Modes of allergy and total IgE concentrations among various ages of Basrah populations

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This study determines the modes of allergy according to concentrations of total IgE of a total of one hundreds healthy persons from basrah population, 48 (48%) males and 52(52%) females were introduce in this study from September 2005 to December 2010.The age studied Basrah population were from 1 to 50 years with a statistical mean of age of (11.42) years, the age groups (infantile and childhood) recorded a percentages of (34.7% and 27.5% respectively) than adult hood patients (groups 3,4,5) that recorded (17.8, 11.4 and 8.7% respectively). Males were highly presence in groups (1, 4, 5) (55.36, 43.2 and 32.84% respectively), while females predominated males in groups (2 and 3), (61.65% and 60.35% respectively). The study showed that personal history for atopy and others were significantly associated with various disorders in 67 (67%). On the other hand, no associated disorder was reported in 33(3%). (P<0.001).While occurrence rates among family history of allergy were found very highly significant (P<0.001).The total concentration of IgE was elevated above the normal value in about 86.5% of various age groups of Basrah population (P<0.001).The modes of allergy in various age groups were studied and it has been found that the mode of allergy, very probable (IgE>100 IU), is predominant in (88.8%) of various age groups of Basrah population (P<0.001).

Keywords: allergy, total IgE, Iraq.

INTRODUCTION

In 1919, a physician observed a blood transfusion, a case of transient asthma caused by allergy to horse dander. This was the first indication of a factor in blood capable of mediating an allergic reaction. In 1921, Prausnitz and Küstner performed the passive transfer of a positive skin test. The search for the reagin started, but until the 1960's it was thought that reaginic activity was not a single, indivisible molecular species but was present in allergic sera in the form of labile complexes, and that it differed radically from immune antibodies. (Oettgen et al., 2001).

Allergy is defined as "a hypersensitivity reaction mediated by immunological mechanisms" which can be antibody- or cell-mediated. In the majority of cases the antibody typically responsible for an allergic reaction belongs to the IgE isotype and individuals may be referred to as suffering from an IgE-mediated allergic disease, e.g. IgE-mediated asthma. Atopy is a personal or familial tendency to produce IgE antibodies in response to low doses of allergens, usually proteins, and, as a consequence, to develop typical symptoms of asthma, rhinoconjunctivitis or allergic skin disease. (Geha et al., 2003).

An allergic reaction is caused when a person's immune system produces IgE antibodies in response to a foreign antigen (allergen). IgE molecules are tightly bound to the surface of mast cells (and basophiles in blood). These cells contain granules that have a high concentration of histamine and other substances that are responsible for the allergic reaction (Vercelli, 2005). Upon subsequent exposure to the same antigen, an immediate (type 1) hypersensitivity reaction called the atopic or allergic reaction ensues. The allergen binds to the IgE and the cross linking of antigen and antibody molecules causes the mast cell to degranulate. The histamine and other allergic mediators are released and cause local swelling (edema) and redness (vasodilation). These reactions occur immediately and may be sufficient in intensity to cause constriction of the bronchi and shock. Such a systemic response to an allergen is called an anaphylactic reaction. Allergens most often responsible for anaphylactic reactions are insect bites and penicillin in

persons who are allergic to these agents. (Novak et al., 2003).

Allergy tests may be of two general types. In vivo tests that measure the immune response to an agent called an allergen that induces an allergic (atopic) reaction, and in vitro tests that measure the antibodies that mediate an allergic response. Such antibodies are those of the immunoglobulin E class (IgE) which have epsilon heavy chains which attach to mast cells (Geha et al., 2003). Allergy tests are performed to determine the cause of a person's allergic reaction. An allergic reaction is caused by the production of specific IgE antibodies against one or more antigens. Those antigens that elicit IgE production are termed allergens and are usually harmless substances (Vercelli, 2005).

The upper limit of normal for total IgE is highly age dependent for children. The upper limit increases over the first 10 years, then levels off. The cutoff for adults varies with the test methodology. For the PRIST test the cutoff is approximately 25 kU/L IgE when the standard used is traceable to the 2nd International Reference Preparation of the World Health Organization (Vercelli, 2005; Novak et al., 2003).

