

SERUM IgE LEVELS OF HEALTHY CHILDREN IN THE TRABZON REGION OF TURKEY*

*Hilal Mocan MD**, Yıldız Saraçlar MD****

Key words: immunoglobulin E, atopy, parasitosis.

Immunoglobulin E (IgE), the carrier of reaginic antibody activity was first identified as a unique immunoglobulin in 1961¹. The role of IgE in the mediation of immediate hypersensitivity reactions and its association with asthma and other atopic diseases has been well established²⁻⁴. The production of IgE may be affected by various factors including age and environment. Thus IgE levels may show some differences individually especially in different geographic regions of a country^{5,6}. This study was carried out to determine the serum IgE levels of healthy children aged between 7-13 years in the Trabzon Region of Turkey.

Material and Methods

The study group involved 431 children attending Cudibey Primary School in Trabzon. There were 212 males and 219 females and their ages ranged between 7-13 years. In order to determine familial and personal atopy, all the children and their parents were asked to fill out a special questionnaire. Each child was given a physical examination, and 200 out of 431 children were also examined for the presence of ova and parasites in the stool. Following the results of the evaluation of the questionnaires, 49 of the children with normal physical findings, those without a personal or family history of atopy, no evidence of ova or parasites in the stool, nor a history of parasitosis within the last six months were examined for serum IgE levels.

The total IgE levels were determined by the ELISA method using the Bio-Merieux IgE kit⁷. Blood samples of about 2 cc were separated from the sera and stored at -20 °C until analyzed.

Geometric means and the *t* test were used for statistical analysis⁸.

* From the Department of Pediatrics, Karadeniz University Faculty of Medicine, Trabzon, and the Hacettepe University Institute of Child Health, Ankara.

** Associate Professor of Pediatrics, Karadeniz University Faculty of Medicine.

*** Professor of Pediatrics and Allergist, Hacettepe University Institute of Child Health, Ankara

Results

Although it is necessary to use certain atopic indices to learn about the atopic tendency of a region, we have documented the results obtained in Table I from the questionnaires of 431 children to elucidate the common problems which may be suggestive of allergic disorders in the Trabzon Region. Eighty-six (20%) of the children in this study presented with at least six complaints related to suggestive allergic disorders in the region.

The distribution of parasitosis in 200 children is illustrated in Table II. The frequency of parasitosis was 57% in the study group and the most common parasites were *Ascaris lumbricoides*, *Trichuris trichura* and oxiur.

The serum IgE levels in two different age groups of children are presented in Table III. The IgE levels were higher in the children aged between 7-9 years than those in children aged between 10-13 years ($p < 0.05$).

The comparison of IgE levels in Trabzon with the levels obtained in Ankara and Samsun are illustrated in Table IV. The 7-9 and 10-13 year-old age groups in Trabzon were found to have significantly higher serum IgE levels than those in Ankara and Samsun ($p < 0.001$).

TABLE I: Data Regarding Suggestive Allergic Disorders Obtained from a Questionnaire Distributed to Primary School Children in the Trabzon Region

	Number of Children
Allergic disorders	
Asthma	35 (8%)
Allergic rhinitis	37 (9%)
Urticaria	39 (9%)
Drug sensitivity	9 (2%)
Food allergy	82 (19%)
Problems Probably Suggestive of Allergic Disorders	
Eczema	13 (3%)
Conjunctivitis	100 (23%)
Ear complaints	210 (49%)
Nasal complaints	157 (36%)
Recurrent bronchitis	56 (13%)
Gastrointestinal disturbances	235 (55%)

TABLE II: Distribution of Parasitosis in 200 Primary School Children

Type of ova and parasite	Number of children
Negative	85
A.lumbricoides	81
T.trichura	23
Oxiur	5
A.lumbricoides + T.trichura	3
Necator americanus	1
Ancilostoma duodenale	1
A.lumbricoides + N.americanus	1
Total number of children	200
Percentage of children with parasitosis	57%

