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Short Communication

THE RELATIONSHIP BETWEEN ASTHMATIC PATIENTS NASAL INFECTION WITH *STAPHYLOCOCCUS AUREUS* AND ASTHMA

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Abstarct

This study aimed to proof the relationship between nasal infection with *S. aureus* and development of severe clinical signs of asthma, this study is carried out in Al-Hussein teaching hospital / Al-Nasiriya city and other part in animal house / college of Agriculture / Sumer university at the period 1/11/2017-1/2/2018, (20) twenty samples of nasal swabs collected from asthmatic patients transported to the lab. by using transport media for detection of *Staphylococcus aureus* after that this bacteria injected intra-nasally in the lab. animal (Rats) and after one month (10) ten serum samples taken for measurement of (IFNγ, IL-4, IL-5, IL13 and IgE), the results showed existence of *S. aureus* in the nasal cavity of Rats and the concentration of these cytokines as followed :significant increasing in the titters of IFNγ (527.173) ; IL-4 (656.03) ; IL-5 (425.05) ; IL-13 (405.11) and IgE (35.51) compared to control groups (139.32) ; (36.115) ; (46.160) ; (42.25) and (1.6) respectively.concluded there was closely relationship between nasal infection with *S. aureus* and development of severe clinical signs of asthma in asthmatic patients.

Key words : asthmatic, *Staphylococcus aureus*, IFNγ, IgE

Introduction

Airway allergy is a worldwide health problem, an estimated 300 million persons worldwide have asthma and about 400 million persons suffer from allergic rhinitis, the prevalence of both diseases is markedly increasing (Aceves, 2008). Allergic reactions occur to normally harmless environmental substances known as allergen ; these reactions are acquired, predictable and rapid (Adamko *et al.,* 1999). Strictly, allergy is one of four forms of hypersensitivity and is called type I or (immediate) hypersensitivity, its characterized by excessive activation of certain white blood cells called mast cells and basophiles by a type of antibodies known as IgE, resulting in an extreme inflammatory response (Ahmadi *et al.,* 2003). Common allergic reactions include eczema, hives, hay fever, asthma attacks, food allergies and reaction to venom of insect sting such as wasps and bees (Aihara *et al.,* 2004). Many factors take part in the pathogenicity of asthma as decreasing in IFN γ secreted from (Th1), increasing of (IL-4) which necessary for B cell growth, promoting (Th2) differentiation and IgE synthesis and (IL-5) which responsible for growth, differentiation and survival of eosinophils in bronchi and the source of these two cytokines from (Th2). There are many factors included in asthma pathogenicity as hereditary causes so that the genetic susceptibility of family has greater effect in the incidence of asthma attacks, Scientists found about 25 genes take part in pathogenicity of asthma also environmental factors as air pollution, pollens, vapors added to that some chemicals as formaldehyde (Aihara *et al.,* 2003). But recently the Scientists directed towards clarify the possible role of Rhinosinusitis and nasal polyps as predisposing factors for asthma which caused by several microbes included Staphylococcus aureus and its toxins specially (SEB) has greater effect in this disease so that this study aimed to proof that the Staphylococcus aureus and its toxins one of causative factors of asthma through applied of Koch

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Materials and methods

This (case–control) study included (20) twenty asthmatic patients admitted to the Al- Hussein Teaching Hospital / Respiratory and Thoracic diseases department in Al- Nasiriya city from period 1/7/2017 – 1/8/2017 who diagnosed depending on clinical signs and radiological examination.

Results

Asthma is consider as one of the common inflammatory disorders (chronic inflammatory disorders) which increase in spreading in our environment as a result of exposure to many effectors or environmental allergens or there was genetic susceptibility that combined with excessive production of IgE antibodies specifically to stimulated antigens as Chinopodium which result in Allergic bronchitis, Rhinosinusitis, Contact dermatitis added to that increase stimulation of (Th2) which secrete large quantity of cytokines as (IL-4, IL-5 and IL-13) which consider as chief key to develop of hyper responsiveness. This study depend on measurement of (IgE, IL-4, IL-5 IL-13 and IFNγ) in the serum samples taken from (10) ten of lab. animals (Rabbits). this study showed statistically significant increasing (p=0.05) in IFNγ level which was in lab. Animals (527.173) and in control group was (139.32) ; statistically significant increasing in titter of IL-4 (p=0.05) which was (656.03) and in control group (36.115); in case of IL-5 there was statistically significant increasing(p=0.05) was (425.05) and in control group (46.166) also in case of IL-13 was (405.11) and in control group (42.25) added to that IgE antibody titter was (35.51) and in control group (1.6). microbial examination of this study revealed to isolation of Staphylococcus aureus from nasal cavity of asthmatic patients and from nasal cavity of Rabbits after month of intra nasal injection.

