

**Original Research Article**

# **Serum IgE levels as a marker of disease activity in childhood asthma - A cross sectional study**

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## **Abstract**

Bronchial asthma is a multifarious chronic disease characterized by uneven airflow obstruction and airway hyper responsiveness. Immunoglobulin E (IgE) plays an important role in mediating the allergic response in bronchial asthma. To this purpose we have evaluated serum IgE levels as a marker of disease activity in childhood asthma in children visiting to tertiary care hospital. This prospective cross sectional study was carried on pediatric age group patients attending both OPD and inpatients for 12 months in a tertiary care hospital, Telangana. Serum IgE levels estimation done for all children with bronchial asthma. All the patients' serum IgE estimation was done by qualitative determination of concentration of test analytes in human serum by chemiluminescent immune assay. Data was analyzed statistically and expressed appropriately. Among the total 20 cases of bronchial asthma, 75% of the children had elevated serum IgE levels and 40% of bronchial asthma children with family history of elevated serum IgE levels. Among the total 20 cases of control children, 6 children had elevated serum IgE levels; all these children had worm infestation with positive stool test. Children with high levels of serum IgE levels and family history had co-morbid condition and

pronged duration of asthma. Values of IgE levels could be useful to contribute for diagnosis of allergic diseases like asthma. High IgE levels can be utilized for long term prognosis and severity of the disease process.

## Key words

Bronchial asthma, IgE, Allergic diseases.

## Introduction

Bronchial asthma is a multifarious chronic disease characterized by uneven airflow obstruction and airway hyper responsiveness [1]. These bronchial asthma patients tend to have raise in airway reactivity to a mixture of stimuli, such as irritants, allergens, exercise, cold air, and viruses etc. The majority patients with bronchial asthma have an allergic component to their illness [2]. Additionally, allergy or atopy is measured important risk factor for developing bronchial asthma [3]. Immunoglobulin E (IgE) plays an important role in mediating the allergic response in bronchial asthma [4]. Epidemiologic studies have constantly revealed that patients with bronchial asthma have elevated levels of IgE compared with non-asthmatic populations [5-7].

Serum IgE levels are age related and maximum levels seen during childhood, typically between the age of 8 and 12 years, and decreases thereafter [8-10]. However, serum IgE levels can differ with ethnicity or race [11, 12]. To this purpose we have evaluated serum IgE levels as a marker of disease activity in childhood asthma in children visiting to tertiary care hospital.

## Materials and methods

This prospective cross sectional study was carried on pediatric age group patients attending both OPD and inpatients for 12 months during the period 2006-2007 whom were attending Department of Pediatrics, Gandhi hospital, Secunderabad. Institutional ethical committee has approved the study and patient information consent was taken from the patents. Children between 2 to 14 years who fulfilled the inclusion Criteria were included in the study. All the patients with more than 3 episodes of wheeze

