

The Consistency of Total Immunoglobulin E with the Symptoms According to Age and the Selection of Allergy Panels in Malatya (Turkey)

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Distribution of allergens may change according to characteristics of regions. Measurements of total immunoglobulin E (TIE) and specific IgE antibodies are used to diagnose allergic diseases. In this study, we investigated sensitivity of TIE and its consistency with allergic symptoms, and compared the appropriateness of some allergy panels with features of Malatya, south-eastern Turkey province. Sera of 233 allergic patients of various age groups were tested for TIE. The specific IgE's were worked with 529 sera for food panel 5 (FP5) and one inhalant panel by using chemiluminescence technique. The sixty of inhalant panel positive sera were tested with specific IgE against house dust mites, *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*. The specific IgE against egg white, milk, wheat, corn, tomato, beef, strawberry and banana were investigated in sixty of FP5 positive sera by enzyme immunoassay method. The sensitivity of TIE was found to be 85%. We concluded that TIE can be used as a scanning test in children aged 5–18 years (69% positive) but it is not useful for 0–5 age group nor in adults (38%, 53% positive, respectively). The allergen scanning test panels should be designed according to custom of society and characteristics of the region.

Key words — total immunoglobulin E, allergens, allergy

INTRODUCTION

Allergens currently represent one of the most common ailments throughout the world. Type I allergy is a hypersensitivity disease affecting almost 20% of the population worldwide. There has been a continuous increase in allergic diseases recent decades.¹⁾ Evaluation of an allergic disorder is difficult and involves history of the patient, clinical signs and laboratory testing. Laboratory tests are generally skin tests and in vitro tests. The Immunoglobulin E (IgE) plays an important role in atopic reactions. The diagnosis of atopic allergy is based on the measurement of total IgE (TIE) antibodies and specific IgE antibodies.²⁾ Humoral immune system gives a response to environmental agents (allergens)

involving the production of allergen-specific IgE.³⁾ The diagnosis of allergies involves various parameters which must indicate some sort of positive correlation. There is no an absolute gold standard for diagnosis the etiology of allergic diseases. This raises concerns about the diagnosis of the disease.

The aim of the present study was to investigate the consistency of TIE with the symptoms, sensitivity of TIE and the appropriateness of some allergy panels in our region. This study was performed on sera of allergic patients who were admitted to the polyclinics and clinics of Turgut Ozal Medical Centre of Faculty of Medicine, Inonu University, Malatya, Turkey.

MATERIALS AND METHODS

Characteristics of the region: Inonu University is a research hospital which provides service to the South-East of Turkey. Study group included patients from Malatya province and South-East of Turkey. The region is an agricultural, industrial and

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stockbreeding centre of Eastern Anatolia. Malatya province which provides an important portion of the world's dried apricot and apricot kernels today.

Evaluation of patients: Patients with allergic symptoms and complaints were evaluated by assistants and specialists working at the clinics and polyclinics. The patients who were suspected to have allergic disorders were referred to our laboratory. The age of the patients ranged between 1–65 years. The sera collected from patients were stored at -20°C and analyzed weekly.

The study continued for one year and performed in two divisions. The IgE levels were examined in patients with allergic diseases in this study. TIE levels, inhalant and food panels were evaluated according to the recommended procedure of the manufacturer by using Immulite® (DPC®) automated analyser. It is designed for the qualitative detection of IgE antibodies specific to common inhalant allergens and for the quantitative measurement of TIE in serum. The working range for the assay of TIE was 1 to 2000 kU/l. The normal range for children is 17–55 kU/l and for adults 25–91 kU/l according to the manufacturer.

Stage I: This division was performed by using immulite auto analyser (Diagnostic Products Corporation, Los Angeles, CA. U.S.A.). Immulite is a chemiluminescent enzyme-labelled qualitative immunoassay technique, it is designed to detect serum levels of IgE antibody. TIE levels were investigated in 233 patients. Five hundred twenty nine sera were tested for food allergens (FP5), inhalant allergens (AlaTOP). Contents of AlaTOP are Timothy grass, Bermuda grass, birch tree, Japanese cedar tree, ragweed, *Plantain*, *Parietaria*, *Dermatophagoides pteronyssinus*, cat dander-epithelium, dog dander, *Penicillium notatum* and *Alternaria tenvis*. FP5 includes egg white, milk, cod fish, soya, peanut and

wheat.

