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## RESEARCH ARTICLE

**PREVALENCE OF IGE MEDIATED AIRBORNE ALLERGIES IN CHILDREN**Rao Poornima B.N.<sup>1\*</sup>, Bhat. S.K.<sup>2</sup><sup>1</sup>Bigtec Labs, 2<sup>nd</sup> Floor, Golden Heights, 59<sup>th</sup> C cross, 4M Block, Rajajinagar, Bangalore-560010, INDIA<sup>2</sup>Biowave Resources, 6<sup>th</sup> Block, SMV Layout, Bangalore- 560110, INDIA\*Corresponding Author's Email: [4bnrao@gmail.com](mailto:4bnrao@gmail.com)

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**ABSTRACT:**

Respiratory allergies constitute one of the major allergic disorders affecting children at global level. In the Renuka Diagnostics Laboratory, serum samples of 280 children (aged between 05-11) were tested for Inhalation allergy (IgE) on commonly occurring airborne allergies. The study has confirmed house dust mites and dermatophytes as the major cause of respiratory allergies among children. Strict avoidance of allergens is the only well-established management strategy for the disorder.

**Key Words:** Asthma, Rhinitis, Inhalation, Anaphylaxis, Immunological reaction, allergic reactions.

**INTRODUCTION:**

Classically, allergy is described as an exaggerated, specific immunologic reaction to foreign (exogenous) particles attaining pathological dimensions. Immunoglobulin E (IgE) is the type of antibody concerned with body's defense against parasites. But in allergic individuals this antibody erroneously takes the protein of the allergen as a threat and is released to attack them. Within the past three decades, there has been a rising trend for prevalence of asthma and allergic diseases worldwide, particularly from developed and industrializing countries<sup>1</sup>. Allergic rhinitis is characterized by nasal symptoms consisting of rhinorrhea, nasal block-age and sneezing triggered by and IgE mediated reaction to allergens<sup>2</sup>. Respiratory allergic disorders like rhinitis and asthma are common conditions that not only affect target organs, but complicate the daily life of affected children and adolescents<sup>3</sup>. Seasonal allergic conjunctivitis (SAC) and perennial allergic conjunctivitis (PAC) are the most common forms of ocular allergies. Allergic conjunctivitis is caused by an allergen-induced inflammatory response in which allergens interact with IgE bound to sensitized mast cells resulting in the clinical ocular allergic expression. The pathogenesis of allergic conjunctivitis is predominantly an IgE-mediated hypersensitivity reaction.<sup>4</sup> The house dust mite (HDM) is a major perennial allergen source and a significant cause of allergic rhinitis and allergic asthma. However, awareness of the condition remains generally low. This review assesses the links between exposure to HDM, development of the allergic response, and pathologic consequences in patients with respiratory allergic diseases<sup>5</sup>. Air pollutants play a part in the incidence of

allergies, but their part towards pollens is not perfectly elucidated. One important point to consider is the enhanced granule liberation by exposed pollens. Due to the small size of the granules, the allergen bioavailability may increase, leading to higher incidence of respiratory allergies<sup>6</sup>.

**MATERIALS AND METHODS:**

Blood samples of 280 children (of age group 5 to 11, with symptoms of prolonged sneezing, runny nose, water-itchy eyes, chronic cough) samples were collected and tested at Renuka Diagnostic Laboratory, Bangalore during 2011-2012 have been considered for the current study. Identification of inhalation specific IgE antibodies for air borne allergens which trigger the allergic reactions such as rhinitis, asthma, anaphylaxis, atopic dermatitis, allergic conjunctivitis was carried out. Euro Immune-Euro Inhalation India (IgE) Professional kit (Euroimmun Medizinische Labordiagnostika AG) was used for diagnosing the allergic conditions. The Euro Immune test kit provides allergen coated test strips. The test strips are coated with parallel lines of 20 different allergen extracts. Human serum/pasma can be used as the test sample. Serum/plasma can be diluted 1:11 with the pre-diluted universal buffer. The diluted sample was incubated overnight on a rocking shaker at room temperature. The following day, the buffer was discarded and the strip was treated with the conjugate and kept on rocking shaker for an hour and excess conjugate was discarded. The strips were washed and treated with substrate and kept on rocker for 10 minutes. The strip has a ccd (Indicator band), which acts as an indicator of perfect protocol followed. Rest of the bands appeared indicate the presence of air borne allergens in the patient's blood sample. It is a semi-quantitative in-vitro assay for human IgE antibodies to

inhalation allergens in serum or plasma hence does not indicate any specific medical condition. In positive

samples, specific antibodies of class IgE remain bound to allergens.

