



GLOBAL JOURNAL OF SCIENCE FRONTIER RESEARCH
BIO-TECH & GENETICS
Volume 13 Issue 3 Version 1.0 Year 2013
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

The Relationship between Tumour Necrosis Factor -Alpha and Zinc/Copper Ratio in Iraqi Patients with Allergic Rhinitis

By Tarek H. Abed Tawfik Al-Khyat, SafaaHussainAlturaihy
& ZinahAbbass Ali

College of Medicine, University of Babylon, Iraq

Abstract- Background: Allergi rhinitis(AR) is a significant cause of widespread morbidity, high medical treatment costs, reduced work productivity, low quality of life and can be associated with conditions such as fatigue, headache, cognitive impairment, and sleep disturbance.

Aim of the study: To find out the relation between tumour necrosis factor alpha (TNF- α) and Zn/Cu ratio in the patients with mild or moderate/severe cases.

Patients and Methods: Ninety subject were enrolled in this study .Fifty patients with AR were subdivided into two groups i.e. mild (comprising 20 patients) with AR , moderate/ severe (comprising 30 patients) with AR . Forty subjects who are apparently healthy were taken as a control group. Serum TNF- α was determined by using enzyme- linked immunosorbent assay (ELISA). Zn and Cu were determined by using colorimetric method.

Results: Serum levels of TNF- α was significantly higher in mild and moderate/severe groups compared with control group ($p < 0.01$). A significant positive correlation between TNF- α and copper. A significant negative correlation between TNF- α and zinc in AR patients in mild and moderate/severe cases.

Conclusion: Zn/Cu ratio affect TNF- α level in patients with AR.

GJSFR-G Classification : FOR Code: 320201, 100402



THE RELATIONSHIP BETWEEN TUMOUR NECROSIS FACTOR -ALPHA AND ZINC/COPPER RATIO IN IRAQI PATIENTS WITH ALLERGIC RHINITIS

Strictly as per the compliance and regulations of :



RESEARCH | DIVERSITY | ETHICS

© 2013. Tarek H. Abed Tawfik Al-Khyat, SafaaHussainAlturaihy & ZinahAbbass Ali. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License <http://creativecommons.org/licenses/by-nc/3.0/>), permitting all non commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

The Relationship between Tumour Necrosis Factor -Alpha and Zinc/Copper Ratio in Iraqi Patients with Allergic Rhinitis

Tarek H. Abed Tawfik Al-Khyat ^α, SafaaHussainAlturaihy ^σ & ZinahAbbass Ali ^ρ

Abstract- Background: Allergi rhinitis(AR) is a significant cause of widespread morbidity, high medical treatment costs,reduced work productivity,lowquality of life and can be associated with conditions such as fatigue, headache, cognitive impairment, and sleep disturbance.

Aim of the study: To find out the relation between tumour necrosis factor alpha (TNF-α) and Zn/Cu ratioin the patients with mild or moderate/severe cases.

Patients and Methods: Ninety subject were enrolled in this study .Fifty patients with AR were subdivided into two groups i.e. mild (comprising 20 patients) with AR , moderate/severe (comprising 30 patients) with AR . Forty subjects who are apparently healthy were taken as a control group. Serum TNF-α was detemrind by using enzyme- linked immunosorbent assay (ELISA). Zn and Cu were determined by using colorimetric method.

Results: Serum levels of TNF-α was significantly higher in mild and moderate/severe groups compared with control group (p<0.01).A significant positive correlation between TNF-α and copper. A significant negative correlation between TNF-α and zinc in AR patients in mild and moderate/severe cases.

Conclusion: Zn/Cu ratio affect TNF-α level in patients with AR.

I. INTRODUCTION

Allergic rhinitis (AR) according to the document (Allergic Rhinitis and Its Impact on Asthma) ARIA is defined as a symptomatic disorder of the nose, induced after allergen exposure due to an immunoglobulin E (IgE)-mediated inflammation of the membranes lining the nose [1]. The classic symptoms of allergic rhinitis are rhinorrhoea, sneezing, nasal congestion and nasal itching [2]. ARIA classification of AR is according to, duration of symptoms: persistent and intermittent, severity of symptoms: mild, moderate/severe [3]. Mild AR (no impairment of, sleep, daily activities, leisure or sport, school or work and symptoms not troublesome). In Moderate/severe AR, One or more of the following criteria are present(sleep disturbance, impairment of daily activities, leisure and sport, impairment of school of work troublesome symptoms) [4]. An etiology of allergic rhinitis develop as

a result of an IgE- mediated immune response to an inhaled allergen (allergens are antigens that induce and react with specific IgE antibodies). The allergic inflammatory cascade has three phases [5]. First (sensitization) in a susceptible person, initial contact with an allergen leads to the production of IgE antibodies against the allergen. These IgE antibodies bind to high-affinity receptors on mast cells and basophile [6]. Second (early-phase response)on further exposure to the allergen, sensitized mast cells are activated when two molecules of boundIgE are cross-linked by the allergen(antigen) [7]. Third (late-phase response) over the next few hours the nasal mucosa is infiltrated by other inflammatory cells (e.g. eosinophils, neutrophils, basophils, T-cells). These release further inflammatory mediators, producing a sustained inflammatory reaction which may persist for hours or days. The predominant late-phase symptom is nasal congestion [8] Allergic rhinitis can be caused by (Common causes) house dust mite, Pollens, animals Moulds (Less common) [9]. Previous studiefound tumor necrosis factor-alpha and interferon gamma, soluble inter cellular -1 in bronchia asthma and allergic rhinitis: relation with disease severity[10]. In this study, the relationship between TNF-alpha and Zn/Cu ratio was investigated in mild and moderate/severe cases of the disease.