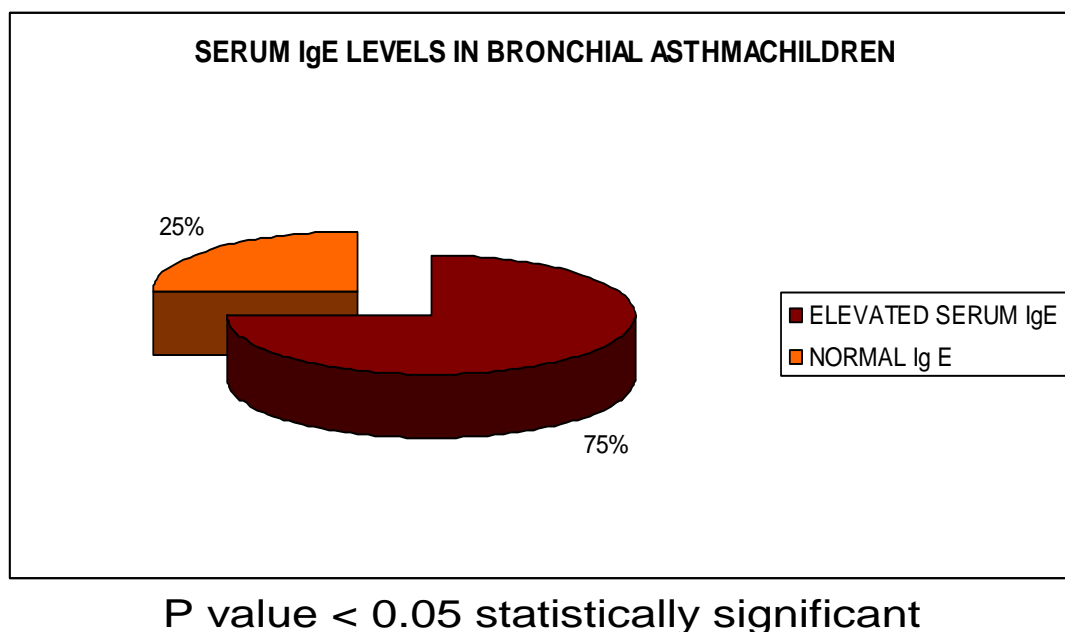
with response to bronchodilator with or without history of eczema/ atopy and family history were included in the study. Patients with age group less than 2 years and more than 14 years of age, Children with <3 episode of wheeze, Tuberculosis, Foreign body, Congenital heart disease, Bronchopneumonia, Congenital anomalies of Lung were excluded from the study. Complete clinical history, examination was done for all the children. History of related to the episodes of wheeze/ eczema/ atopy and family history was taken. Clinical diagnosis of asthma was done based on >3 episodes of wheeze with response to bronchodilator with or without history of eczema/ atopy and family history. All children with bronchial asthma were categorized to mild intermittent, mild persistent, moderate persistent, severe persistent. Stool and skin examination was done to all the children of control group. Serum IgE levels estimation done for all children with bronchial asthma. Serum IgE estimation was done by qualitative determination of concentration of test analytes in human serum by chemiluminescent immune assay [13]. The immunoenzymetric assay include high affinity and specific antibodies, the enzyme activity determined by reaction with a substrate that generates light, in the anti body bound fraction is directly proportional to the native antigen concentration by utilizing human serum references. 1 ml/vial icons of a-f six vials of human serum based reference calibrator at concentration of 0(a), 5(b), 25(c), 50(d), 150(e) and 400(f) IU/ml. The calibrators are standardized against the WHO'S 2<sup>nd</sup> IRP 7/502 for IgE. The expected value for the IgE in human serum was done by chemi-luminescent immune assay [14] by acculite monobind. Serum IgE levels of asthma children compared with normal children and results were statistically analyzed.

