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Original Article

The Study of Total IgE Reference Range in Healthy Adults in Tehran, Iran

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Abstract

Background: IgE is an antibody class that regarded as an important factor in the pathogenesis of allergic diseases, asthma, immune responses to parasitic infection and it could be responsible for the late- phase allergic response. The objective of this study was to evaluate total IgE in healthy Iranian adults, establishment of reference range of total IgE and assess helpfulness of this value in clinical diagnosis atopic and allergic diseases.

Method: Three hundred sixty six healthy adults from blood transfusion volunteers (18 to 60 years) were selected in this study. A specific questionnaire (including demographic factors, smoking status and …) was filled out for each person. Also, we evaluated effect of race and education on total IgE. These adults had no history of allergic disease. The total serum IgE level using a commercial enzyme immunoassay and CBC (Eosinophil count) was determined in them.

Results: Mean of age was 37.32± 10.93 yrs and 219 cases were males and 147 females. The geometric mean of total IgE was 20.84 IU/ml (2-373 IU/ml) (95% percentile= 250) (95% confidence interval=46.27-62.70). No differences was observed between mean of IgE log in males and females (P= NS) but mean of total IgE log in females is more than males.

Conclusion: Normal range of serum total IgE obtained in this study could be helpful for diagnosis of IgE-dependent allergic disease, as reference ranges in Iranian healthy adults.

Keywords: *Total IgE, Reference range, Healthy adults, Iran*

Introduction

IgE is an antibody class that regarded as an important cause in the pathogenesis of allergic diseases, asthma and in immune responses to parasitic infection, it could also be responsible for the late- phase allergic response (1, 2). Despite of several recognized restrictions, the foundation of allergic diseases is allergic sensitization mediated by IgE, and high total IgE was commonly included as a diagnostic factor of allergic diseases and other IgE-mediated disorders (3, 4).

The explanation of reference ranges of total IgE can be hard because of a significant overlap of IgE values between subjects having atopy or no having atopy and the broad diversity of factors that affect total IgE values such as gender, age, race, smoking (3, 5, 6). Also, some diseases such as parasitic diseases, some cancers, hyper IgE syndrome and wiskott Aldrich syndrom can cause increased IgE production (6, 7).

Determination of local reference value of Immunoglobulins is important for clinical interpretation in different populations. Normal ranges of IgA, IgG and IgM were determined in Iranian Healthy adults in 2003 (8). Also, in another study (2006), total IgE levels were measured in healthy children in Tehran (9). At present, physicians and laboratories use several references from different countries (10-12) for total IgE normal range in Iran but because of ethnical diversity, geographic condition and flora distribution, local reference should be provided (13). The determination of total IgE helps to diagnose of atopic status (6).

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The aim of this study was to evaluate total serum IgE in healthy Iranian adults, determination of reference range of total IgE and assess helpfulness of this range in clinical diagnosis of allergic diseases.

Materials and Methods

Four hundred twenty three blood donor volunteers from Iran Transfusion Blood Center, Tehran, Iran were entered this study between Jan 2007 to Jan 2008. Fifty seven donors were excluded from this study due to exclusion criteria [including having allergy history and/or family allergy history including allergic rhinitis, urticaria, atopic dermatitis, asthma symptoms (chough, wheezing, breathlessness) and eosinophil count more than 450 (absolute counts) (14)]. In the end, 366 healthy adults, in the age range 18-60 (Mean±SD= 37.32±10.93) were selected. All subjects gave informed consent for participating in this study. A specific questionnaire (including demographic data and smoking status, education) was full filled for them (one day in each week by one researcher). These adults had no history of allergic disease in themselves and their family. One-milliliter serum of blood samples was collected and stored at -20". The value of serum total IgE using a commercial enzyme immunoassay (Genesis Diagnostics, Cambridgshire, England) and also, 1cc whole blood in EDTA was taken and CBC diff (Eosinophil count) was performed with Sysmex (KX21) for them. This study was approved by the ethical committee of Tehran University of Medical Science.