The presence of atopy can be assessed by increased levels of total serum IgE and specific IgE to common allergens, skin test positivity and increased numbers of peripheral blood eosinophils. Genetic studies indicate that multiple genes are involved in the pathogenesis of atopy and that different genes regulate the presence of increased levels of serum total IgE and specific IgE (Prussin et al., 2003).

The discovery of IgE allowed the development of immuno-assays for IgE and IgE-antibodies, enabling direct and objective measurement of the extent and specificity of the immune response. In RAST, allergens are linked to paper discs or polyurethane caps (CAP - RAST) and are reacted with the individual's serum. Binding of IgE specific to that allergen is detected by the use of an enzyme linked anti-human IgE antibody in a colorimetric reaction. Results of RAST testing show a very good corelation between the presence of IgE antibody in serum and positive skin and provocation tests, as well as symptoms of allergy. Positive RAST results to a specific allergen demonstrate specific IgE sensitization but are not proof that the allergen is the cause of clinical symptoms (Saffar et al., 2007; Metcalfe et al., 1997).

The aims of the present study were to determine the concentrations of total IgE and modes of allergy through basrah population.

MATERIALS AND METHODS

Sampling

A total of (100) healthy individuals were randomly collected (without any allergic features, skin infections and immunological disorders)

Blood samples: 10 ml of blood was collected by venous puncture in a suitable tubes according to (Fischbach, 2000)

The study was carried out in allergy and asthma center in basrah city September 2005 to December 2010

The grouping of patients

The patients male and female were grouped into five groups

According to (Falk, 1993; Herd et al., 1996; Nishioka, 1996; Charman and Williams, 2002). These groups are:

1 Infantile group: less than two years.
2 Childhood group: from 2 to < 11 years.
3 Adult hoot group: more than 11 years, and then subdivided in to: group (3): 11 to < 20 years .
group (4): 20 to < 30 years .
group (5): over than 30 years .

Measurement of the concentration of total IgE

Quantitative determination of total concentration of IgE was done for (178) AD patients by total IgE microplate Elisa kit (Biomagherb), which is a two – site enzyme linked immunosorbent assay. It could be summarized assay procedure as fallow (Alsaimary, 2006):

1- 20 ml of standards labeled in duplicate, control and 20ml of patient sera or control sera were added to 100ml of assay buffer Elisa plate wells, and 20ml of 0 standard to blank substrate was added to blank well.

2- Incubated in an incubator for 90 minute 37oC after homogenized at 300rpm (horizontal shaking)

3- Three times washing by 300ml of wash solution in to each well by auto strip washer (ELX50 Bio- tek. Inst.)

4- 100ml of conjugate (anti-IgE alkaline phosphatase conjugate) was added in to each well and incubated for 90mins at 37 oC then washed same as steep 3

5- 100ml of chromogen (PNPP as a substrate) was added into each well and incubate for 30 mins at room temperature in the dark. (PNPP: Para Nitro- Phenyl-Phosphate)

6- 100ml of stop solution (NaOH, 2N) was added into each well.

7- Universal microplate ELISA Reader (Bio-tek. Instruments, Inc. mod.ELX800) was used to read the result against blank well of all strips at 405nm, and.

8- The total IgE concentration was evaluated in (IU / ml) by semi log paper.

Determination of modes of allergy

Allergy may be detected according to total IgE concentration as follow:

Lower than 20 IU/ ml	Allergy not propable
Between 20 – 100IU / ml	Allergy questionable
Higher than 100 IU / ml	Allergy very probable

The Assay was done according to instruction of suppling company (Biomagherb - Tunisia).

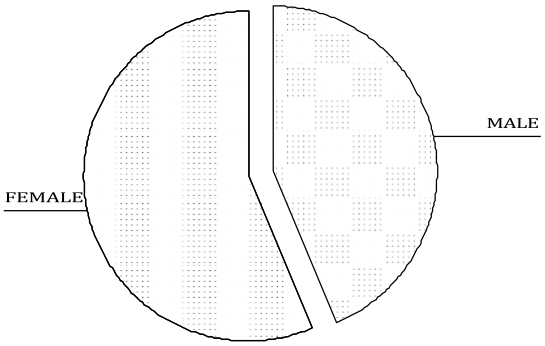

Figure 1: percentages of studied population (both sexes)