## Results

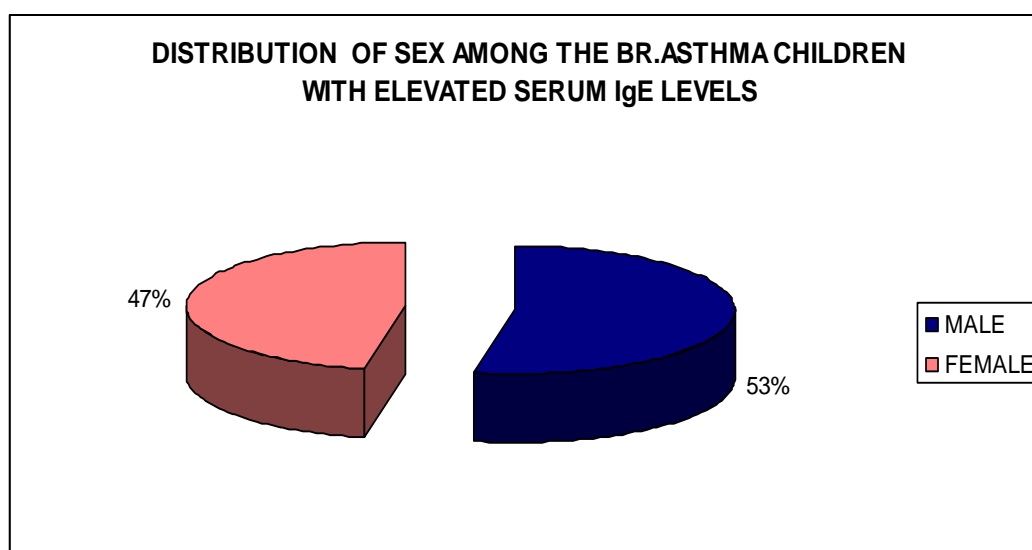
Among the total 20 cases of bronchial asthma, 75% of the children had elevated serum IgE levels. Serum IgE levels elevated in mild persistent, moderate persistent, severe persistent bronchial asthma. Serum IgE levels were markedly raised in correlation with severity of bronchial asthma. Serum IgE levels were found

predominantly in boys to girls ratio of 1.5: 1. 40% of bronchial asthma children with family history had elevated serum IgE levels. Among the total 20 cases of control children, 6 children had elevated serum Ig E levels; all these children had worm infestation with positive stool test. (Figure – 1 to 7)

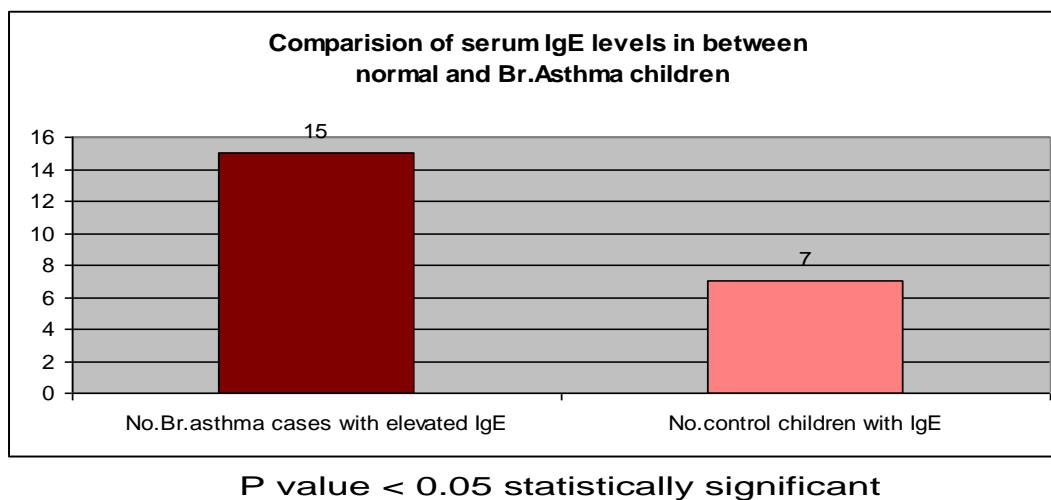
**Figure – 1:** Serum IgE levels in bronchial asthma children.