II. PATIENTS AND METHODS

This study was conducted in Babylon Maternity and PediatricTeaching Hospital and in the laboratory of Biochemistry Department, College of Medicine, University of Babylon in the period starting from December 2012 to May 2013.Fifty patients with AR. These selected patients were divided into two groups according to severity of disease.

The first: Mild group included 20 patients with mild AR, their age ranged between (20-25) years. Second moderate/severe group included 30 patients with AR. Full history was taken from all patient which include: age, residence, smoking, family history of allergic rhinitis, medical history drug history and surgical history, No drugs were prescribed to those patients thatmay interfere with the measured parameters. Forty apparently healthy subject (who are age and sex-matched with the patients group were selected as a

Author α: Dept. of Clinical Biochemistry.

Author σ: Dept. of surgery, College of Medicine.

Author ρ: Dept. of Clinical Biochemistry, College of Medicine, University of Babylon, Hilla, Iraq.

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 ± 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.

III. RESULTS AND DISCUSSION

The results in (table-1) reveals a highly significant increase in the sera level of TNF-α in patients with allergic rhinitis in both mild and moderate/severe cases compared with those of control group (P1<0.01 and P2<0.01) as well as a highly significant increase between the mild and moderate/severe cases (P3<0.01). Such increase may be attributed to the activation of Th cells leads to the production of various cytokines, such as interleukin IL-4, IL-5, interferon (IFN), and TNF-α (is a major cytokine produced by mast cells that upregulates endothelial and epithelial adhesion molecules). During the late phase, all these cytokines were recruited; with transendothelial migration and infiltration of activated T-cells, eosinophils, basophils, neutrophils and macrophages into the nasal mucosa[11]. TNF-α causes changes in the ionized calcium flux within smooth muscle. which lead consequently to the promotion of IgE production. IgE triggers the release of mediators that are responsible for arteriolar dilation, increased vascular permeability, itching, rhinorrhea and mucous secretions [10]. Serum zinc showed a highly significant (p<0.01) decrease in moderate/severe AR compared with those of healthy subjects and highly significant (p<0.01) decrease observed between mild cases and control group. There was a significant increase between the mild and moderate/severe cases (p<0.05). Decreased zinc level in the sera of AR may be attributed to its depletion

throughout its antioxidant action and its involvement immune response. Zinc plays a central role in the immune system affecting a number of aspects of cellular and humoral immunity [12]. Zinc was also shown to play an essential part in anti-apoptotic effect for respiratory epithelium besides its involvement in the structure of some antioxidant enzyme[13]. Oxidative stress may lead to membrane instability causing the destructive events and histamine secretion from mastocytes that lead consequently to the pathogenesis of AR[14]. Anandaetal found that zinc supplementation prevents pulmonary pathology due to hyperoxia[15].

Membrane zinc concentrations are strongly influenced by dietary zinc status where zinc plays an important role in preserving membrane integrity through its binding to thiolate groups. Megha and Ratnesh reported that approximately twice as much zinc is absorbed from a non vegetarian or high meat diet than from a diet based on rice and wheat (which is the typical diet in developing countries) where usually a high phytate content that decrease zinc absorption[17].

A significant increase in copper level was observed in the sera of moderate/severe patients in comparison with control group (p<0.05) while a highly significant (p<0.01) increment in copper was seen in mild cases of AR patients compared with those of control group, and significant increase in mild comparison with moderate/severe cases (p<0.05). the highly significant increase in copper levels in the sera of patients with AR may be attributed to the reciprocal relationship between zinc and copper in normal physiology where zinc affect the absorption of Cu and vice versa. In addition the increase in oxidative process as reported by some researchers[18]. From the above results, we can conclude that zinc supplementation is quiet essential for Iraqi people infected with AR in order to alleviate TNF-α levels which was shown to be a good marker in patients with AR especially when the latter was shown to increase with disease severity and a high significant correlation was found to exist between these parameter and TNF -α levels.

Table 1 : Biochemical parametrs of allergic rhinitis and control Groups.