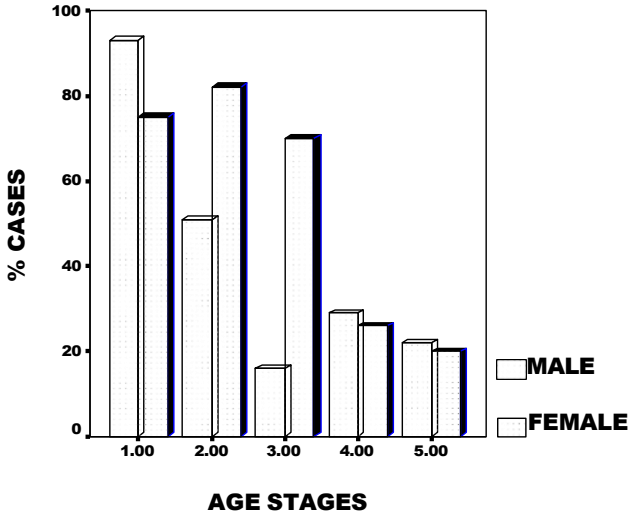

Figure 2: Age distribution among both sexes of basrah population
Personal history

Table 1: illustrates percentages of personal history through basrah population. (P<0.001).

+ ve of personal history (%)	- ve of personal history (%)	Total
67(67.0)	33 (33.0)	100

RESULTS

A total of 100 healthy persons from basrah population, 48 (48%) males and 52(52%) females were introduced in this study. Figure 1

The age studied basrah population were from 1 to 50 years with a statistical mean of age of (11.42) years, the age groups (infantile and childhood) recorded a percentages of (34.7% and 27.5% respectively) than adulthood patients (groups 3, 4, 5) that recorded (17.8, 11.4 and 8.7% respectively).

Males were highly present in groups (1, 4, 5) (55.36, 43.28 and 32.84% respectively), while females predominated males in groups (2 and 3), (61.65% and 60.35% respectively). Figure 2

The study showed that personal history of basrah population were significantly associated with various disorders , such as allergic sinusitis or rhinitis , bronchial asthma, allergy, fungal infections, tuberculosis, pneumonia, pharyngitis, otitis media and urinary tract infections which has been reported in 67 (67%). On the other hand, no associated disorder was reported in 33(3%). (P<0.001). (table1)

Family history occurrence rates among family history of allergy were found very highly significant (P<0.001). (table 2)

Table 2: illustrate percentages of family history through basrah population. (P<0.001).

+ ve of family history (%)	- ve of family history (%)	Total
53(53.0)	47 (47.0)	100

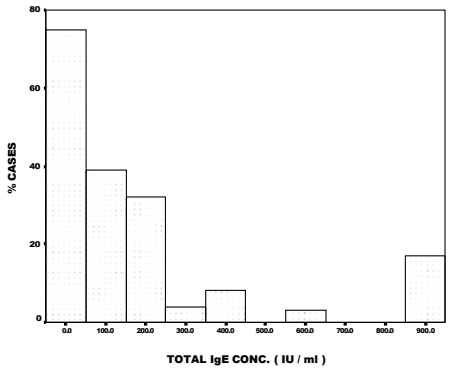

Figure 3: Concentrations of total IgE among studied population.

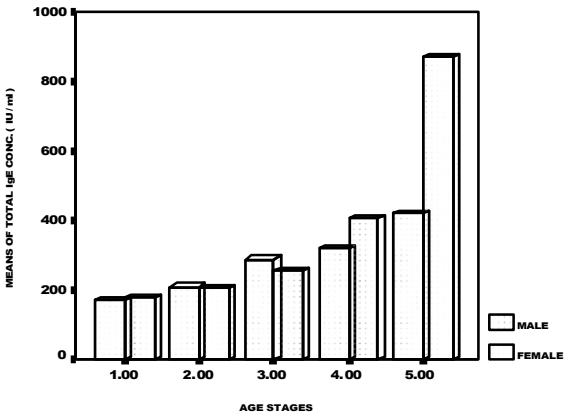

Figure 4: Means of total IgE concentrations of various age groups for both sexes.

