SERUM TOTAL IGE LEVELS IN HEALTHY CHILDREN AND ADULTS IN IBADAN, NIGERIA

OG Arinola

Abstract

Background: Total serum IgE may be helpful in the diagnosis of atopic and certain diseases. However, the normal range is very wide and levels do not correlate well with symptoms.
Objectives: This study determined the levels of IgE in Nigerians, so as to provide additional reasons for the wide normal range of IgE values.
Methods: One hundred and eight healthy Nigerian children (2- 12 years of age) and one hundred and fifty-six healthy Nigerian adults (15-54 years of age) were selected for determination of serum IgE levels using ELISA method. The subjects were grouped by locality (urban or rural), age, sex and with or without helminthiasis.
Results: The level of serum IgE ranged between 30 – 750 IU/ml. The level of serum IgE was significantly reduced in children compared with adults independent of sex and locality. The level of serum IgE was significantly reduced in urban children compared with rural children, and in children without helminthiasis compared with children having helminthiasis.
Conclusion: Sex, urbanization and helminth infestations affect the level of serum IgE particularly in children, therefore IgE may not be helpful for diagnostic purposes in children

Keywords: Serum IgE, children

Introduction

Immunoglobulin E (IgE) is a unique class of immunoglobulins present in the circulating plasma at extremely low concentration. This class of immunoglobulin is responsible for homocytotropic or reaginic antibody activity in serum [(1)]. It has been demonstrated to mediate atopic type of hypersensitivity reaction in man and its high level has been associated with parasitic infestations [(1)]. In clinically healthy subjects, the serum IgE levels exhibit a wide distribution range and do not follow a normal distribution [(1, 2)]. Many workers have suggested that raised level of IgE is associated with various vascular diseases [(2)], parasitosis (1), lead overload [(3)], asthma [(1)], cigarette smoking [(4)] and alcohol use[(5)]. The physiological or immunologic role of IgE is still uncertain. However, with the increased understanding of IgE, it is hoped that the quantitative determination of this immunoglobulin may be of value to the clinicians.

Decreased levels of IgE are found in cases of hypogammaglobulinemia, autoimmune diseases, ulcerative colitis, hepatitis, cancer, and malaria [(6)]. Cord blood or serum IgE levels may have prognostic value in assessing the risk of future allergic conditions in children. In non-allergic normal individuals IgE concentrations increase steadily during childhood, reaching their highest levels at age 15 to 20 years and thereafter remaining constant until about age 60 years when they slowly decline[(7)]. There are several reference ranges of total IgE levels [(7, 8, 9)] but the published data about Nigerian population are scanty. Moreover, if the estimation of IgE is to serve as a diagnostic tool, it is important to estimate and re-estimate their levels in normal individuals of a given population to serve as control. This study determined the levels of IgE in Nigerians, so as to provide additional reasons for the wide normal range of IgE values.

Correspondence: Arinola O.G. College of Medicine, University of Ibadan, Nigeria. arinolaog@doctor.com,.drarinolaog64@yayoo.com,

Dept. of Chemical Pathology and Immunology, Immunology Research and Training Centre

Participants and Laboratory Analysis:

The participants were apparently healthy male and female children (2-12 yrs) and adults (15-54yrs) leaving in both rural and urban parts of Oyo State, Nigeria. They were not asthmatic as per the definition of ISAAC (12). Those who were on steroid therapy, evidence of infection and pregnant females were excluded from the study. Based on questionnaire, none of the participants had diabetes, cardiac disease, renal and liver dysfunction. Informed consent was obtained from all participants and ethical clearance was also obtained from the Institutions (UI/UCH) Review Committee. Five ml of blood was collected by venepuncture into a plain bottle, allowed to retract and serum was collected from whole blood sample by spinning at 3500rpm for 5 minutes. The serum was stored at -20^{0}C until analyzed. IgE level was determined using IgE-kits of Leinco Technologies, Inc, USA by ELISA method and the results were expressed as international units per milliliter (iu/ml).

Stool and urine samples were also collected in clean plastic sample bottles. Stool samples were homogenized with normal saline. Both stool and urine samples were spun at 3500rpm for 5 minutes and the sediments were examined microscopically for the ova of parasites.