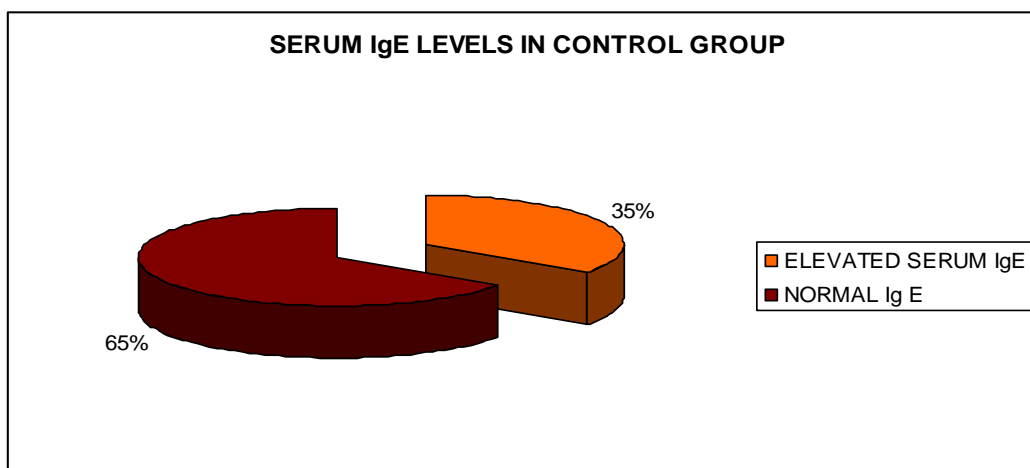
**Figure – 2:** Distribution of sex among the bronchial asthma children with elevated serum IgE levels.



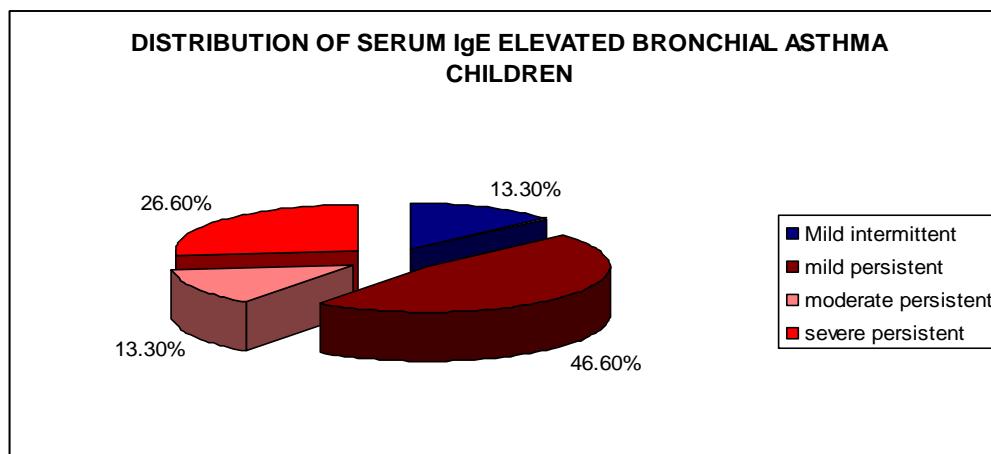
**Figure – 3:** Comparison of serum IgE levels in between normal and bronchial asthma children.