## RESULTS:

The Euro Immune-Euro Inhalation India (IgE) Professional kit tested for the detection of air borne specific IgE antibodies for 20 allergens. The results of 280 patients are presented in Fig. 1.

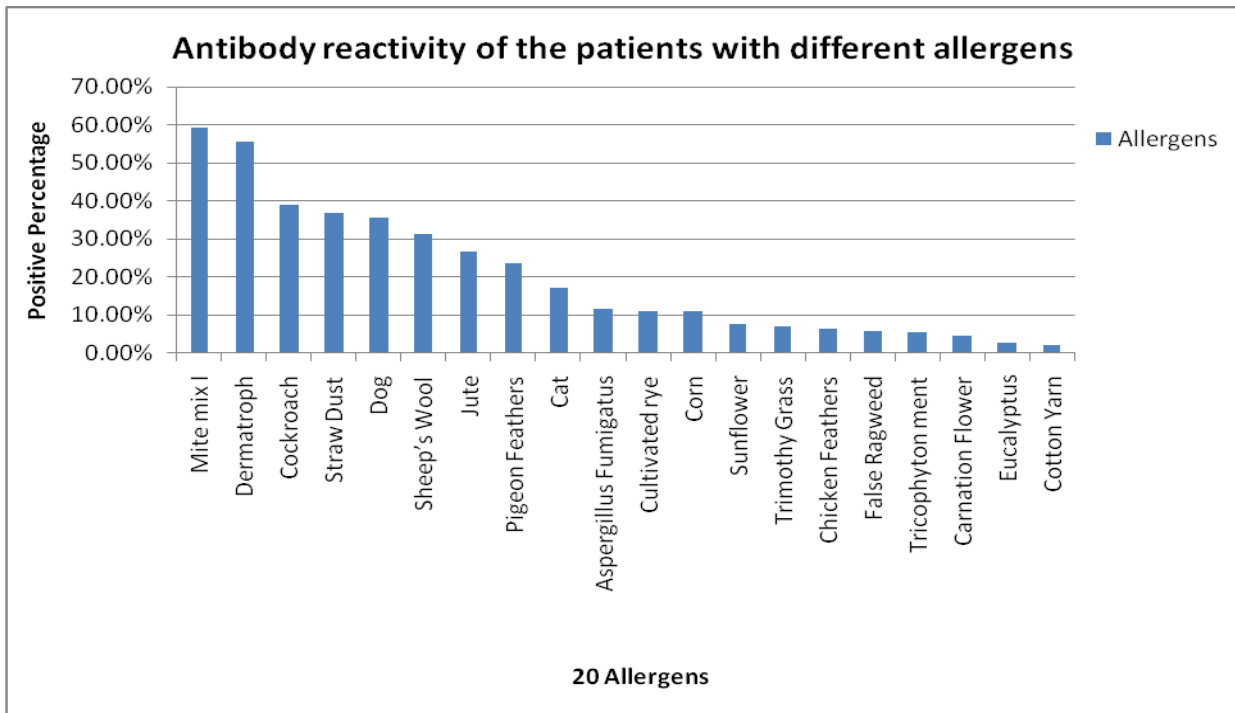


Figure 1: Comparative evaluation of IgE antibody response to common allergens among children \*Mite mix=all the mites present in dust, Dermatroph= parasitic mites feeds on skin

## RESULTS AND DISCUSSION:

The study has confirmed that house dust mite and dermatroph (*Dermatophagoides pteronyssinus* & *Dermatophagoides farinae*) as the major cause of IgE mediated airborne allergies among children. Cockroach, straw dust and dog allergens ranked next in sequence inducing allergic rhinitis among children. Meanwhile considerable number of children was found to be positive for sheep wool, jute, pigeon feathers and cat allergens.