Statistical analysis: The result was presented as mean and standard deviation. The significances of the differences between values were determined using Students (t) test.

Results

As shown in Table 1, the level of IgE was significantly reduced in either male or female children compared with adult counterparts. Also from this table, the level of IgE was not significantly reduced in female children compared with male children or female adults compared with male adults. In Table 2, children from urban population had low level of IgE compared with those in rural population while there was no significant decrease in the level of IgE of adults from urban areas compared with those from rural areas. In Table 3, the level of IgE was significantly raised in children having helminthiasis compared with children not having helminthiasis while there was no significant increase in the level of IgE in adult having helminthiasis compared with adult not having helminthiasis. In the three tables (Tables 1, 2 and 3), the levels of IgE in adults were significantly raised compared with the children. The types of parasites detected were *Taenia* spp, *Ascaris* spp and hookworms.

Table 1: The mean levels (IU/ml) of IgE in male and female Nigerians

Children	Adults
Male	
189.5 ± 161.6*(31 -500 iu/ml) iu/ml) (n=48)	309.9 ± 212.3(40-750 (n=58)
Female	
141.7 ± 124.8*(30-430 iu/ml) iu/ml) (n=60)	264.2 ± 233.1 (40-750 (n=98)

*Significantly different from adults (p<0.0.05)

Table 2: The mean levels (IU/mL) IgE in rural population compared with urban population

Children	Adults
Rural population	
122.2 ± 44.5*♠(31-500 iu/ml) (n=78)	296.3 ± 238.4(40-500 iu/ml) (n=80)
Urban population	
68.4 ± 59.9*♠ (31-430 iu/ml) (n=30)	259.7 ± 147.8 (31-450 iu/ml) (n=76)

*Significantly different from adults (p<0.05)
♠Significantly different from urban population (p<0.05)

Table 3: The mean levels of IgE in Nigerians with helminthes and those without helminthes

.Children	Adults
Those with helminthes	
211.3 ±123.6*♠ (40-400iu/ml) (n=16)	312 ± 239.8 (50-750iu/ml) (n=78)
Those without helminthes	
160.8 ±141.1*♠ (30-430 iu/ml) (n=50)	281.2 ±225.3 (31-700 iu/ml) (n=40)

* Significantly different from adults (p<0.05)
♠Significantly different from urban population (p<0.05)

Discussion

Allergy is one of the health problems worldwide; and it is often erroneously assumed that an elevated IgE explains allergy of obscured symptoms.[1] The result of the present study showed that the total serum level of IgE increases with age. This could be due to longer years of contact with environmental and food allergens by the adults more than children. Rural subjects had higher levels of IgE compared with urban subjects. This contrasts previous studies that reported high levels of IgE in urban population compared with rural population based on increased air pollution and exacerbation of inflammation in those already sensitized.[10] The present result could be explained by lack of intense infections in urban areas owing to improved hygiene, vaccination and use of antibiotics. This could also be supported by the observation of higher prevalence of helminthisasis in children especially in the rural area.

Helminth infections are universally associated with responses stimulated by Th-2 type cytokines resulting to high level of IgE, eosinophilia and mastrocytosis. Therefore higher level of IgE in subjects with helminthiasis is expected. The effect of helminthiasis of IgE level is more noticeable in children than in adults because children have higher prevalence of helminthiasis than adults due to increased susceptibility and lack of self-medication [11].

Immunoepidemiological studies showed that helminth infections are often associated with highly polyclonal IgE which is not specific for parasite antigen.[10, 11] Such polyclonal IgE saturates high affinity IgE receptors on mast cells and basophils thus blocking the binding of specific IgE to environmental allergens. This hypothesis is in support of the protective role of helminth infections on allergic reactivity. Therefore, total IgE in children may be a poor for the presence or absence of atopic disease.

Conclusion

The present study shows that the normal range of IgE in children is 30-500iU/ml and 31-750 iU/ml in Nigerian adults but these reference ranges should be used as a guide only, considering various interfering factors especially in the children.

Acknowledgement

The author would like to thank Prof. Olopade C., of Illinois, Chicago USA for the gift of IgE kit; Mr Titiloye Oyewumi and Miss Aderinto Grace, Department of Chemical Pathology and Immunology, University of Ibadan, Nigeria for their technical assistance.

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