

The Relationship of Immunoglobulin-E and Oxidative Stress in Iraqi patients with asthma

Zinah Ali¹, Mufeed Ewadh^{*1}, Gaylany Abdullah², Hamid Hasan¹

1. Dept. of Clinical Biochemistry, College of Medicine, University of Babylon, Hilla, Iraq

2. Hawler Medical University, Medical research center, Arbil, Iraq

E-mail : mewadh@yahoo.com

Abstract

Asthma is a disease characterized by airway chronic inflammation and bronchial hyperactivity, involving the imbalance of oxidative and antioxidative agents. There is an increased free radical generation and a decreased antioxidant enzyme activity. Fifty subject were enrolled in this study .twenty patients with Asthma . Thirty subjects who are apparently healthy were taken as a control group. Serum IgE was determined by using enzyme-linked immunosorbent assay (ELISA) .MDA was determined by using colorimetric method .Serum levels of IgE was highly significantly increase in asthma group compared with control group ($p < 0.01$). A significant positive correlation between IgE and MDA. MDA affect IgE level in patients with Asthma .

Key words : Immunoglobulin – E , Oxidative stress, Asthma

1- Introduction

Asthma is a chronic inflammatory disorder of the airways involving interaction of cells and mediators that ultimately result in high levels of reactive oxygen and nitrogen species (Dweik *et al.*, 2001). Reactive oxygen species (ROS) can be formed in metabolic reactions, such as in the mitochondrial electron transport during respiration. Ozone and air particulates, including pollutants such as cigarette smoke, represent another source of ROS generation that affects airways (Voynow *et al.*, 2011) . Regarding the airway inflammatory process such as asthma and chronic obstructive pulmonary disease, there is an increased production of ROS by inflammatory cells activation (Kim *et al.* , 2012). Therefore, ROS production, irrespective of its origin becomes an important focus for therapeutic intervention (Chung *et al.*, 2010). Malondialdehyde is the organic compound with the formula $\text{CH}_2(\text{CHO})_2$. It is the end product of lipid oxidation and is a marker for oxidative stress .All biological membranes are characterized by the large amounts of polyunsaturated fatty acid (PUFAs) associated with amphipathic lipid and a variety of membrane proteins. Both isolated polyunsaturated fatty acid (PUFAs) and those incorporated into lipid are readily attacked by free radicals, becoming oxidized into lipid peroxidation . Therefore, peroxidized membrane lipid occurs as a result of oxidative stress in intact cells (Farmer *et al.*, 2007)., Peroxidation of these labile unsaturated fatty acids can damage both protein and lipids as well as disrupt the structure and function of the membrane in most body cells (Agarwal *et al.*, 2008) . MDA is one of the most frequently used indicators of lipid peroxidation (Yang *et al.*, 2001). The immunoglobulins are a group of plasma proteins that function as antibodies, recognizing and binding foreign antigens. This facilitates the destruction of these antigens by elements of the cellular immune system (Mojtaba *et al.*, 2011). The essential features of IgE function involve interactions between members of the protein network and the role of the different cells outlined as following. In allergy and asthma, the populations of B cells and plasma cells in the respiratory tract mucosa are heavily biased towards the production of IgE (Hannah *et al.* , 2008). Approximately, 4% of the B cells and 12–19% of the plasma cells express IgE in the nasal mucosa of patients with rhinitis and asthma, compared with 1% and <1% respectively in healthy subjects (Smurthwaite *et al.* , 2001) .

Previous studied found increased serum levels of MDA and IgE in bronchia asthma and allergic rhinitis (Sagdica *et al.* , 2010) .The aim of the study to find out the Relation between Immunoglobulin-E and Oxidative Stress In Iraqi patients with asthma.

2- Patients and Methods

This study was conducted in Babylon Maternity and Pediatric Teaching Hospital and in the laboratory of Biochemistry Department, College of Medicine , University of Babylon.

Twenty patients with Asthma have been taken and full history was taken from all patient which include: age, residence, smoking, family history, medical history drug history and surgical history, No drugs were prescribed to those patients that may interfere with the measured parameters. Thirty apparently healthy subject (who are age and sex-matched with the patients group were selected as a control group in the study ., All control subject have no history of chronic disease(as diabetes mellitus, hypertension inflammatory disease such as rheumatoid arthritis) and not smoking. The statistical analysis was performed by using SPSS version 18 for windows. Data were expressed as Mean \pm SD. The normality of the distribution of all variables was assessed by the Student's F-

test and Pearson correlation analysis that have been used to determine the significant difference between the two groups. P values less than 0.05 is considered significant.