**Figure – 4:** Serum IgE levels in control group.



**Figure – 5:** Distribution of serum IgE elevated bronchial asthma children.



**Figure – 6:** Distribution of bronchial asthma children with elevated serum IgE levels.

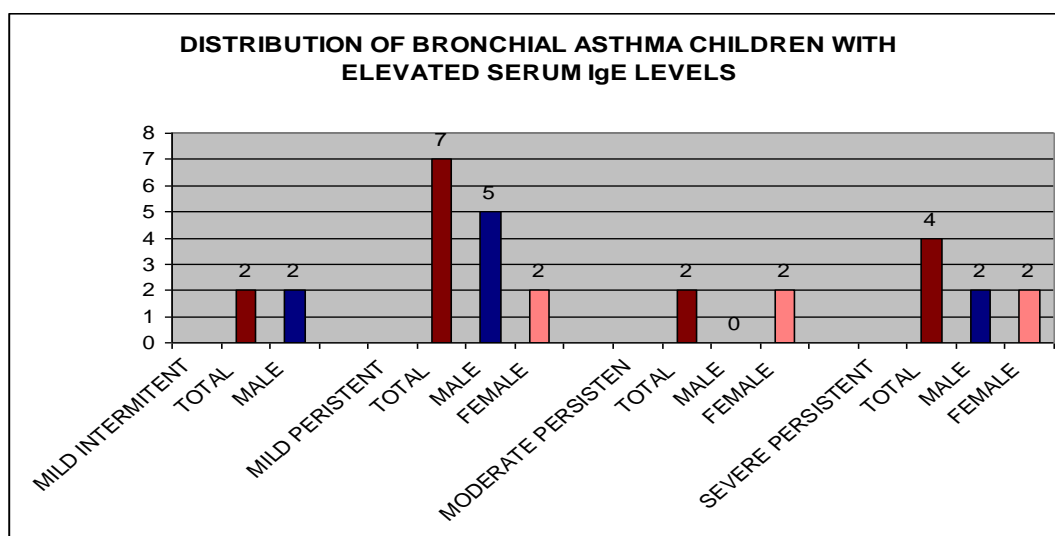
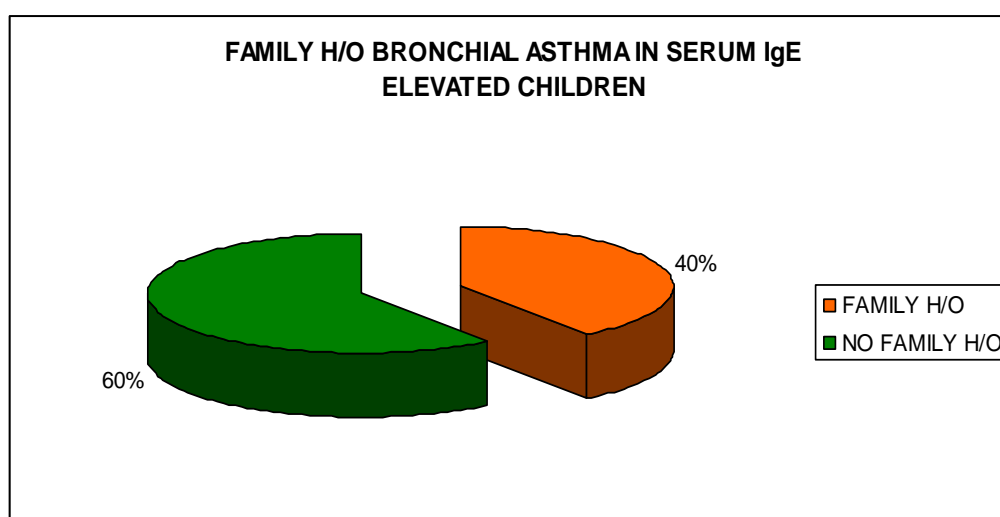


Figure – 7: Family history of bronchial asthma in serum IgE elevated children.



P value < 0.05 statistically significant

## Discussion

Bronchial asthma is one of the commonest chronic pediatric problems in the world, and serum IgE levels are one of the prognostic markers. The results of present study showed that elevated Serum IgE levels were found in 74% of bronchial asthma cases, a study done by Slivca, et al. [15] showed that hyper immunoglobulinemia E directly proportional to increased risk of bronchial asthma in child with recurrent wheeze. In our study, boys had elevated Serum IgE levels than girls with ratio of 1.5: 1

respectively; similar study done by Sears MR, et al. [16] showed that there was no significant difference between mean IgE levels in comparison with sex. Another study done by Benjamin A Raby, et al. [17] first time demonstrated the possibility of genetic basis for differences in total IgE between sexes. Raised IgE levels were found in severe persistent asthma followed by moderate persistent, mild persistent asthma, a study done by Kovač K, et al. [18] had shown that total IgE concentration was much higher in severe persistent asthma comparative other grade of asthma.

## Conclusion

Children with high levels of serum IgE levels and family history had shown co-morbid condition and prolonged duration of asthma. Values of IgE levels could be useful to contribute for diagnosis of allergic diseases like asthma. High IgE levels can be utilized for long term prognosis and severity of the disease process. Further studies are required to provide reference limits of total IgE in healthy children in our geographic area.