Statistical Analysis

Statistical analyses were performed using SPSS-15. Independent sample t-test, one-way and multifactorial analysis of variance (ANOVA) was used. The IgE mean levels were reported by Log_{10} mean and geometric mean.

Results

The adults consisted of 219 males and 147 females. The total IgE among 366 healthy Iranian adults ranged from 2 to 373 IU/ml. In the whole sample, the geometric mean of total IgE was 20.84 IU/ml (95% percentile= 250) (95% confidence interval= 46.27-62.70). Females have higher total IgE values than males (23.91 vs 19.1).

The education of these subjects in our study was categorized in five groups (illiterate, uneducated, diploma, university degree and PhD) and geometric mean of total IgE was measured in each group and there is no significant difference between them (P>0.05).

Table 1 also reports the mean of total IgE log and geometric Mean by sex and smoking status and the 95th percentile. Table 2 shows geometric mean in different age groups.

Table 1: Characteristics of studied subjects and Mean log_{10} (SD), Geometric mean, 90 and 95% percentile

Variable	*Total No.*	*Mean log_{10} (SD)*	*Geometric Mean*	*90% Percentile*	*95% Percentile*
All subjects	366	1.32(0.73)	20.84	166.6	250
Sex:					
Males	219	1.27(0.62)	19.1	123.1	227.6
Females	147	1.37(0.66)	23.91	238.4	312.3
Smoking:					
Yes	42	1.26(0.60)	18.40	152	236.3
No	324	1.32(0.65)	21.18	174.5	259.7

Table 2: Geometric mean and mean of total IgE log in different age groups

Age groups	*n*	*Geometric Mean*	*Mean of tIgE log±SD (KU/l)*
18-20	10	31.45	1.49±0.58
21-30	116	25.35	1.40± 0.67
31-40	92	19.86	1.29± 0.65
41-50	94	16.03	1.20± 0.55
51-60	49	19.41	1.28± 0.69

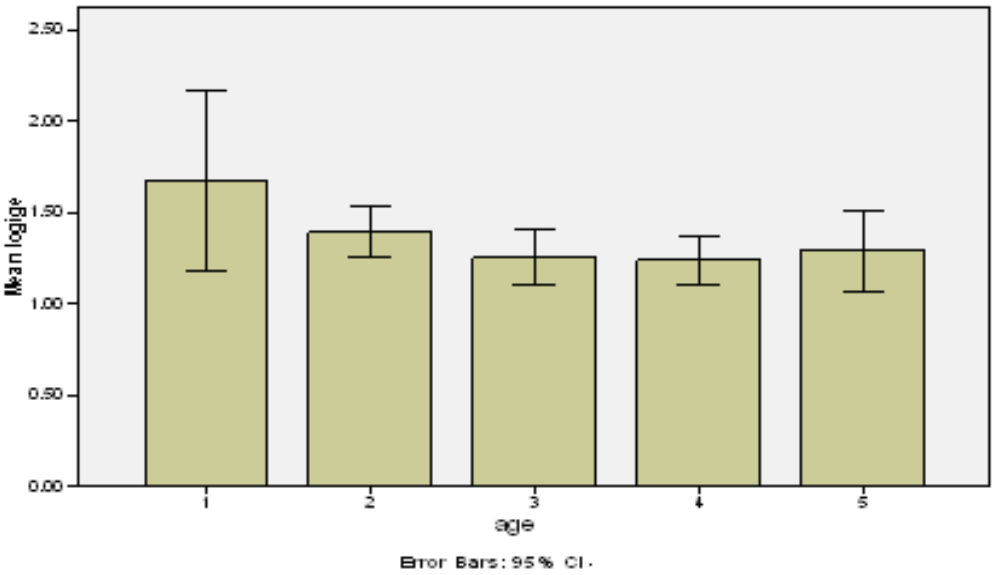

Fig. 1: Mean of IgE log in different age groups (yr)