Discussion

This study showed statistically significant increasing in IFNγ compared with control group and this agreed with many studies that found significant increasing in IFNγ in asthmatic patients infected with nasal *Staphylococcus aureus* and this fact explained by that the increasing in IFNγ necessary in immunological response against bacterial infections which act as activator and stimulator of the macrophage, NK, antigen presentation on the surface of the macrophage and stimulation of WBC transmigration from blood vessels to the site of infection, increasing in titter of IL-4 in asthmatic patients and this type of interleukins consider as important one in growth, survival and differentiation of B lymphocytes also plasma cells and production of antibodies specially IgE and increase of no. of eosinophils in respiratory tract added to that IL-13 which has same effect, increasing of IL-5 agreed with many studies on asthmatic patients which responsible for increase no. of eosinophils growth and differentiation so that, its responsible for greater part of asthma pathogenicity due to its presence in large no. in respiratory tract and in case of IgE there was significant increasing in serum of lab. animals specially those infected with *S. aureus* compared with control group. further studies for elucidating mechanisms and for confirming their relationships between asthma and infection with *S. aureus* in large scale population there are many different studies proved that *S. aureus* and its toxins have major role in asthma as following :

1. Bachert *etal.,* (2012), found enterotoxin IgE positivity was significantly greater in patients with severe asthma than in healthy control subjects so that they proved SE IgE antibodies but not IgE against inhalant allergens are risk factors for asthma severity and hypothesize that the presence of enterotoxin IgE in serum indicates the involvement of Staphylococcal super antigens in pathophysiology of patient with severe asthma.
2. Yang *et al.,* (2005), proved that the asthma is closely related with sinusitis by taking 85 asthmatic patients they found 51 of 85 patients with high serum anti staphylococcus enterotoxin B antibody before treatment obtained satisfactory results for both sinusitis and asthma.
3. Kowalski *et al.,* (2011), observed that total IgE had a strong correlation with specific IgE to SEs in serum from asthma patients that was independent of atopic status and these two factors significantly correlated with asthma severity markers.
4. Xin Yan *et al.,* (2015), found positive rate and level of SEB specific IgE significantly higher in the serum from Chinese patients with Chronic Rhinosinusitis without nasal polyp than that from healthy control so, the positive rate and level of SEB – specific IgE in Chronic Rhinosinusitis with nasal polyp showed an increasing trend but didn't reach significance.
5. Lara *et al.,* (2010), proved that the *S. aureus* is correlated with the development of persistent severe inflammatory diseases of the upper airway including Chronic Rhino sinusitis with nasal polyp.
6. Tomassen*etal.,* (2013), in first large – scale population – based epidemiological study to demonstrate the

sensitization to *S. aureus* enterotoxins in European volunteers, they are demonstrated that IgE sensitization to SE is common in Europe, may occur in the absence of sensitization to other allergens (aeroallergens such as house dust mite), probably reflecting a different pathophysiologic basis, this effect may be mediated through its association with strongly increased total IgE concentration via polyclonal super antigen action of enterotoxins.

7. The effects of *S. aureus* nasal carriage on nasal cytokines environment was noticed by Riechelmann *et al.,* (2015) and Refaat *et al.,* (2008) who found that *S. aureus* nasal carriage in allergic rhinitis patients was associated with high levels of nasal IL-4 and IL-13 (Th2 cytokines) and low level of IFN γ (Th1 cytokines) and its associated with high nasal IgE level suggesting that nasal *S. aureus* can augment Th2 bias and promote local IgE production thus can actively modulate the allergic reaction in affected tissues.
8. Ensaf *et al.,* (2015) found significant positive correlation between SEB – specific IgE level in patients and markers of severity of allergic reaction including blood eosinophilia, ECP and total IgE levels, So that, they suggest that nasal carriage of enterotoxin producing *S. aureus* has a potential role in the development and severity of allergic airway diseases.

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