

## ASSESSMENT OF NORMAL IgE LEVEL IN 0-14 YEAR OLD HEALTHY CHILDREN IN TEHRAN

R. REZAEIPOOR, Ph.D., AND H.R. MOHAMMAD ZADEH, M.S.

*From the Department of Immunology, Medical School, Shahid Beheshti University of Medical Sciences,  
Tehran, Islamic Republic of Iran.*

### ABSTRACT

In order to determine the normal values of total IgE in children, 3270 sera were taken from 0-14 year old males and females in different parts of Tehran, the capital of Iran. The technique which was used to measure total IgE was ELISA method using monoclonal anti-IgE antibody.

The results of this research indicated that the lower value for IgE was detected in children at birth ( $X=3.53$  IU/mL), while the highest value was in 10 year old children ( $X=74.63$  IU/mL). Therefore, it has been concluded that with increasing age, the IgE level will also increase ( $r=0.919$ ).

Regardless of the age value, the IgE content in both males and females are the same. But concerning age and sex, the IgE level in four year old girls was higher ( $X=44.92$ ) than similarly aged boys ( $X=28.2$ ) ( $P<0.01$ ), while in eight year old boys, a higher value of IgE ( $X=66.42$ ) was recorded in comparison to the same aged girls ( $X=49.59$ ) ( $P<0.05$ ).

*MJIRI, Vol. 6, No. 4, 269-272, 1993.*

### INTRODUCTION

Since there have been different diagnostic values for immunoglobulin E (IgE) in allergic diseases, hyper-IgE syndrome and parasitic infections, thus it is very critical and important to have information regarding normal IgE levels in health to compare with disease situations.

In this regard, Johansson<sup>11</sup> revealed that the normal IgE level was lowest in infants, but highest in 20-30 year old adults. Berg, et al.<sup>2</sup> indicated that in contrast to IgM and IgG, there was no difference in IgE levels in males and females. Grundbacher<sup>8</sup> mentioned that the IgE levels in blacks and adults were higher than other individuals. According to Wittig,<sup>17</sup> the IgE levels in men were higher than women. Streven, et al.<sup>16</sup> worked on 372 serum samples taken from 20-65 year old males and females and he obtained the mean IgE level of 12 IU/mL with no significant variations in different sexes and ages. In 1988,

Bernstein, et al.<sup>3</sup> recorded the lowest and the highest IgE levels in 1-4 and 9-11 year old children, respectively.

As it can be concluded from the above investigations, the IgE value may be affected by different factors such as race, age, sex, etc. Therefore, it is very important to determine the normal IgE value in our country to be used for comparisons with disease situations.

In this regard, the normal IgE level was detected in 0-14 year old children from different parts of Tehran.

### MATERIALS & METHODS

Sera were collected from children at schools, nursery schools, and vaccination centers. The number of samples was determined using a pre-test.

In order to determine the presence of parasitic infection, stool samples were examined by three different methods such as direct examination, floatation, and formaldehyde-ether method at the same time.

Atopic children were distinguished based on

\*This work was completely Supported by a grant of Jehade-Daneshghahi of Tehran University of Medical Sciences.

## IgE Level in Children in Tehran

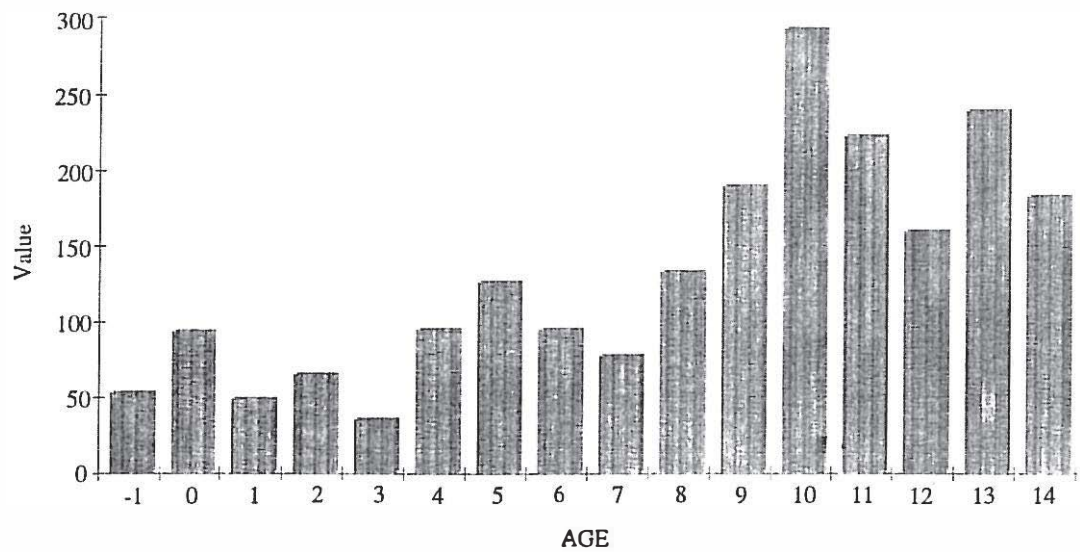


Fig. 1. Distribution of age.

questionnaires containing signs and symptoms of allergic diseases in the children and their family.