## References

1. US Department of Health and Human Services. National Asthma Education and Prevention Program: Guidelines for the Diagnosis and Management of Asthma. Washington, DC: US Dept of Health and Human Services; 1997. National Institutes of Health publication 97-4051.
2. Global Institute for Asthma. Global Strategy for Asthma Management and Prevention. Washington, DC: US Dept of Health and Human Services; 2002. National Institutes of Health publication 02-3659.
3. Hopkins JM. Mechanisms of enhanced prevalence of asthma and atopy in developed countries. *Curr Opin Immunol.*, 1997; 9: 788-792.
4. Ownby DR. Clinical significance of immunoglobulin E. In: Middleton E, Reed CE, Ellis ER, et al, eds. *Allergy Principles and Practice*. 5<sup>th</sup> edition. Vol 2. St Louis, MO: Mosby; 1998, p. 770-782.
5. Grundbacher FJ, Massie FS. Levels of immunoglobulin G, M, A, and E at various ages in allergic and nonallergic black and white individuals. *J Allergy Clin Immunol.*, 1985; 75: 651-658.
6. Burrows B, Martinez FD, Halonen M, et al. Association of asthma with serum IgE levels and skin-test reactivity to allergens. *N Engl J Med.*, 1989; 320: 271-277.
7. Criqui MH, Seibles J, Hamburger RN, et al. Epidemiology of immunoglobulin E levels in a defined population. *Ann Allergy*, 1990; 64: 308-313.
8. Wittig HJ, Belloit J, De Fillippi I, Royal G. Age-related serum immunoglobulin E levels in healthy subjects and in patients with allergic disease. *J Allergy Clin Immunol.*, 1980; 66: 305-313.
9. Sunyer J, Anto JM, Sabria N, et al. Relationship between serum IgE and airway responsiveness in adults with asthma. *J Allergy Clin Immunol.*, 1995; 95: 699-706.
10. Grundbacher F. Causes of variation in serum IgE levels in normal populations. *J Allergy Clin Immunol.*, 1975; 56: 104-111.
11. Grundbacher F. Causes of variation in serum IgE levels in normal populations. *J Allergy Clin Immunol.*, 1975; 56: 104-111.
12. Gerrard JW, Ko CG, Dalglish R, Tan KT. Immunoglobulin levels in white and metis communities in Saskatchewan. *Clin Exp Immunol.*, 1977; 29: 447-456.
13. Li TM, Chuang T, Tse S, Hovanec-Burns D, El Shami AS. Development of a third generation allergen-specific IgE assay on the continuous random access IMMULITE 2000 analyzer. *Clin Chem.*, 2003; 49(S6): A20.
14. Tse S, Chuang T, Li TM, Hovanec-Burns D, El Shami AS. Analytical performance evaluation of the allergen-specific IgE assays on the IMMULITE 2000 System. *Allergy*, 2003; 58 (Suppl 74): 364.
15. Slivca, Svetlan, et al. Prognostic importance of IgE for the evolution of recurrent wheezing into the Br. Asthma in children state of Medical University, Pediatrics, Chisineu Modova, 2007.
16. Sears MR, Burrows B, et al. Relation between airway responsiveness and serum IgE in children with Asthma and in apparently normal children. *The New*

- England Journal Medicine, 1991; 325: 1067-1071.
17. Benjamin A Raby, et al. Sex specific linkage to total serum immunoglobulin E in families of children with bronchial asthma in Costa Rica. Human Molecular Genetics, 2007; 16(3): 243-253.
18. Kovač K, Dodig S, Tješić-Drinković D, Raos M. Correlation between asthma severity and serum IgE in asthmatic children sensitized to dermatophagoides pteronyssinus. Archives of Medical Research, 2007; 38(1): 99-105.