

A Study of Serum IgE Levels among Children of 6 Months to 5 Years of Age Group

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ABSTRACT

Introduction: Sometimes the immune system reacts unnecessarily vigorously against otherwise harmless environmental agents, allergens. These over reactions are termed hypersensitivity reactions and fall into four subgroups, type's I-IV, depending upon the mechanism behind the action. The type I hypersensitivity reactions are mediated by allergen specific IgE and are responsible for the clinical manifestation of atopic allergies, such as hay fever, food allergies, exzema, asthma and anaphylaxis, parasitic infections. Objective of the study was to study of serum IgE levels among children.

Material and Methods: Ethical clearance was obtained from Kamineni Hospital Ethics Committee. This was a Hospital based prospective observational study. Approximately 99 children (OP and IP) 6 months to 5 years of age, visiting Kamineni Hospital, LB Nagar, Hyderabad with recurrent respiratory tract illnesses meeting defined inclusion and exclusion criteria were enrolled in the study after taking an informed consent and approval of institutional ethical committee. All patients were subjected to detailed questionnaire. A thorough clinical examination was done. Blood samples were collected and total serum IgE levels were determined.

Results: Out of 99 children with RRTI studied, 48 had elevated serum IgE levels. Almost similar number of children with RRTI i.e. 51 had normal serum IgE levels. Serum IgE levels were significantly higher (66.07%) in males as compared to females (25.58%) with p value of 0.0003 ($p < 0.05$). The elevation of serum IgE levels was 48.48% in children (48 out of 99 children). It was noticed that, the number of children suffering from RRTI and the number of children with elevated serum IgE levels increased with increasing age. There was significant increase in serum IgE levels from 10% in infancy to 64.10% in 49-60th month with significant p value of 0.001.

Conclusion: This study showed increasing number of children with recurrent respiratory tract illness and serum IgE levels with increasing age.

Keywords: Serum, Children, IgE

lation is estimated at 2-2.5 days.⁴

Asthma is a chronic inflammatory disorder of the airways involving many cells and cellular elements. The inflammation causes swelling and narrowing of the airway restricting the capability of air to pass through to the lung tissue. The swelling and narrowing of the airways cause recurrent episodes of coughing, wheezing, breathlessness and chest tightness.¹ Sometimes the immune system reacts unnecessarily vigorously against otherwise harmless environmental agents, allergens. These over reactions are termed hypersensitivity reactions and fall into four subgroups, type's I-IV, depending upon the mechanism behind the action. The type I hypersensitivity reactions are mediated by allergen specific IgE and are responsible for the clinical manifestation of atopic allergies, such as hay fever, food allergies, exzema, asthma and anaphylaxis, parasitic infections.

MATERIAL AND METHOD

Ethical clearance was obtained from Kamineni Hospital Ethics Committee. This was a Hospital based prospective observational study. Approximately 99 children (OP and IP) 6 months to 5 years of age, visiting Kamineni Hospital, LB Nagar, Hyderabad with recurrent respiratory tract illnesses meeting defined inclusion and exclusion criteria were enrolled in the study after taking an informed consent and approval of institutional ethical committee. All patients were subjected to detailed questionnaire. A thorough clinical examination was done. Blood samples were collected and total serum IgE levels were determined.

Inclusion criteria

1. Age group > 6 months to < 5 years
2. Children with symptoms of recurrent respiratory tract infections defined as (at least one of the following should be met

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- > 6 respiratory infections per annum
- > 1 respiratory infections per month involving upper airways from September to April
- > 3 respiratory infections per annum involving lower airways

Exclusion criteria

- Age less than 6 months and more than 5 years
- Congenital heart disease
- Cerebral palsy
- Proven immunodeficiency disorder

Sample size: 99 children and Study period was from 1st March 2013 to 28th February 2014.

Investigations: Standard methods were used to draw the blood samples. The collected blood sample was transported immediately to laboratory. Serum IgE levels were measured by chemiluminescence method.

Statistical method used: Chi square test, Pearson coefficient analysis and other appropriate statistical methods.

RESULTS

The present study was undertaken to determine the correlation of serum IgE levels among children. A total of 99 children were included in the study. Out of 99 children, 48 had elevated serum IgE levels and 51 had normal serum IgE levels.

