected from SPT results is analyzed and most common aeroallergens causing allergic symptoms in patients visiting to our OPD is studied.

Skin testing is done by the widely practiced skin prick test (SPT) According to European guidelines. Using a lancet or by the intradermal test using an insulin syringe. The SPT has a high sensitivity, low specificity, less expensive with minimal equipment and a greater selection of antigen. It is done using standardized allergen extracts (Creative Diagnostic Medicare pvt ltd) were done for our cases using standard guidelines.

Allergen extracts to be used

- Mites (Dermatophagoides pteronyssinus, Dermatophagoides farina, Blomia tropicalis)
- Anemophilous fungi (alternaria alternate, cladosporium herbarum, Aspergillus fumigates)
- Epithelia of dog (Canis familiaris)
- Epithelia of cat (Felis domesticus)
- Epithelia of pigeon (Columba livia)
- Cockroach (Periplaneta americana)
- Parthenium grass (Parthenium hysterophorus)
- Bermuda grass (Cynodon dactylon)

Statistical methods

The data is entered and analyzed in Microsoft Excel 2010. For analysis descriptive statistics used were percentage, mean and standard deviation (SD). Data presented in descriptive tables and analysis was done at 95% confidence interval (CI) using Chi Square test. P value less than 0.05 was considered as statistically significant. All the analysis was carried out using SPSS 16.0 and EPI Info 3.5.1.

RESULTS

Table 1 shows sex Wise Distribution of the study subjects. The total number of the patients included in the study was 100 patients. There were 50 study subjects who were males. There were 50 study subjects who were females. Thus, it has been found out that there were equal number of males and females. Mean Age was found out to be 6.15 years and with standard deviation of 2.4 years.

Table 1: Sex wise distribution of the study subjects.

Sex	Number	%
Male	50	50
Female	50	50
Total	100	100

Table 2 shows age Distribution of the study subjects. There were 31 study subjects in the age group of 2-4 years. There were 36 study subjects in the age group of 5-7 years. There were 33 study subjects in the age group of 8-10 years. Thus, it has been found that the children in the present study across the age groups which ranged from two years of age to the ten years of age, were equally distributed. Majority of the study subjects were found out to be in the age group of 5-7 years i.e. there were 36% of the children in this age group. This was followed by 8-10 years i.e. it has been found out that there were 33% of children in this age group.

Table 3 shows association of sex and allergen sensitization. Out of 100 children in the study, 67 children were found sensitive to at least one aeroallergen and 33 were negative for all aeroallergens. Association between positive skin prick test and wheezing. Out of the 50 male cases 35 (70%) had positive SPT to at least one of the aeroallergens and 15 (30%) were negative for all aeroallergens tested. Out of the 50 female cases 32 (64%) had a positive SPT to at least one of the aeroallergens and 18(36%) were negative for all aeroallergens.

Table 2: Age distribution of the study subjects.

Age groups (years)	Number	%
2-4	31	31
5-7	36	36
8-10	33	33
Total	100	100

Table 3: Association of sex and allergen sensitization.

Skin prick test	Male	Female	Total
Positive	35	32	67
Negative	15	18	33
P value	0.6709		

Table 4 shows association of skin prick test with age group. Out of 100 children 67 (67%) had positive SPT to at least one of the aeroallergens. 26 (70.2%) of patients with positive tests were in age group 5-7 years and 26 (78.78%) were in the age group of 8-10 Yrs. Only 15 (48.3%) were found in age group 2-4 years. A statistically significant correlation is seen between age groups and sensitivity (p value 0.025).

Table 4: Association of skin prick test with age group.

Age (years)	Sensitivity				Total	
	Number	%	Number	%	Number	%
2-4	15	48.3	16	51.7	31	31
5-7	26	70.2	10	29.8	36	36
8-10	26	78.8	7	21.2	33	33
Total	67	67	33	33	100	100

Chi-square value =7.37 p value=0.025.

Table 5: Skin sensitivity to allergens.