The IgE level in each healthy individual was determined by ELISA sandwich method using anti-human IgE monoclonal antibodies conjugated with peroxidase (Enzygnost-IgE monoclonal, Behring Co.)

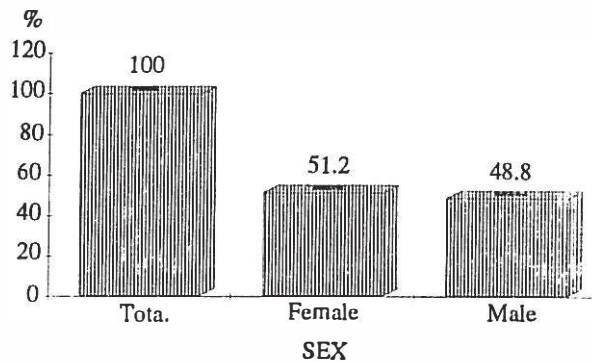


Fig. 2. Distribution of sex in 2103 samples.

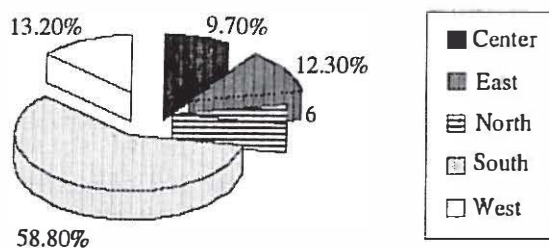


Fig. 3. Geographic distribution of 2103 samples.

## RESULTS

3270 sera were collected totally, among which 1167 samples were not included in our study due to parasitic infections, allergic diseases, etc.

In order to gain statistically significant results, the total number of samples was determined using a pre-test. On the basis of pre-test a standard deviation of 45 units was calculated. Thus, to obtain 95% confidence for IgE levels with error less than 2 units, at least 2000 samples were needed totally from 0-14 year old males and females.

The number of samples needed for every age group was calculated using the following formula:

$$n_i = \frac{s_i}{s_i} n$$

$n$  = total samples

$n_i$  = number of samples in age  $i$

$s_i$  = standard deviation in age  $i$

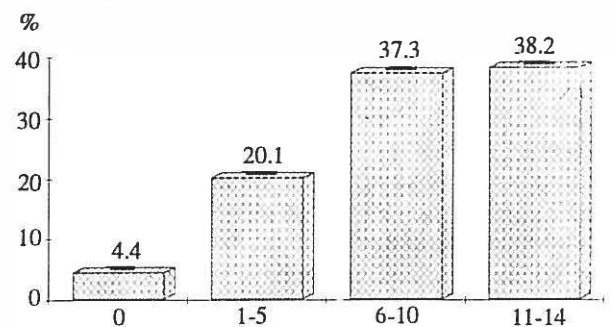


Fig. 4. Distribution of age-groups in 2103 samples.