The positivity of TIE was investigated in 101 sera, which had given positive reaction to at least one allergy panel.

Stage II: In this division, specific IgE against *Dermatophagoides pteronyssinus* (D1), *Dermatophagoides farinae* (D2) with sixty of AlaTOP positive sera, and egg white (F1), milk (F2), wheat (F4), corn (F8), tomato (F25), beef (F27), strawberry (F44) and banana (F92) with sixty of FP5 positive sera were investigated. Timothy grass (G6) was worked on 24 of AlaTOP positive sera. AlaSTAT (Diagnostic Products Corporation). Kits were used. It is an enzyme-immunoassay method used for the measurement of allergen specific IgE antibodies.

Statistical analysis was performed using Chi square tests. Values of $p < 0.05$ was considered significant.

RESULTS

The first division: TIE levels were investigated in sera of 233 patients with allergic signs and symptoms. Distribution of TIE ratios according to age groups are given in Table 1.

The sensitivity of TIE was investigated in 101 sera, which had given positive reactions to at least one allergy panel. The sensitivity of total IgE was found to be 85%. It was false negative in 15% of sera. There was no considerable difference in the TIE ratios for the upper ten years old groups, (50–58%). Consistency of TIE with the symptoms in 1–5 year age group was found to be low (38%). The highest value was observed in the 5–10 year age group (75%).

In addition, the results were analysed from 529

Table 1. The Distribution of TIE Ratio According to Ages

Age (years)	1–5	6–10	11–18	19–35	36–50	51–65	Total
TIE positive (%)	20(38)	28(75)	14(58)	28(51)	23(57)	13(50)	126(54)
Total sera	52	37	24	54	40	26	233

Table 2. The Distribution of Specific Allergens

Allergens ^{a)}	D1	D2	F1	F2	F4	F8	F25	F27	F44	F92	G6
Positive (%)	26(43)	19(32)	17(28)	6(10)	10(17)	13(22)	24(40)	9(15)	9(15)	19(32)	11(46)
Total sera	60	60	60	60	60	60	60	60	60	60	24

^{a)} *Dermatophagoides pteronyssinus* (D1), *Dermatophagoides farinae* (D2), egg white (F1), milk (F2), wheat (F4), corn (F8), tomato (F25), beef (F27), strawberry (F44) and banana (F92) and timothy grass (G6).

patients in this stage. Inhalant allergens (AlaTOP) were most frequently positive (38%). FP5 was 20%. In the second division, specific IgE for eight food allergen types were studied with FP5 positive sera. Tomato sensitivity (40%) was most frequently seen among food allergens. There was statistically significant difference between tomato sensitivity and those of wheat, beef, strawberry, milk (40% and 17%, 15%, 15%, 10%, respectively). The sensitivity to Timothy grass (G6) (46%) among AlaTOP positive sera was very high. Sensitivity to D1 and D2 among AlaTOP positive sera were 43% and 32%, respectively. Distributions of specific allergens are demonstrated in Table 2.

DISCUSSION

The diagnosis of atopic allergy is difficult. To our knowledge, there isn't a gold standard diagnostic procedure. The measurement of TIE and specific IgE are important in determining the aetiology of allergic diseases.

In this study, the sensitivity of TIE was found to be 85%. It has been reported to be 84% for adults and 57% for children in another study performed by using immulite auto analyser in a different region of Turkey.⁴⁾ According to these results, TIE can be used as a screening method for allergic patients, but it is unsuitable as an allergy screening test for children under 5 years old.⁴⁻⁶⁾ We didn't investigate the sensitivity of TIE according to age groups. However, correlation was made between the consistency of TIE with symptoms in different age groups. It was quite low (38%) for 1-5 age group and was most high in 5-10 years old group (75%) (Table 1). In one report, the TIE ratios was 20% for 1-3 age, 19% for 3-7 ages, 46% for 7-10 ages and 66% for 10-16 age.⁶⁾ In another study, the peak of IgE concentration was noted at age group of 8-14 years.⁷⁾ The discriminating ability of TIE is most suitable in children aged 5-16 years according to the results of our study and those of others.^{6,7)} Serum TIE values decline with age in the general population.⁸⁾ In our study, the consistency between TIE and the symptoms was found between 51% and 57% in adult age groups. A similar result has been noted as 39-59% in adults (18-55 years old) from different regions in another study.⁹⁾ However, correlation between the IgE concentration and the severity of allergic symptoms was not determined from the beginning of the work and the current data are insufficient for mak-

ing proper interpretation.