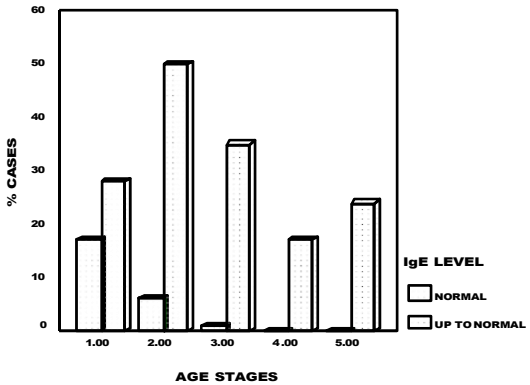

Figure 5: Normal and over normal values of total IgE in various age groups.

The total concentration of IgE was elevated above the normal value in about 86.5% of various age groups of basrah population .(P<0.001). Figures (3, 4 and 5).

The modes of allergy in various age groups were

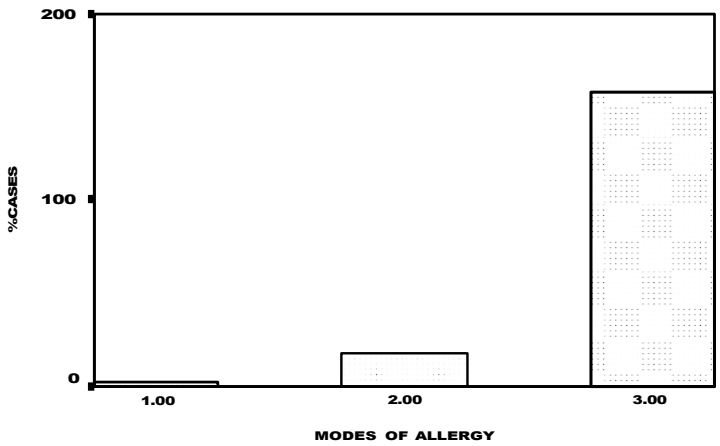

Figure 6: Modes of allergy among studied population

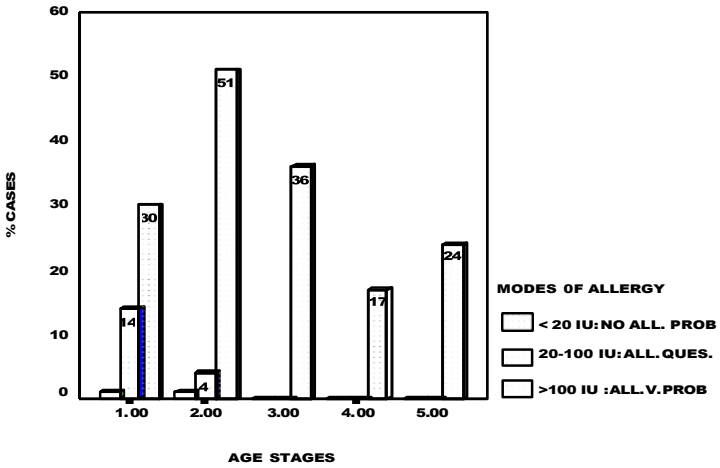

Figure 7: Modes of allergy for various age groups in both sex.

studied and illustrated in figures (6 and 7). It has been found that the mode of allergy, very probable (IgE>100 IU), is predominant in (88.8%) of various age groups of basrah population (P<0.001).

DISCUSSION

A significant relationship exists between serum IgE levels and allergy in populations presumed to be free of parasites where IgE levels presumably provide a better clue to atopy than do skin tests (Yamaguchi et al., 1997). Researchers were of the opinion that detection of specific IgE is a prerequisite for both, the definitive diagnosis and the therapeutic strategy of allergic rhinitis and other allergic disorders. (Maurer et al., 1998; Maurer et al., 1995) reported that there is an inter relationship of the allergen type, total serum IgE, eosinophil and bronchial hyper responsiveness suggesting that all three may play a role in the development of bronchial asthma in rhinitis patients. (Raby et al., 2007) stated that IgE secretion by lymphocytes defines the allergic state and nearly all asthmatics have a higher IgE levels in serum than normal, following adjustment with age and sex. Reducing IgE levels is now considered as a strategy for the treatment of allergic rhinitis and asthma.