For children at high risk of allergy, maternal exclusion diet during lactation and protein hydrolysate as a supplement or alternative for children who could not be breast-fed seems to provide further protection. The preventive effect of avoidance of house dust mite allergen alone during pregnancy or after birth is disappointing. However, prospective randomized studies evaluating a combined food and house dust mite allergen avoidance regimen show some protection against atopic dermatitis in infancy and asthma in later childhood<sup>7</sup>.

According to a study in the Journal of Allergy and Clinical Immunology (2004;114:807-13): allergic disorders among children can be minimized through

supplementing diet with fish oil, avoiding dust mite allergens at home, and reducing children's exposure to cigarette smoke as well as common allergens such as dust mites and animal dander. In a review article, of 56 studies selected, the review group concluded that breastfeeding seems to protect from the development of atopic disease. The effect appears even stronger in children with atopic heredity. If breast milk is unavailable or insufficient, extensively hydrolysed formulas are preferable to unhydrolysed or partially hydrolysed formulas in terms of the risk of some atopic manifestations<sup>8</sup>.

Allergy immunotherapy (AIT) is an effective treatment for allergic asthma and rhinitis, as well as venom-induced anaphylaxis. In addition to reducing symptoms, AIT can change the course of allergic disease and induce allergen-specific immune tolerance<sup>9</sup>.

Inhaler therapy can efficiently treat asthma and other chronic airway diseases. Inhaler devices are of various types, such as metered dose inhalers (MDI) or dry powder inhalers (DPI). Regardless of the type of inhaler device employed, appropriate use of the inhaler can give accurate result.

Initially, the medication should be clearly explained and well demonstrated. Therapy schedule should be discussed, particularly when more than one medication is prescribed. An explanation of the dissimilarity

between maintenance therapy and rescue medication is fundamental. Further studies into the effect of education and monitoring on the appropriateness of inhalation technique in children are recommended <sup>10</sup>.

## RECOMMENDATIONS:

In children with allergic rhinitis, immunotherapy may prevent the consequent development of asthma <sup>11</sup>.

### WHO Strength of Recommendations:

**Table 1: summary of specific recommendations <sup>11</sup> :**

<b>Identifying infants at risk of allergic disease</b>	A family history of allergy and asthma can be used to categorize children at increased risk of allergic disease
<b>Allergen avoidance in pregnancy</b>	Dietary constraints in pregnancy are not recommended. Aeroallergen avoidance in pregnancy has not been shown to reduce allergic disease, and is not recommended.
<b>Breastfeeding</b>	Breastfeeding should be recommended because of other beneficial effects. Maternal dietary restrictions during breastfeeding are not recommended.
<b>Infant formulae</b>	In high risk infants only, If breast feeding is not possible a hydrolysed formulae is recommended (rather than conventional cows milk based formulae). Partially hydrolysed formula is available in Australia without prescription. Extensively hydrolyzed formula is more expensive, only available on prescription, and only subsidised for treatment of combined cow's milk and soy allergic infants. Soy formulae and other formulae (eg. Goat's milk) are not recommended for the reduction of food allergy risk.
<b>Infant diet</b>	Complementary foods (including normal cows milk formulae) should be delayed for at least 4-6 months This preventive effect has only been demonstrated in high-risk infants There is no evidence that an elimination diet after the age of 4-6 months provides a protective effect, though this needs additional investigation Avoidance of peanut, tree nuts, and shellfish may be recommended in high risk children during the first years of life pending further study as this is unlikely to cause harm, however it must be emphasised that there is no evidence to support this recommendation.
<b>House dust mite exposure</b>	Before definitive recommendations can be made, further research is needed to determine the relationship between early HDM exposure and the development of sensitisation and disease. No recommendation can be made at this time regarding the implementation of HDM avoidance measures for prevention of allergic disease.
<b>Pet exposure</b>	No recommendations can be made at this time regarding exposure to pets in early life and the development of allergic disease. If a family already has pets it is not necessary to remove them, unless the child develops evidence of pet allergy (as assessed by an allergy specialist). However, at this stage we do not recommend getting new pets to reduce allergy.
<b>Smoking and other irritants</b>	Pregnant women should be advised not to smoke in pregnancy. Parents should be advised not to smoke.
<b>The role of microbial agents</b>	No recommendations can be made at this time regarding the use of probiotic supplements for the prevention of allergic disease

