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RESEARCH ARTICLE

Non specific humoral parameters in asthma patients and asthma treated with immunotherapy

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Abstract

The aim of this study to determine some parameters in asthma patients without treatment and other with immunotherapy treatment , Blood samples were included (15 asthma patients ,15 asthma with immunotherapy treatment and 10 healthy as control) .Immunoglobulins (IgA , IgG and IgM) and complement components(C3and C4)were determined by radial immunodiffusion plate IgG , IgA, concentrations were significantly decreased in patients compare control ,while IgM concentrations were higher significantly in patients compare with control ,C3 and C4 concentrations were significantly increased in patients compare with control ,C reactive protein were higher in asthma than patients that treatment with immunotherapy ,total protein were decreased in treatment patients compare with control and asthma patients .This study conclusion that immunotherapy affect act as immunomodulating by effect on non specific parameters.

INTRODUCTION

Allergy or IgE-mediated hypersensitivity affects more than 25% of the population in industrialized countries. (1). The allergic response is oriented against various environmental proteins (called allergens) and cause diseases such as allergic rhinitis, allergic asthma, food allergy, skin allergy and ocular allergy. Allergic response can be local as in the case for allergic rhinitis and asthma or systemic as in the case for anaphylaxis (2). During sensitization phase, priming of allergen-specific Th2 cells results in the production of inflammatory cytokines such as IL-4 and IL-13, which are responsible for Bcells class switching to produce IgE which bind to its high affinity receptors FCεRI on mast cells and basophils, these cells degranulate and release vasoactive amines, lipid mediators, chemokines and other cytokines (3). Allergen-specific immunotherapy (SIT) is the only available treatment of allergy (4). This treatment is based on the repeated administration of the causative allergens with in order to reduce the sensitivity to the administered allergens through various immunological mechanisms. The purpose of immunotherapy treatment is to modify the responses of antigen-presenting cells (APC), T cells, B cells and effector cells towards allergens (5). The aim of this study is to measure some immunological parameters IgA, IgM, IgG, C3, C4, Total protein and C-Reactive Protein for allergic patients before and after immunotherapy treatment

Materials and methods

1- Patients and control

The population of this study consist of 40 allergic patients (15 before treatment and 15 after treatment), and 10 persons as a control group. Their ages ranged from 17-58 from both sexes. All the patients have been diagnosed under the supervision of consultant physician in allergy and asthma center in Babylon province.

2- Immunological parameters

Blood samples allowed to clot and was then centrifuged and sera was collected and stored at -20 C° until it was used to estimate the level of IgA, IgM, IgG, C3, C4 concentration were determined by using single radial immunodiffusion plate according the inter medical company ,Total protein and C-Reactive Protein according the company procedure(spin react and biolabo recepctively).

Statistical analysis

Statistical analysis was done by using computer software Statistical Package for Social Science (SPSS) version 20. Results were expressed as mean ± standard deviation (SD).

Results

The results show that there is an increase in the concentration of IgA in allergic patients before immunotherapy treatment which reached 263.55± 81.25457 in compared with those after treatment which reached 256.73± 48.64774 , while it reached in control group 342.85± 72.82706. The same thing for the concentration of IgM which reached before treatment group 268.4125± 52.40883 , in compared with after treatment group 256.4667± 93.21834 and control group 227.5± 68.8077 .The concentration of IgG was different , because it reached 264.7321± 176.2634 before treatment in compared with the group after treatment 573.2154± 191.7064 and control 2379.5± 957.0426 figure (1). The concentration of C3 before treatment was reached 123.0483± 62.0161 in compared with after treatment 72.2± 12.0025 and control 70.6575± 22.31583.

The concentration of C4 before treatment was 63.98125± 1.016886 in compared with after treatment 55.1± 25.89219 and control 45.525± 22.05689 figure (2). The results also shows that there is an increase in the level of total protein before treatment 8.866108±0.309315 in compared with after treatment 7.028707±0.958562 and control 8.809953±0.309483. The level of C-reactive protein before treatment was 68±44.5934 in compared with its level after treatment 28±30.98387 figure (3),figure (1) appeared significant among groups . Through this study we calculate the percentage of allergens that cause allergic symptoms to the patients under the study table (2).