TABLE III: Serum IgE Levels in Different Age Groups of Non-atopic Healthy Children in the Trabzon Region

Age group (yrs)	IgE levels (I.U./ml)		
	Number of children	Geometric mean	Range
7 - 9	23	220.65	100 - 1240
10 - 13	26	180.08	93 - 1100

TABLE IV: Comparison of IgE Levels in Different Regions of Turkey

Age group (yrs)	Serum IgE levels* (I.U./ml)		
	Ankara ¹⁹	Trabzon	Samsun ²⁰
7 - 9	129.15 (n:42)	220.65 (n:23)	126.88 (n:38)
10 - 13	104.94 (n:65)	p<0.001	p<0.001
		180.08 (n:26)	126.65 (n:58)
		p<0.001	p<0.001

* Geometric mean.

Discussion

It has been generally accepted that allergic diseases occur in about 10 percent of the population although this figure may fluctuate with regard to climate and socio-economic conditions in different countries⁵. In Turkey, the incidence of bronchial asthma had been previously reported to be 1.2-2.6 percent⁹. In our hospital practice we found the incidence of allergic bronchitis to be 2.93 percent in our region¹⁰. However, the results of the questionnaire suggest that the actual figures may be higher.

There are several reports in the Turkish literature about the incidence of parasitosis in different regions of Turkey¹¹⁻¹⁵. Climate and socio-economic conditions of a region seem mostly to affect the incidence of parasitosis. In previous studies the incidence of parasitosis was reported to be 47.4 percent in the Erzurum Region¹¹, 16.01 percent in the Samsun Region¹², 87-93 percent in south-eastern Turkey¹³, 24 percent in the Marmara Region¹⁴, and 52.5-79.9 percent in the Kayseri Region¹⁵. Reviewing these results, it may be said that in our region the value 57 percent is still quite high as compared to values obtained from other regions. As in other studies^{5,15}, *A.lumbricoides* and *T.trichiura* are the most commonly seen parasites in our region. The high frequency of parasitosis seems to be responsible for the high ratio of gastrointestinal disturbances in the area¹⁶.

It is known that IgE plays an important role in atopic allergy. High levels of IgE have been found in the sera of patients with asthma, hay fever and atopic eczema¹⁷. Racial differences are considered to be of minor importance. The high incidence of elevated serum immunoglobulin levels in Africans compared to Europeans has been reviewed by Turner and Voller¹⁸. Extremely high levels of IgE were found in the Ethiopian samples studied in preschool children⁶ although clinical investigations did not show a high incidence of atopic allergy among them. This high level was explained by the high incidence of parasitic infestations in Africa.

In Turkey serum IgE levels in healthy children of various age groups were studied in the Ankara¹⁹ and Samsun Regions²⁰. In these two regions, the IgE levels were the highest in the 7-9 year-old age group. The IgE levels obtained from the same age groups in Trabzon were significantly higher than those in Ankara and Samsun ($p<0.001$). Similarly the IgE levels in the 10-13 year-old age group were also higher than the levels of the children in the same age group living in Ankara and in Samsun ($p<0.001$). It is known that in parasitosis the IgE levels increase more than those of atopic diseases and even long after parasitosis therapy, the IgE levels remain high²⁰. The frequency of parasitosis in Trabzon is 57 percent and the frequency of ascariasis is 70 percent. The most likely explanation for the raised

IgE levels in our study groups may be the high incidence of parasitic infestation, especially the occurrence of ascariasis in Trabzon.

Therefore, determination of normal serum IgE levels in various regions of a country may help in the diagnosis of atopic diseases in addition to obtaining data regarding allergic tendencies in the respective regions.

Summary

Serum IgE levels were determined in 49 non-atopic children following the evaluation of the results obtained from questionnaires regarding allergic disorders in 431 primary school children in the Trabzon Region of Turkey. IgE levels were found to be significantly higher than the levels obtained in Samsun and in Ankara. The importance of determining serum IgE levels in various regions of a country is also discussed.

Acknowledgment

We would like to thank Dr. Salim Erdoğan for his assistance in obtaining the IgE assays in this study.