In the present study, it was observed that the normal IgE levels in basrah population were relatively higher than the western values. According to others healthy, non allergic adults have an expected IgE concentration up to 120 IU/ml. Here, the total IgE levels in controls ranged from 10 IU/ml to 380 IU/ml with a mean of 180 IU/ml. The higher IgE levels in normal controls in basrah is explained probably by the higher incidence of parasitic infestations and allergic complication (Stokes and Casale, 2004; Lin et al., 1995; Boulet et al., 1997).

Thus, either different genes are to be involved in the regulation of total IgE and allergen specific responses or one (or more) gene may interact with the environment or both. Furthermore, distinct combinations of genes may

result in different disease expressions such as asthma, rhinitis and atopic dermatitis. For instance, it is hypothetical but not totally improbable that genes for atopy and airway hyper-responsiveness are to be present. In case of the clinical expression of asthma, yet the latter genes are not mandatory for eczema (or even rhinitis) (Varela et al., 1999; Poole et al., 2005).

The immune response in allergy begins with sensitization. for example, when house dust mite or pollen allergens are inhaled, antigen presenting cells such as Langerhans cells in the epithelium lining the airways of the lungs and nose, internalize the process and then express these allergens on their cell surface. The allergens are then presented to other cells involved in the immune response, particularly T-lymphocytes. Through a series of specific cell interactions B-lymphocytes are transformed into antibody secretory cells - plasma cells. In the allergic response, the plasma cell produces IgE-antibodies, which, like antibodies of other immunoglobulin isotypes, are capable of binding a specific allergen via its Fab portion. Different allergens stimulate the production of corresponding allergen-specific IgE antibodies. Once formed and released into the circulation, IgE binds, through its Fc portion, to high affinity receptors on mast cells, leaving its allergen specific receptor site available for future interaction with allergen. Other cells known to express high-affinity receptors for IgE include basophiles, Langerhans cells and activated monocytes. Production of allergen specific IgE-antibodies completes the immune response known as sensitization (Poole et al., 2005; Johansson et al., 2002; Holgate et al., 2005 Beck et al., 2004).

Several candidate genes have been identified, yet more atopic genes are to be discovered in the future. These genes will give us more insight of the path physiological mechanisms of atopic disease. It can be expected that this will lead to new and more effective therapeutic interventions, New methods for early diagnosis, development for disease prevention in susceptible individuals and more insight in the pharmacogenetics (Leung et al., 2003; Rosenwasser et al., 2003).

The mechanisms of primary sensitization are still essentially unknown. Avoidance of allergen exposure has only partially been successful in prevention of IgE-sensitization. Avoidance is difficult to implement and can severely restrict lifestyle, benefits are small, and long-term effects are doubtful. Until recently it has been recommended that infants at high allergy risk may benefit through avoidance of pets and dust mites during the first year of life, but new research suggests that in some individuals, such exposures may result in immunological tolerance rather than immunological sensitization. Some early respiratory infections, e.g., pertussis and Respiratory Syncitial Virus (RSV) bronchiolitis as well as some forms of gastroenteritis, may enhance IgE-sensitization and thus enhance allergic diseases, although relative lack of early microbial exposure (both gastrointestinal and respiratory) may also enhance the development of allergic diseases. 31 Prevention of IgE sensitization is possible in the occupational environment by the elimination of sensitizing agents from the workplace or implementing measures to prevent employee exposure. Smoking has been shown to be a risk factor for the development of IgE antibodies against occupational agents and has an adjuvant effect with irritant gases, such as ozone and sulphur. So apart from other benefits to health, non-smoking policies in the workplace may have a role to play in preventing IgE sensitization (Lawlor et al., 1995; Chowdary et al., 2003; Fahy, 2000).

Measurement of total IgE, not IgE antibodies, in serum, secretion or on cell surfaces is of little diagnostic value. The reason is that mitogenic factors in viruses (e.g., Cytomegalovirus - CMV), bacteria (e.g., Staphylococcus), helminths (e.g., Ascaris, Schistosoma) and adjuvant factors in air pollution (e.g., cigarette smoke, and diesel exhaust) stimulate the production of IgE molecules without initiating any allergen specific IgE-sensitization. However, production of IgE-antibodies will increase the total IgE level slightly and thus an increased total-IgE in cord blood is a high sensitivity but low specificity predictor of allergy (Cogswell, 2000 Brantly et al., 2009).

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