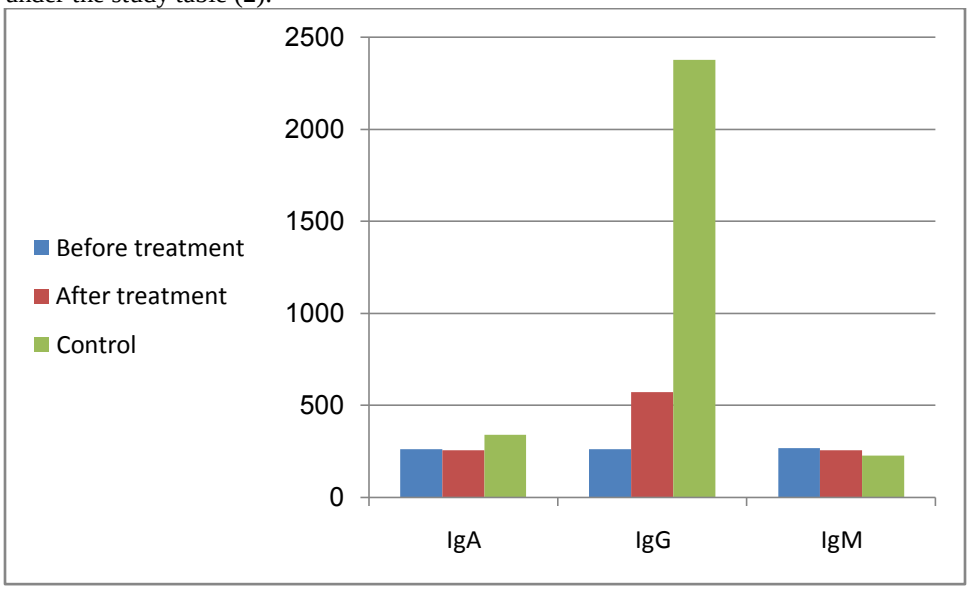

Figure (1) The concentration of IgA, IgG and IgM for allergic patients (before treatment and after treatment) and control

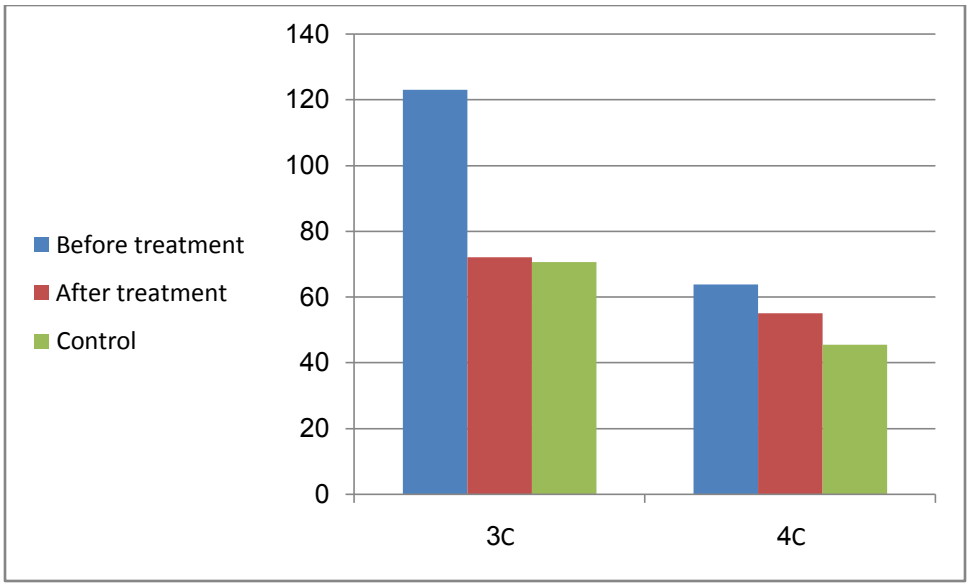

Figure (2) The concentration of C3 and C4 for allergic patients (before treatment and after treatment) and control

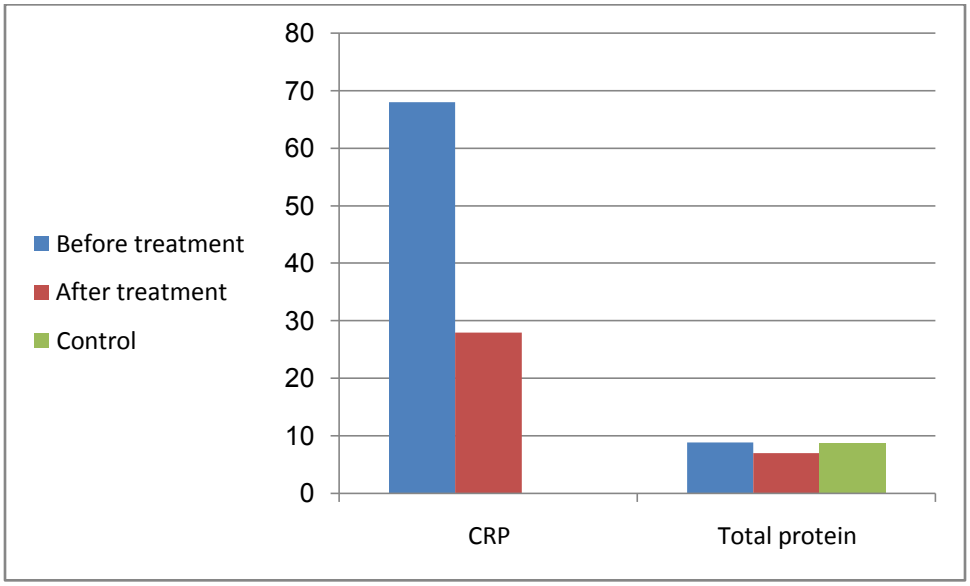

Figure (3) The concentration of C-reactive protein and total protein for allergic patients (before treatment and after treatment) and control