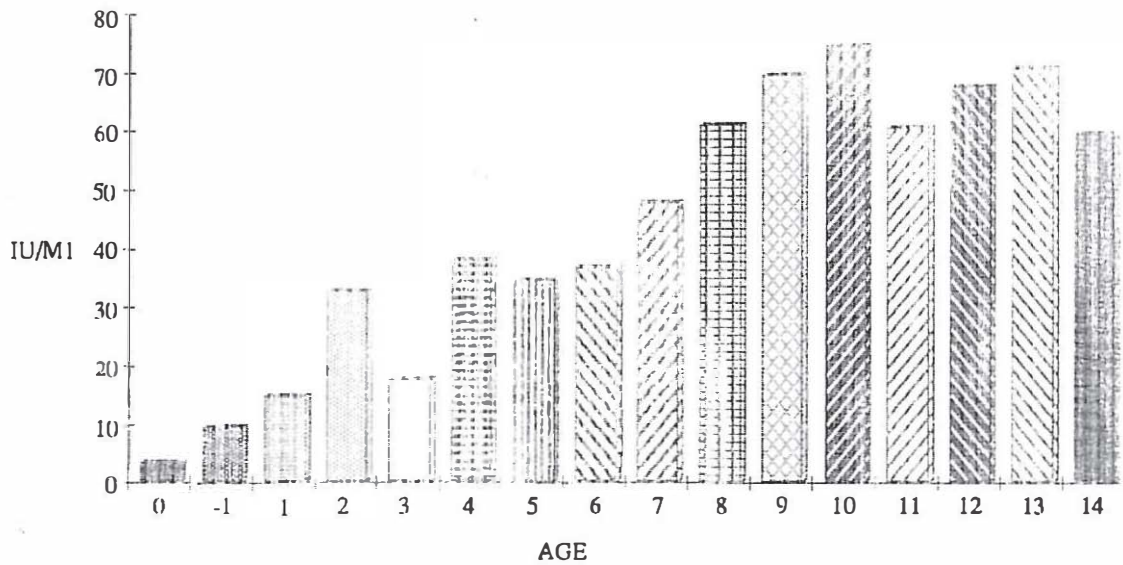


Fig. 5. IgE values in children of Tehran.

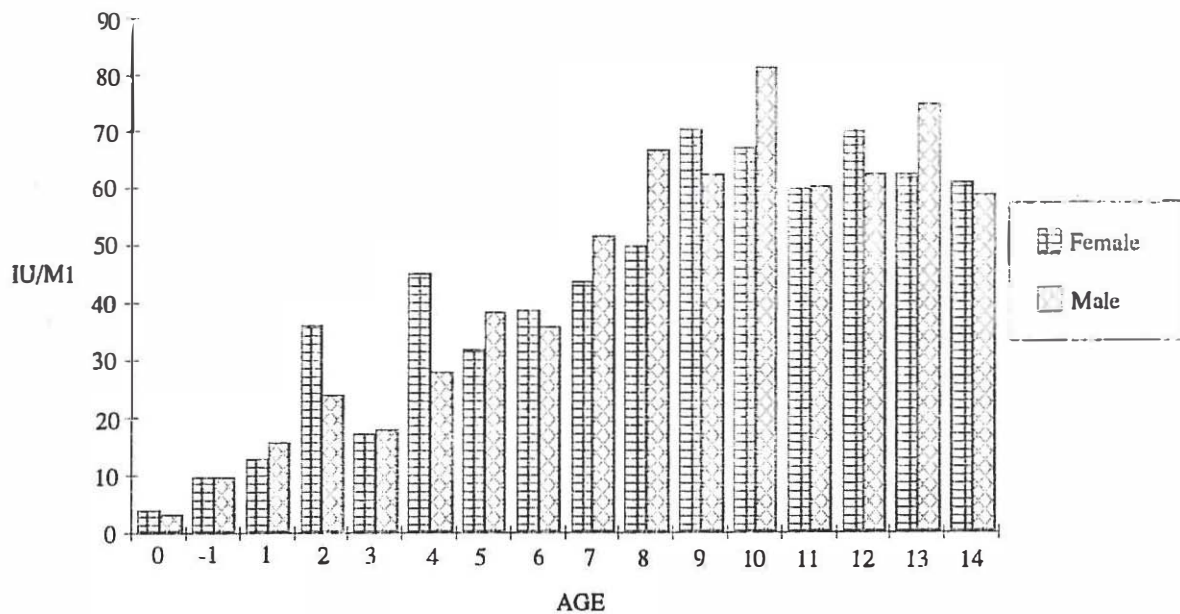


Fig. 6. IgE values in children of Tehran by sex.

The number of samples in each age group is shown in Figure 1. Regarding sex, the number of samples and its percentage is shown in Figure 2. Figure 3 represents the distribution of samples in different parts of Tehran. Figure 4 indicates the distribution of age group in 2103 samples.

IgE levels in 0-14 year old children are indicated in Figure 5. This value is shown separately at different ages and sexes in Figure 6. The comparison of IgE group values in different sexes is represented in Fig. 7.

## DISCUSSION

IgE level has significant diagnostic use in allergic diseases, parasitic infections, etc., therefore defining its normal value is very important for further investigations.<sup>9,14,15,16</sup>

As such a value is affected by different factors such as genetic,<sup>5,8,13</sup> race,<sup>8</sup> age,<sup>3,10,14</sup> sex,<sup>8,14</sup> physiological<sup>1,10,14</sup> and environmental<sup>6,12</sup> conditions, therefore, determination of

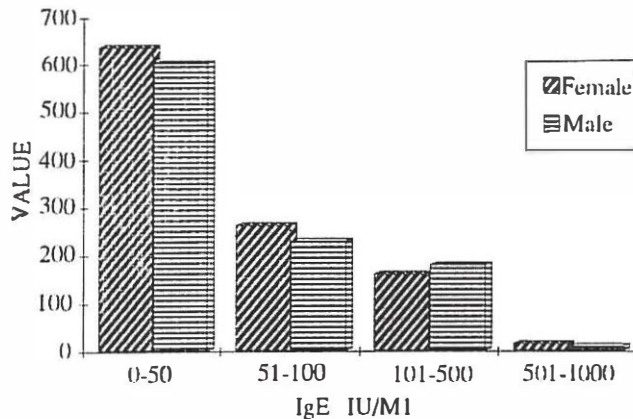


Fig. 7. Comparison of IgE-group values by sex.

normal IgE level seems necessary in each population.