3-Results and Discussion

The results in (table- 1) reveals a highly significant increase in the sera level of IgE in patients with asthma group cases compared with those of control group ($P < 0.01$). The activity of IgE is associated with a network of proteins; prominent among these are its two principal receptors, Fc RI (high-affinity Fc receptor for IgE) and CD23. IgE triggers the release of mediators that are responsible for arteriolar dilation, increased vascular permeability, itching, rhinorrhea and mucous secretions (Finkelman *et al.*, 2006). Elevated levels of ROS such as hydroxyl radicals, superoxides and peroxides may induce a variety of pathological changes that are highly relevant in nasal and airway mucosa (Atambay *et al.*, 2006). These include lipid peroxidation, increased airway reactivity, and nasal mucosal sensitively and secretions, production of chemoattractant molecules and increased vascular permeability. Such association between chronic inflammation and oxidative stress is well documented by many investigators (Orazio *et al.*, 2012).

From the results, we can conclude a high significant positive correlation between IgE and MDA in Asthma group.

References

- Agarwal, A., Makker, K., Sharma, R.: (2008) Clinical Relevance of Oxidative Stress in Male Factor Infertility: An Update *Am J Reprod Immunol* ; 59: 2–11.
- ASagdica, O., Sener, B., Bulucua, N., Karadurmusa, H. E., Özcel, L., Yamaneld, C., Tasci, e, I., Naharcia, R., Ocald, A., Aydin, F. (2010), Oxidative stress status and plasma trace elements in patients with asthma or allergic rhinitis, Received 13 May 2010; accepted 5 July
- Atambay M, Karabulut A, Aycan, O. M., et al: (2006), Dust-mites: effect on lipid peroxidation the national medical journal of india vol. 19, no. 2.
- Chung, K. F. and Marwick, J. A. (2010), Molecular mechanisms of oxidative stress in airways and lungs with reference to asthma and chronic obstructive pulmonary disease. *Annals of the New York Academy of Sciences*, 1203, 85-91
- Dweik RA, Comhair SA, Gaston B, Farver C, Thomassen MJ, Kavuru M, Hammel J, Abu-Soud HM, and Erzurum SC. (2001), NO chemical events in the human airway during the immediate and late antigen-induced asthmatic response. *Proc Natl Acad Sci USA* 98: 2622–2627.
- Finkelman, F. D. & Vercelli, D. (2007), Advances in asthma, allergy mechanisms, and genetics in 2006. *J. Allergy Clin. Immunol.* 120 544–550.
- Farmer- EE., Davoine- C.; Reactive electrophile species. (2007), *Curr. Opin. Plant Biol.*; 10(4): 380-386.
- Hannah J and Brian J. ; (2008), IgE in allergy and asthma today. volume 8 march
- Kim, B. J. and Hong, S. J. (2012), Ambient air pollution and allergic diseases in children. *Korean Journal of Pediatrics*, 55, 185-192
- Li Yang, F., Shan Li, X., Xiang He, B., et al (2001), Malondialdehyde level and some enzymatic activities in subclinical mastitis milk. *African Journal of Biotechnology* ; Vol. 10(28), pp. 5534-5538, 20 June.
- Mojtaba, E., Somayeh, B., Payman, A.: (2011), Does systemic inflammation and allergen-specific IgE are related to each other in presence asthma ISSN: Vol. 1, No. 5, p. 89-94
- Orazio, N. D., Gammone, M. A., et al: Marine Bioactives: (2012), Pharmacological Properties and Potential Applications against Inflammatory Diseases *Mar. Drugs*, 10, 812-833
- Smurthwaite, L. et al : (2001), Persistent IgE synthesis in the nasal mucosa of hayfever patients. *Eur. J. Immunol.* ; 31, 3422–3431
- Voynow, J. A. and Kummarapurugu, A. (2011), Isoprostanes and asthma. *Biochimica et Biophysica Acta*, 1810, 1091- 1095. 2011.04.016

Table (1):-): Biochemical parametrs of asthma and control Groups.

Parameter	Asthma group n= 20	Control n=30	P values
IgE IU/ml Mean ± SD Range	402 ± 3.17 (398.- 407.5)	47.52±1.012 45.10 - 48.9	P <0.01
MDA μM Mean ± SD Range	6.368 ± 0.329 5.9-6.8)(2.43 ± 0.187 2.1-2.8)(P <0.05

Table (2): Pearson's correlation between MDA and IgE the levels of in different groups (n= 50)

parameres	Asthma group		control	
	r	p	r	p
MDA vs IgE	0.969	0.01	0.44	0.05

Significant = P< 0.05 high significant = P< 0.01