Out of 99 children with RRTI studied, 48 had elevated serum IgE levels. Almost similar number of children with RRTI i.e. 51 had normal serum IgE levels.

Serum IgE levels	RRTI	%
Elevated	48	48.48
Normal	51	51.52

Table-1: Association between serum IgE levels and recurrent respiratory tract infections (RRTI)

Sex	Elevated serum IgE levels	Normal serum IgE levels
Male (n = 56)	37 (66.07%)	19 (33.92%)
Female (n = 43)	11 (25.58%)	32 (74.41%)
Total (n = 99)	48	51

Table-2: Elevated serum IgE levels and Gender

Age group (months)	No. of RRTI children	No. of children with elevated serum IgE levels	% age with elevated IgE levels	P value
1-12	10	1	10%	0.12
13-24	14	3	21.4%	0.30
25-36	16	9	56.25%	0.07
37-48	20	10	50%	0.24
49-60	39	25	64.10%	0.001
Total	99	48	48.48%	

Table-3: Elevated serum IgE levels and age

Serum IgE levels were significantly higher (66.07%) in males as compared to females (25.58%) with p value of 0.0003 ($p < 0.05$).

The elevation of serum IgE levels was 48.48% in children (48 out of 99 children). It was noticed that, the number of children suffering from RRTI and the number of children with elevated serum IgE levels increased with increasing age. There was significant increase in serum IgE levels from 10% in infancy to 64.10% in 49-60th month with significant p value of 0.001.

DISCUSSION

In the present study, the number of boys with elevated serum IgE levels was more than girls, which was statistically significant ($p = 0.0003$). Similar results were seen in the studies done by Satwani et al⁵ (65%) and Borish L et al⁶ (66.5%). The factor responsible for this results could be that, the boys are more exposed to the outdoor activities, hence, increased chances of getting exposed to respiratory infections and allergens.

The number of children with elevated serum IgE levels significantly increased with increasing age with p value 0.01. This is in accordance with the study conducted in Greek children, by Petridou et al⁷, in children aged 1 month to 14 years, total serum IgE levels increased by almost 80% per year until 5 years of age. Similarly in a study by Johnson et al⁸ (USA), 60% increase in serum IgE levels was observed from birth to 4 years of age. Hamid Habib et al⁹ too had significantly increased serum IgE levels with increasing age with p value 0.001.

Serum IgE levels were significantly elevated (78.04%) in children who were weaned off earlier (before 6 months of age) with p value of 0.01. Similar results 60% elevation of serum IgE levels with early weaning was seen in the study by Satwani H et al⁵ with p value of less than 0.01 and little less, 50% elevation of serum IgE levels with early weaning were seen in Wright AL et al¹⁰ with p value of less than 0.005.

IgE appears to function as an enhancer of immune responses against antigens that are present at low concentrations. Intravenous administration of small protein antigens together with antigen specific IgE can induce antibody responses that are more than 1000 fold higher than those induced by antigen alone.¹¹ The response to IgE/antigen is strictly antigen specific, but not isotype specific, as it involves upregulation of IgM, IgG1, IgG2a as well as IgE responses. The proposed mechanism behind IgE mediated enhancement is endocytosis of IgE/antigen complexes via CD23 by B cells and presentation of antigen peptides to antigen specific T cells.¹¹ The ability of IgE to augment responses under suboptimal conditions is suggestive of a physiological function in early responses.¹¹ This together with the comparatively high turnover rate of IgE in serum, raises questions regarding the positive value of IgE. Does IgE function as a door keeper scanning the antigen repertoire of the environment and pre-

paring the individual for potentially harmful pathogens?¹² A rapid turnover may serve to adequately prepare the individual to deal with its present environment. Furthermore, surgery and other forms of tissue injury, such as burns and heart attacks, characteristically evoke a transient rise in serum IgE levels.^{13,14,15,16,17} Serum IgE levels appear to rise shortly after surgery, peak by day five and then decline again.^{14,17}

CONCLUSION

Elevated serum IgE levels were found in 48.48% of children with recurrent respiratory tract illness. Male to female ratio in recurrent respiratory tract illness with elevated serum IgE levels was 3.4:1. This study showed increasing number of children with recurrent respiratory tract illness and serum IgE levels with increasing age.

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