REFERENCES

1. Ishizaka K, Ishizaka T, Hornbrook MM. Physicochemical properties of reaginic antibody. V. Correlation of reaginic activity with gamma-E-globulin antibody. *J Immunol* 97:840, 1966.
2. Ishizaka K, Ishizaka T. Identification of gamma-E-antibodies as a carrier of reaginic activity. *J Immunol* 99:1187, 1967.
3. Johansson SG. Raised levels of a new immunoglobulin class (IgND) in asthma. *Lancet* 2:951, 1967.
4. Berg T, Johansson SG. IgE concentrations in children with atopic diseases. A clinical study. *Int Arch Allergy* 36:219, 1969.
5. Kauner KA, Adkinson NF. Clinical significance of IgE. In Middleton E, Reed CE, Ellis EF (eds) *Allergy, Principles and Practice* (2nd ed). St. Louis: C. V. Mosby, 1983, p 673.
6. Johansson SG, Mellbin T, Vahlquist B. Immunoglobulin levels in Ethiopian preschool children with special reference to high concentrations of immunoglobulin E (IgND). *Lancet* 1:1118, 1968.
7. Hoffman DR. Estimation of serum IgE by an enzyme-linked immunosorbent assay (ELISA). *J Allergy Clin Immunol* 51:303, 1973.
8. Heperkan Y. Tıpta istatistik yöntem ve uygulamaları. Ankara Üniversitesi Tıp Fakültesi Yayınları, Sayı 415, I. baskı, Ankara, 1981, s 103.
9. Özkaragöz K, Çakın F. Atopic children in Turkey. *Ann Allerg* 27:13, 1969.
10. Mocan H. Trabzon Yöresinde sık görülen çocuk hastalıkları. *Çocuk Sağlığı ve Hastalıkları Dergisi* 27:51, 1984.
11. Öğütman R, Saygı G. Erzurum ilkokul öğrencilerinde koproparazitolojik tarama. XVI. *Türk Mikrobiyoloji Kongresi, İzmir 1974*, s 286.
12. Gedikoğlu S. Barsak helmintlerinin Samsun yöresinde dağılımı *Mikrobiyoloji Bülteni* 19:229, 1980.

13. Kurtpınar H, Sarnıç H, Mete O. Sosyo-ekonomik ve çevre sağlığı koşulları farklı iki semtin ilkokul öğrencilerinde barsak parazitlerinin araştırılması. *Diyarbakır Tıp Fakültesi Dergisi* 5:1, 1976.
14. Çolak H. Türkiye’de barsak parazitlerinin bölgesel yaygınlığı. *Mikrobiyoloji Bülteni* 13:115, 1979.
15. Çitak Y. Kayseri’de barsak parazitlerinin bulunuş oranları. *Mikrobiyoloji Bülteni* 14:225, 1980.
16. Sellioglu B, Özcan K. Hacettepe Hastanelerinde 1974-1979 yılları arasında incelenen dışkı örneklerinde barsak parazitlerinin dağılımı. *Mikrobiyoloji Bülteni* 14:235, 1980.
17. Johansson SG, Bennich H. Immunological studies of an atypical (myeloma) immunoglobulin. *Immunology* 13:381, 1967.
18. Turner MW, Voller A. Studies on immunoglobulins of Nigerians. I. The immunoglobulin levels of a Nigerian population. *J Trop Med Hyg* 69:99, 1966.
19. Erdoğan S. Normal Türk Çocuklarında serum IgE düzeyleriyle nazal yaymada eosinofil ve metakromatik hücrelerin araştırılması. Hacettepe Üniversitesi Tıp Fakültesi Çocuk Sağlığı ve Hastalıkları Anabilim Dalı Uzmanlık Tezi, Ankara, 1982.
20. Küçüköçük Ş, Saraçlar Y. The Evaluation of serum immunoglobulin E and peripheral eosinophil counts in healthy children in the Samsun Region of Turkey. *Turk J Pediatr* 29:37, 1987.