Parameter	Mild n=20	Moderate/ Severe n= 30	Control n=40	P values
TNF -αpg/ml Mean± SD Range	37.70±4.15 (34.7-50.1)	100.84±12.55 (90.2-124.1)	17.88±3.97 (13.70-25.2)	P1 < 0.01** P2 < 0.01** P3 < 0.01**
Copper μg/dL Mean± SD Range	132.54±6.70 (125.2-143.1)	165.6±13.04 (150.2-185.02)	96.56±7.79 80.02-101.4)	P1 < 0.01** P2 < 0.05* P3 < 0.05*
Zinc μg/dl Mean± SD Range	75.8±3.04 (70.01-78.40)	62.15±5.07 (45.1-66.40)	100.19±6.23 (90.70-110.1)	P1 < 0.01** P2 < 0.01** P3 < 0.05*

Zn/Cu Ratio Mean± SD Range	0.67±0.098 (0.56-0.84)	0.36±0.028 (0.31-0.40)	0.95±0.03 (0.92-1.03)	P1 < 0.01** P2 < 0.05* P3 < 0.01**
----------------------------------	---------------------------	---------------------------	--------------------------	--

P1= Mild VsControl P2 = moderate/severe VsControl P3 = Mild Vs Moderate/Severe

**Highly significant * Significant

Table 2 : Pearson's correlation between the levels of copper, zinc, zn/cu Ratio and TNF in different groups (n= 90)

parameres	mild		Moderate/severe		control	
	r	p	r	p	r	p
Cu vs TNF-α	0.5	0.01	0.7	0.05	0.24	0.05
Zn vs TNF-α	-0.56	0.01	-0.51	0.01	0.3	0.1
Zn/Cu Ratio vs TNF-α	-0.51	0.01	-0.8	0.05	0.03	0.1

Significant = P < 0.05 high significant = P < 0.01

REFERENCES RÉFÉRENCES REFERENCIAS

- MulloJ, Valero A, etal. Allergic Rhinitis and its Impact on Asthma Update (ARIA 2008) The Perspective From Spain, J Investig Allergol Clin Immunol 2008; Vol. 18(5): 327-334.
- Kirtsreesakul V, Somjareonwattana P, Ruttanaphol S. Thecorrelation between nasal symptom and mucociliaryclearance in allergic rhinitis. Laryngoscope. 2009 after six tAug:119 (8): 1458-62.
- ARIA in the pharmacy: Management of allergic rhinitis symptoms in the pharmacy [online]. (Accessed 3 May 2011). Pharm Guide (accessed 3 May 2011).
- Bousquet J, Khaltaev N, Cruz AA, etal. Allergic Rhinitis and its Impact on Asthma (ARIA). Allergy 2008; 63(suppl 86): 8-160
- Bachert C, van Cauwenberge P, Khaltaev N. Allergic rhinitis and its impact on asthma. In collaboration with the World Health Organization. Executive summary. of the workshop report. 7–10 December 1999, Geneva, Switzerland. Allergy 2002;57:841–55.
- Adkinson F Jr, Yunginger JW, Busse WW, Bochner BS Allergic and non allergic rhinitis. In :Middleton's Allergy Principles and Practice. Mosby, Pennsylvania; 2003: 1391-1414.
- Salib RJ, Drake-Lee A, Howarth PH. Allergic rhinitis: past, present and the future. ClinOtolaryngol Allied Sci. 2003;28:291-303.
- Ciprandi G, Buscaglia S, Pesce G, etal. Minimal persistent inflammation is present at mucosal level in patients with asymptomatic rhinitis and mite allergy. J Allergy ClinImmunol. 1995;96:971-979.
- Gendo K, Larson EB. Evidence-based diagnostic strategies for evaluating suspected allergic rhinitis. Ann Intern Med 2004;140(4):278-89.
- Abdel- Raheim M. Meki, Raafat T.El-Sokkary, Montaser. A. Hafez,Role of tumor necrosis factor-alpha, interferon gamma, soluble inter cellular -1 and soluble vascular adhesion molecular-1 in bronchia asthma and allergic rhinitis: relation with disease severity.el-minia med., bull. 2006, vol. 17, no. 1.
- Shankar AH, Prasad AS : Zinc and immune function: the biological basis of altered resistance to infection. American Journal of Clinical Nutrition, 1998, 68(Suppl.):S447–S463.
- Verena W, Ute F, Heike W, etal:Zinc Oxide Nanoparticles Induce Necrosis and Apoptosis in Macrophages in a p47phox- and Nrf2-Independent MannerJune 2013 | Volume 8 | Issue 6 | e65704
- Smurthwaite, L. etal : Persistent IgE synthesis in the nasal mucosa of hayfever patients. Eur. J. Immunol. 2001; 31, 3422–3431.
- Prasad S: Zinc: role in immunity, oxidative stress and chronic inflammation Current Opinion in Clinical Nutrition and Metabolic Care 2009, 12:646–652.
- Ananda S, Frances WJ, Bin B, James T etal: Zinc supplementation decreases incidence of infections in the elderly: effect of zinc on generation of cytokines and oxidative stress1–3 Am J Clin Nutr 2007;85:837–44. Printed in USA.
- Megha D and RatneshDAS2: Need of education and awareness towards zinc supplementation: A review International Journal of Nutrition and Metabolism Vol. 4(3), pp. 45-50, March 2012.

17. Atambay M, Karabulut A, Aycan.O.M, etal:dust-mites: effect on lipid peroxidationthe national medical journal of india vol. 19, no. 2, 2006.