Table(1)non specific humoral immunity in asthma patients and asthma treated with immunotherapy(mean ± standard deviation)

parameters	**Asthma patients**	**Asthma with immunotherapy treatment**	**Control**
IgA *	263.55±81.25	256.7 3±48.64	342.85±72.82
IgG *	264.73±176.26	573.21±191.70	2379.50±957.04
IgM *	288.41±52.40	256.46±93.21	227.50±68.80
C3 *	123.04±62.01	72.20±12.0	70.65±22.31
C4 *	63.98±1.01	55.1±25.89	45.52±22.05
Total protein *	8.86±0.30	7.02±0.95	8.81±0.30

Table (2) the percentage of allergens

Allergens	Symbols	Percentage
Pollen	pollen	**4%**
Mite	mite	**12%**
Dermatophagoides pteronyssinus	DP	**4%**
Dermatophagoides pteronyssinus and *Dermatophagoides farinae*	DPDF	**20%**
Pullularia, Neurospora, Furasium and *Helminthosporium*	M3 + M4	**8%**
Pollen + *Dermatophagoides pteronyssinus and Dermatophagoides farinae*	pollen + DPDF	**4%**
Dermatophagoides pteronyssinus + *Helminthosporium*	DP + M4	**4%**
pollen + mite	pollen + mite	**24%**
date pollen + *Dermatophagoides pteronyssinus*	date pollen + DP	**4%**
Dermatophagoides pteronyssinus + pollen	DP + pollen	**12%**
Dermatophagoides pteronyssinus and *Dermatophagoides farinae* chenopodium+	DPDF + chenopodium	**4%**

Discussion

It is well known that the purpose of allergen specific immunotherapy is to modulate the immunological profile against allergens and that the benefits achieved are long-lasting even when the therapy is discontinued (6). In the course of injection immunotherapy, allergen- specific IgG antibodies which act as a blocking antibodies are induced and and work by competing with IgE for allergen binding and thereby prevent an allergen-induced activation of effector cells and IgE-mediated presentation of allergen to T cells (7, 2, 8). IgG antibodies reduce the boosting of IgE responses by allergen exposure, and thus may down-regulate allergen-specific IgE production (9, 10). SIT can also cause T cell responses modification, which may be due to the induction of regulatory T cells and increase the ratio of Th1 to Th2 cytokines with regulatory activity (IL-10,TGF-β) (3). T cell activation and the release of pro-

inflammatory cytokines can be down-modulated through the inhibition of IgE-facilitated allergen presentation to T cells by IgG (11,7). Less is known about the relationships of allergy to immunoglobulin A (IgA) and immunoglobulin G (IgG), which are better known for their roles in host defense. It has been thought that IgA deficiency promotes allergic sensitization, and the mechanism is not well established, IgA may competitively bind to allergens, thereby preventing the allergen from being engaged with other immunologically active factors. Therefore, deficiency of allergen-specific IgA could promote allergen-specific immune activation, and cause allergic sensitization and clinical allergy in susceptible individuals.

This concept is controversial, some groups have found evidence supporting this theory (12,13) and against this theory (14,15) According to this study we found that there is an increase in the level of IgA in allergic patients without immunotherapy. Absence or functional impairment of IgG and IgA lead to increase the risk of allergic infection. On the other hand, there is a hypothesis called "hygiene hypothesis" which said that exposure to frequent infections in early childhood has beneficial effects on the developing immune system to promote health later in childhood (16). This theory raises the possibility that early respiratory infections could accelerate immune development by boosting immunoglobulin synthesis. There are few studies have tested for developmental relationships between individual variations in IgA or IgG levels and the risk of respiratory infections. IgM is the first immunoglobulin class produced in a primery response to an antigen, this immunoglobulin which cannot cross the placenta are the first to appear in a primary response to an antigen and also the first to disappear from the serum, it is a better agglutinating, complement fixing and bacteriolytic antibody (17). A small proportion of circulating IgM exists in a hexameric form which lacks J chain but is up to 20 times more effective in activating complement-mediated lysis than the pentamer. IgM is present during chronic infection but is unable to activate complement (18).

Mast cells are known to be activated in asthma (*19*,20) mast cell can degranulate under allergen stimulation in bronchial smooth muscle and mucus glands occurs in asthmatic lungs (21,22); and are a rich source of proteases (23;24). Also, the acidic pH of the airways of asthma subjects (25) may promote β-tryptase proteolytic activity (26,27). It has been hypothesize that mast cell-released β -tryptase may be responsible for anaphylatoxin generation in the airways of asthma subjects, β-tryptase generate C3a from C3, C4a from C4 and C5a from C5 at acidic PH, C3 and C4 are efficiently cleaved to generate the corresponding anaphylatoxins, which are then slowly degraded. With β-tryptase tetramers the α-chain of C3 and C4 are cleaved but any anaphylatoxins produced appear to be degraded before they are detected (28).

The level of C-reactive protein (acute-phase protein) associate with the innate immune response, its react with widely distributed ligands to activate the classical and lectin pathway, respectively, and lead to C-mediated inflammation (29).

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