Allergen group	Allergens	Number	%	% of cases
Mites	D. Farinae	54	54	80.5
	D. Pteronyssinus	54	54	80.5
	D. Bloomia	46	46	68.6
Fungi	Aspergillus fumigates	8	8	11.9
	Alternaria Alternate	7	7	10.4
	Cladosporium Herbarum	2	2	2.9
Pollens	Cayanodon dactylon	6	6	8.9
	Parthenium hysterophorus	5	5	7.4
Epithelia	Cat epithelia	13	13	19.4
	Dog epithelia	0	0	0
	Pigeon	3	3	4.4
Insects	Cockroach	10	10	14.9

Table 5 shows skin sensitivity to allergens. The highest prevalence of positive skin reaction was recorded for mite allergens among them Dermatophytoides pteronyssinus (80.5%), D. farinae (80.5%), Bloomia (56.4%), among

Fungi group, Aspergillus fumigates (11.9%) Alternaria alternate (10.4%), Cladosporium herbarum (2.9%) Cat, cockroach and pigeon showed positive in (19.4%) (14.9%) and (4.4%) of cases respectively. Among Pollen group Cynodon dactyl (8.9) & Parthenium hysterophorus (7.4).

Table 6 shows association between indoor and outdoor allergens. Frequency of positive tests to individual allergen is depicted in table. In the studied population, the highest a prevalence of positive skin reactions were documented for the D. pteronyssinus and D. farinae with a frequency of (80.5%) of cases, and the lowest for Dog (Canis familiaris) (0%) of cases respectively. Out of the 67 children with a positive skin prick test, 66 showed sensitivity to indoor allergens (dust mites, fungi, cockroach, cat) & 10 showed sensitivity to outdoor allergen (pollen, pigeon). The association between indoor allergens and wheezing is statistically significant (P value <0.0001).

Table 6: Association between indoor and outdoor allergens.

Allergen	Positive	Negative
Indoor	66	1
Outdoor	10	57

Chi square value= 95.3 p value <0.0001

DISCUSSION

Authors found that 67% of children were found to be sensitive to aeroallergen. This negative reaction may be probably that the patients were sensitized to particular allergens which have not been tested in our study; or not identified yet. This high percent of sensitization also was shown by the two studies in Iran which report (81%), (63.2%) of their patients had positive skin reactivity to aeroallergens, which were also comparable to 68%.[7-9]

Authors found that mites were the most common aeroallergen which is similar to other Indian study. When compared to our study pollens are most common cause of sensitization in Tehran. Moderate temperature with more humidity is required for mites to survive. They are also reported from Iran.[7-9,13]

Authors noted that DP was very sensitive followed by DF and then Bloomia. Similar findings were given by a study carried out among Malaysian asthmatic patients. Bloomia also showed significant reaction in our study which is comparable to other study.[14,15]

Among the fungi, in our study Aspergillus fumigatus (10.6%) being the most common sensitizer followed by Alternaria Alternate and (7.4%), pencillium species (5.4%,), similarly, Aspergillus fumigates had been identified as a major fungal allergen in the study.[16,17]

Results from the current study showed that 8.5% of patients had positive skin reactions to cockroach allergen. Farhoodi studied the sensitivity of asthmatics to cockroach allergens in children from 6 months to 12 years old and reported a 29 % rate of positive skin tests in these children.[18]

Authors found that boys had a slightly greater prevalence of any positive skin-test (70% vs 64%), responses to house dust mite (91.4% vs 100%). This is similar to the results.[19] Showed Age-specific sensitization rates as 26.5%.[20]

Sensitization to pollen was found in age groups more than 5 years of age with all 10 cases with a Skin prick test positive for pollen being the age group more than 5 years. The age group of 5-7 yrs accounting for 7.4% and in the age group of 8-10 yrs accounting for 33.3% of the positive skin prick tests. Similar results were seen.[19]

CONCLUSION

The sensitivity to aeroallergens increases with age. In children the sensitivity to indoor allergens is more prevalent than sensitivity to outdoor allergens. Sensitivity to pollen was found in older children more than 5 years of age. Furthermore, this study may also be helpful in controlling or avoiding allergens causing allergic disease.

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