In this study, about 3270 sera were taken totally from 0-14 year old children, among which 1167 samples were omitted in IgE determination due to parasitic and allergic diseases. This omission was necessary because both parasitic infections and allergic diseases may affect the normal IgE level.

Thenormal IgE levels were determined in 2103 healthy samples, among which 1077 (51.2%) were female and 1026 (48.2%) were male (Fig. 1).

Due to availability of sera, most of the samples were taken from the southern part of Tehran at different times of year (Fig. 3).

As shown in Figure 5, the lowest value for IgE was detected in children at birth ( $X=3.53$  IU/mL). Therefore, it has been concluded that by increase of age, the IgE level will also increase ( $r=0.919$ ) (Figures 4,5).

In this study, it was proved that most of the healthy children had about 0-50 IU/mL of IgE, while only a very small fraction of them had IgE levels higher than 500 IU/mL (Fig. 7).

As some other investigators showed, the normal IgE levels may differ in males and females.<sup>8,14</sup> But in our study regardless of age, there was no significant difference in IgE levels between males and females (Fig. 7). However, based on age and sex, the highest IgE level was found in four year old females ( $X=44.92$ ) than same age boys ( $X=28.2$ ) ( $P<0.01$ ), while in eight year old boys, a higher value of IgE ( $X=66.42$ ) was recorded in comparison to the same age girls ( $X=49.59$ ) ( $P<0.05$ ).

Finally, the results of this investigation indicate that the normal IgE level increases by age increment. The peak value of IgE in our study was for 6-14 year old children which is somewhat different than other studies.<sup>10,11</sup>

## ACKNOWLEDGMENT

The authors wish to thank Mr. Navid, A.; Rashidi, K.; Barzcar, G.; Haddj Parvaneh, A.; Lotfi, H. and Masomi, M. for their sincere help and cooperation. The authors also wish to thank Mrs. Modarress, S.; Mortazavi, S.; Bagheri, J. and Kyani, M. for their valuable assistance and collaboration.

## REFERENCES

1. Barbee RA, et al: Distribution of IgE in a community population sample: Correlations with age, sex and allergen skin test reactivity. *J Allergy Clin Immunol* 68:106, 1981.
2. Berg I, Johansson SGO: IgE concentrations in children with atopic disease. *Int Arch Allergy* 61:296, 1988.
3. Bernstein CG, et al: IgA, IgG, IgM, and IgE levels in normal healthy non-atopic Israeli children. *Ann Allergy* 61:296, 1988.
4. Burrows B, et al: The relationship of serum immunoglobulin to cigarette smoking. *Am Rev Respir Dis* 124:523, 1981.
5. Edfors-Lubs ML: Allergy in 7000 twin pairs. *Acta Allergol* 26:249, 1971.
6. Geha RS: Human IgE. *J Allergy Clin Immunol* 72(2). 109, 1984.
7. Gerrard JW, et al: Immunoglobulin levels in smokers and non-smokers. *Ann Allergy* 44:261, 1980.
8. Grundbacher FJ: Heritability estimates and genetic and environment correlations for the human immunoglobulins G, M, and A. *Am J Human Genetic* 26:1, 1974.
9. Hamburger RN, et al: Development of IgE and allergy during the first year of life. *J Allergy Clin Immunol* 2:94, 1974.
10. Johansson SGO: Serum IgE levels in healthy children and adults. *Int Arch Allergy* 3401:1968.
11. Johansson SGO, et al: Immunoglobulin levels in Ethiopian pre-school children with special reference to high concentration of IgE. *Lancet* 1: 1118, 1968.
12. Rodriguez GE: Evaluation of serum IgE levels in twins and their parents. *J Allergy Clin Immunol Abst* 152, 1984.
13. Shemi H: IgE levels in the allergic and healthy Israeli population. *J Ann Allergy* 61:123, 1988.
14. Singer AD, et al: Evidence for secretory IgA and IgE in utero. *J Allergy Clin Immunol* Feb. 94, 1974.
15. Streven VH, et al: Serum total IgE in Canadian adults. *J Allergy. Clin Immunol* 73:516, 1984.
16. Warren CPW, et al: The relationship between smoking and total IgE levels. *J Allergy Clin Immunol* 69:370, 1982.
17. Wittig HJ: Age related serum IgE levels in healthy subjects and in patients with allergic disease. *J Allergy Clin Immunol* 66:(a), 305, 1980.