Inhalant allergens are the most common cause of allergic diseases. The food allergens take place with less frequency.^{10,11)} Also in our study, Inhalant allergens (AlaTOP) were also found to be more frequently positive than food allergens (FP5) among allergic patients. We investigated the allergens in sera by using the AlaTOP and FP5. These panels have been standardized according to the most common allergens worldwide. *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Felis domesticus*, pollen allergens and Timothy grass are seen most frequently and they are widespread in the world.^{10,12)} However, distribution of allergens changes according to regions. *Dermatophagoides pteronyssinus* (43%), *Dermatophagoides farinae* (32%) and Timothy grass (46%) could be important allergens among patients also in our study (Table 2). AlaTOP results were positive in 38% in our region. This ratio is insufficient to be used as a screening test. The constituents of AlaTOP are *Dermatophagoides pteronyssinus*, cat dander-epithelium, dog dander, Bermuda grass, Timothy grass, *Penicillium notatum*, *Alternaria tenuis*, birch, Japanese cedar, Common Ragweed, English Plantain, *Parietaria officinalis*, birch, Japanese cedar, Ragweed is rare in our region and other regions of Turkey. Black pine, Scots pine and beech are most frequent in Turkey. The most important inhalant pollen may be apricot tree pollens for Malatya, stockbreeding of cattle goat, and sheep is widespread in rural parts of the south-eastern Turkey. Although cats and dogs are most commonly nourished by farmer families in rural regions, the majority of people in urban region are not pet owners. The constituent of AlaTOP is inappropriate to be a scanning method for inhalant allergens in Malatya and other regions of Turkey. The positivity of inhalant allergen panel may probably be higher than current values in our region, if AlaTOP kit includes specific IgE for allergens such as apricot tree pollens, black pine, Scots pine and beech which are popular in Malatya province and south-east of Turkey. Moreover, we couldn't find a study dealing with these allergens in Turkey. We haven't had means to test these allergens currently.

Food allergens are second important cause of allergic diseases. Eight percent of children and 1-2% of adults are affected from food allergy.¹³⁾ It is seen much more in children with atopic disease than general population. About 30% of children with atopic dermatitis and 10% of children with

asthma have been shown to have food allergies.¹⁴⁾ In a study in Turkey among patients with drug intolerance and asthma, food allergy was found to be 22.7% and the patients just with asthma was found to be 7.8%.¹⁵⁾ A limited number of foods are responsible for allergic reactions: milk, egg, peanuts, fish, and tree nuts in children (90% of hypersensitivity reactions) and peanuts, tree nuts, fish, and shellfish in adults (85% of reactions).¹³⁾ We found FP5 positivity ratio as 20%. According to our results, tomato (40%), banana (31%), egg white (29%) and corn (21%) were the most important allergens for our community (Table 2). In our country, tomato is a fundamental nourishment. It is found in almost all recipes. Apricot is important nourishment for this region. Malatya provides an important portion of the world's dried apricot and apricot kernels today. Cod fish and soya are rarely used in Malatya and Turkey. FP5 includes egg white, milk, cod fish, Soya, peanut and wheat. It is insufficient as scanning test for food allergy in our region. A panel, which included tomato, egg white, milk, wheat, tomato, banana, egg white and corn, is more favourable as food scanning panel for our region and Turkey.

According to these results, TIE can use as a screening test in children aged 6–18 years (69% positive). It is inappropriate for children aged 1–5 years and adults (38%, 53%, respectively). The test panels should be designed according to custom of the society and characteristics of the region to get the more reliable results.

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