

Total IgE Levels in Healthy Children in Tehran, Iran

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Abstract

Determining the normal range of Immunoglobulin E (IgE) in any population is important for diagnosis of allergic diseases. The aim of this study was to determine normal values of IgE in children living in Tehran. Two-hundred and fifty six healthy children aged one month to 14 years were selected. These children had neither parasitic infections nor atopic disease. They were divided into six groups and the total serum IgE levels were measured by ELISA methods. The reference range of the IgE levels were 0.1-25, 0.8-162, 0.6-184, 3-221, 2.9-501 and 2-316 KU/L in age groups as follows: <3 month, 4-12 months, 1-3, 3-7, 7-10, and 10-14 years respectively. IgE levels were higher in boys but were not statistically significant except in 4-12-month olds ($P < 0.005$). There was also an increase in IgE levels with age. Normal value of serum total IgE obtained in this study could be useful to contribute for diagnosis of allergic disease, as reference ranges in Iranian healthy children.

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Keywords • IgE • Normal values • Air pollution

Introduction

Reference value of IgE level is an important factor for description and diagnosis of allergic diseases.¹ Because of ethnical differences, parasitic infections, geographic situation, and flora distribution in any population, local reference should be provided.² The first report for normal total IgE level in healthy children was presented in 1976.¹

Recent studies show the level of IgE in normal individuals was significantly higher than what was reported previously.³ There are some plausible factors, such as parasitic diseases, smoking, alcoholic drinks, and malnutrition that may increase total IgE serum level.⁴⁻⁸ Therefore, defining a reference range in normal subjects for IgE level is very difficult.⁹

There are several reference ranges of total IgE levels for adults and adolescents in the literature,¹⁰⁻¹⁶ but there is not any published data about Iranian population. Therefore, the aim of the present study was to provide upper reference limits of total serum IgE levels in healthy children living in Tehran, Iran.

Subjects and Methods

During a two-year period, we visited 807 children who were referred to Children Medical Center, affiliated with Tehran University of Medical Sciences, for outpatient surgery. The study was approved by the ethical committee of Tehran University of Medical Sciences. The children consisted of 426 males and

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381 females with the age range of 1 month to 14 years. Physical examination was done and a specific questionnaire (containing demographic information, allergy history of the subject and their family) was completed by a physician. Then, cell blood count differentiation test and stool examination (for three times) were done. We enrolled healthy subjects, who were not atopic and had not personal or family history of allergy. And excluded those with Eosinophilia ($>350/\mu\text{L}$), or positive parasitic infections.

After full explanation of the tests to the parents and taking the written consent, 1 ml of blood was drawn by venous puncture and serum was extracted and stored in -70°C . Children were divided into six age groups and serum IgE levels were measured by a quantitative enzyme-linked immunosorbent assay (Diagnostic Automation Inc., California, USA).

Statistical Analysis

Data are presented as mean \pm SD. Kolmogorov-Smirnov tests were done for normal distribution. The reference range for total IgE was determined as the 95% confidence interval (CI) of mean log IgE ± 1.96 SD. Differences in IgE levels between the males and females were analyzed with Mann-Whitney U-test and $P < 0.05$ was considered as statistically significant.

Results

Considering the exclusion and inclusion criteria, we selected 256 children (126 males and 104 females) with the age range of 1 month to 14 years and divided them to six age groups as presented in Table 1. As shown, geometric means of IgE levels in each group were reported separately. Means of IgE levels in males were relatively higher than females, although, data analysis showed non-significant difference between them except in 4-12-month age group that IgE level in males was significantly higher than females (Fig 1).

Table 1: Geometric Mean of IgE levels (GM; KU/L) and 95% CI Reference Range (Ref R, KU/L) of healthy children obtained in this study and presented in the textbook of Kjellman, et al.¹

Age range	N	GM	Ref R	REF
<3 Month	32	1.8	0.1-25	0.2-4
4-12 Month	38	11.1	0.78-162	0.8-15
1-3 Yr	42	18	0.6-184	0.2-17
3-7 Yr	76	24	3-221	1-161
7-10 Yr	36	38.3	2.9-501	1-571
10-14 Yr	32	26.8	2-316	2-195
Total	256	16	0.8-316	-

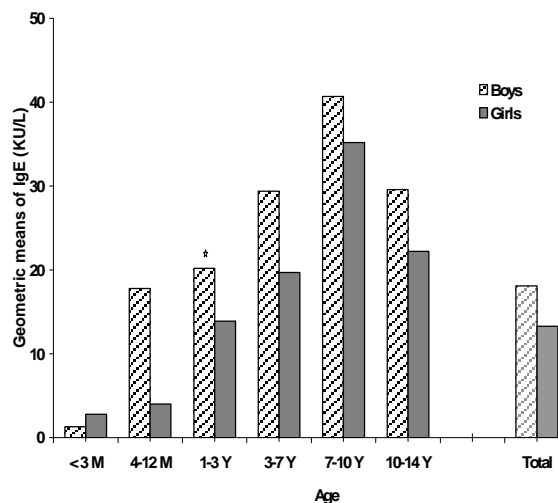


Fig 1: Comparison of means of IgE between girls and boys. *Mean IgE levels of boys and girls are significantly different at $P < 0.05$.

Discussion

Allergy is one of the health problems in the world and serum IgE level is a means for diagnosis of allergy.^{17,18} The results of the present study showed that the total serum level of IgE varies with age and is higher than what was previously reported in the textbooks.¹ But there is not any previous published study about reference ranges of serum IgE in Iranian healthy people to compare. The reference ranges have been mentioned by Pharmacia Company in Uppsala.¹⁸

Chan et al. in 2003 reported that total IgE levels in healthy subjects are higher than the previous references and argued that the pollution may be the cause of this elevation.³ In recent decades, increased of air pollution in the world, particularly in the industrial countries and big cities can be a cause for the increased incidence of atopic diseases by promotion of T helper type 2 cells responses to antigens or by exacerbation of such inflammation in those people who are already sensitized.^{3,11,19,20} In the present study, normal values of total IgE in males were relatively higher than females, which is similar to the study reported by Berciano et al.²¹ This difference was not significant, except in 4-12-month age groups.

Conclusion

The total IgE levels obtained here, as reference ranges in Iranian healthy children, might be useful for the diagnosis of allergic disease. However, due to the variation of allergens in cities and air pollutions it is recommended to repeat local normal range of serum total IgE every 10 years.

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