Groups: Group1 (18-20), Group 2 (21-30), Group 3(31-40), Group 4(41-50), Group 5 (51-60)

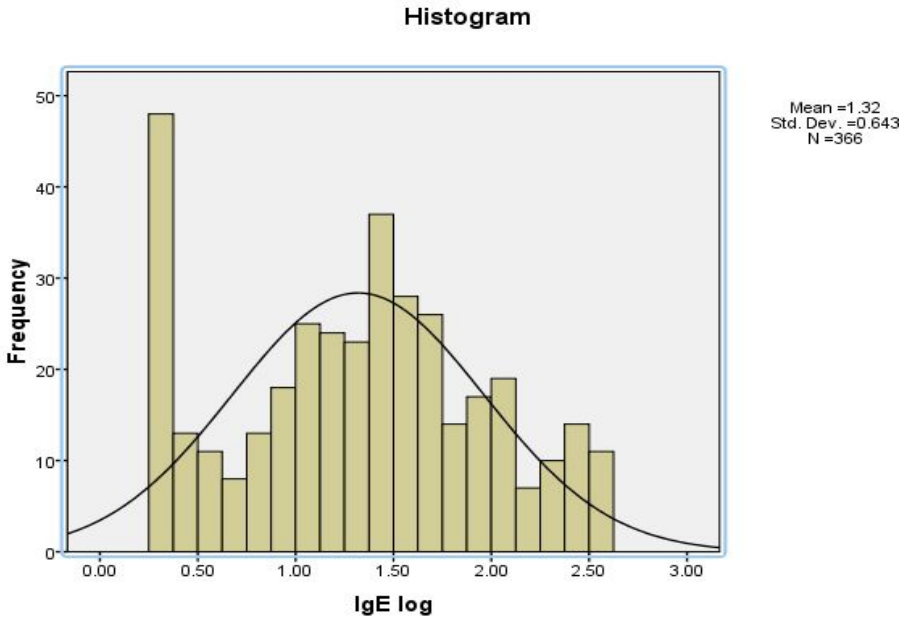

Fig. 2: Histogram of normal distribution of total IgE log

Discussion

Results of our study implied that reference value for healthy adults (2-373 IU/ml) is different of other studies that a reason could be due to difference of geographic area and place of birth and background exposure (3,4,15).

For example, in some studies total IgE levels were higher in men than in women (3, 4, 6, 7, 16, 17). The authors concluded that the higher levels in men could be due to a strong relationship with smoking, while in our study, there was no significant difference between males and females and in contrast with other studies, females had total IgE higher than males. In another study (1981) that IgE levels was measured in healthy adults, the geometric mean of serum IgE was 13.2 IU/ml and no significant difference between age groups or sexes was found (15). Reference range obtained in that study (1.5-114IU/ ml), has been applied broadly for identifying allergic and atopic patients (3, 4). The mean of total IgE was 38±43 IU/ml in normal non-allergic Caucasians in a different study (18).

Effect of smoking was assessed on total IgE levels in this study, but we did not observe statistically any significant difference between smokers and non- smokers volunteer blood donors. While in other studies, smokers had higher total IgE than non-smokers (3, 19). It may be due to lower smokers in blood donors precipitating in our study (11%). According to a study in Iran, 17.4% of Iranian populations were smokers. (20).This percent is lower than some countries for example England (25%), Italy (25.8%) (21, 22).

Reference range of total IgE in young adults from 10 western European countries was 95% percentile of total IgE reference value (148 IU/ml in women, 169 IU/ml in men) which was lower than our study (227.6 in males and 312.3 in women) (3).

Our limitation was imbalance in men/women population because the most blood volunteers were men.

In conclusion, normal range of serum total IgE obtained in this study could be helpful for identifying atopic from non-atopic and diagnosis of IgE-dependent allergic disease, as first reference ranges in Iranian healthy adults.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the author (s).

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