## REFERENCES:

1. Vichyanond P, Jirapongsananuruk O, Visitsuntorn N, Tuchinda M. J Med Assoc Thai. Prevalence of asthma, rhinitis and eczema in children, ISAAC (International Study for Asthma and Allergy in Children) questionnaires, 1998 Mar;81(3),175-84.
2. Mancilla-Hernández E, Medina-Ávalos MA, Osorio-Escamilla RE. Rev Alerg Mex. Validation of a diagnostic questionnaire of allergic rhinitis in children and adults for epidemiological studies, US National Library of Medicine National Institutes of Health, pubmed.gov 2014 ;61(3),153-61.
3. Kiotseridis, Hampus ; Cilio, Corrado ; Bjermer, Leif; Aurivillius, Magnus; Jacobsson, Helene; Dahl, Aslög and Tunsäter, Alf, In The clinical respiratory journal -Quality of life in children and adolescents with respiratory allergy, assessed with a generic and disease specific instrument, 2013,7(2),168-175.
4. Mario LR ,Elena L, Michele R, Andrea R, Antonio L, Salvatore L, Stefania T, Teresio A, and Alfredo R ,Allergic conjunctivitis: a comprehensive review of the literature ,Ital J Pediatr. 2013; 39: 18,doi: 10.1186/1824-7288-39-18 PMID: PMC3640929.
5. Moisés AC, MD, PhD<sup>a</sup>, Allan L, MD, PhD, Jörg KT, MD, Frédéric DB, MD, PhD, Dolores H, Fernandez DR, MD, PhD<sup>c</sup>, Johann CV , MD, FRCP, FCCP<sup>d</sup>, Pascal D MD, PhD<sup>e</sup>, Respiratory allergy caused by house dust mites: What do we really know? ,Journal of Allergy and Clinical Immunology,2014,doi:10.1016/j.jaci.2014.10.012.
6. Lacroix G, Respiratory allergy, pollen and pollutants,Archives des Maladies Professionnelles et de l'Environnement,2005,66(6),584-591.
7. Syed HA, Review and feature article Primary prevention of asthma and allergy ,2005,116(1),3-14,doi:10.1016/j.jaci.2005.03.043.
8. Van Odijk J, I. Kull, M. P. Borres, P. Brandtzaeg, U. Edberg, L. Hanson, A. Høst, M. Kuitunen, S. F. Olsen, S. Skerfving, J. Sundell, S. Wille, Review article-Breastfeeding and allergic disease: a multidisciplinary review of the literature (1966-2001) on the mode of early feeding in infancy and its impact on later atopic manifestations, Allergy ,2003; 58: 833-843,ISSN 0105-4538.
9. A. Wesley Burks, MD<sup>a</sup>, Moises A. Calderon, MD, PhD, Thomas Casale, MD, Linda Cox, MD, Pascal Demoly, MD, PhD, Marek Jutel, MD, Harold Nelson, MD<sup>e</sup>, Cezmi A. Akdis, MD<sup>b</sup>, Reviews and feature article-Update on allergy immunotherapy: American Academy of Allergy, Asthma & Immunology/European Academy of Allergy and Clinical Immunology/PRACTALL consensus report ,Journal of Allergy and Clinical Immunology,2013,131(5), 1288-1296.e3.
10. Johannes HJM Uijen, Yannick JW van Uijthoven, Johannes C van der Wouden<sup>a</sup> and Patrick JE Bindels, Adequate use of asthma inhalation medication in children: more involvement of the parents seems useful. Corresponding author: Johannes C van der Wouden, MC – University Medical Center Rotterdam. BMC Research Notes 2009, 2:129 doi:10.1186/1756-0500-2-129.
11. Susan L Prescott, Mimi Tang , Prevention in Children, ASCIA Position Statement ,Summary of Allergy Prevention in Children, as published in the Medical Journal of Australia, Australasian society of clinical immunology and allergy, Allergy 2005,182 (9), 464-467.