

## **Evaluation the levels of eosinophil and some electrolytes in Allergic Rhinitis**

**Bushra jihad sabbar 1, Zena Abbass Ali 2 and Tariq Hussein Mgheer3**

**1 Department of Chemistry and Biochemistry - College of Medicine – Babylon University .  
Email:bushrajihad86@.com .**

**2Department of Chemistry and Biochemistry - College of Medicine – Babylon University. Assent  
Professor Email:Zeanaabbass1980@gmail.com.**

**3Department of Chemistry and Biochemistry - College of Medicine – Babylon University. Assent  
Professor Email: [almgheer.tariq@uobabylon.edu.iq.phon](mailto:almgheer.tariq@uobabylon.edu.iq.phon); Tel: 07801889743.**

### **Abstract**

It is known in the analysis of allergic rhinitis increase the concentration of Ig-E also eosinophil in patients with allergic rhinitis . It was discovered to play a role in an inflammatory reaction. Certain electrolytes may have a role in allergic rhinitis like Magnesium is a crucial element that facilitates lung constriction relief, while no significantly difference in levels of potassium.

### **Objectives:**

To evaluate local immune reaction by determine serum Ig-E and eosinophils when allergic rhinitis is present as patients and apparently healthy individuals. and to correlate them with concentration of Magnesium ions and potassium ions.

### **Methods and materials:**

The present study included 100 subjects (case-control ) included 50 patients with allergic rhinitis and 50 apparently healthy individuals, ranging in age from 29 to 45

Serum Ig-E was estimated by an enzyme-linked immunosorbent assay (ELISA) based on principle of (sandwich) method.

An Abbott device was used to measure potassium concentrations using ICT (Integrated Chip Technology) in human serum, The Magnesium ions concentration was measured manually with Magnesium kit using a spectrophotometer (Taytec, Canada.

### **Results:**

The levels of Immunoglobulin-E (Ig-E) and eosinophil , were discovered to be significantly higher in AR patients than in the control group ( $p<0.05$ )

An investigation revealed a magnesium ion deficit in Patients with Rhinitis compared with control , While, no significantly difference in levels of Potassium in patients with allergic rhinitis compare with control group ( $p > 0.05$ ).

Our results are consistent with previous research on the differences in prevalence according to sex. AR prevalence were higher in males in comparison to females

The results show no significant differences ( $p > 0.05$ ) in age between control group and Allergic rhinitis. The frequency distribution of patients with AR according to age was as following: 35 (70 %) cases from 30-37 years, 15 (30%) cases and between 38-45 year.

Statistical analysis of the results was performed using SPSS(version 20).

## **Introduction:**

Concentrations of mediators in nasal secretions may be indicative of nasal mucosal inflammation such us allergic rhinitis. in presence of allergens, Airborne allergens [1]. Clinically recognized Ig-E-mediated reaction characterized by nasal discharge, itching, coughing, and nasal congestion [2].

The identification of allergen-specific Ig-E and the agreement between allergy tests and past experiences, such as the incidence of symptoms following inhalation of the sensitizing allergen, are used to make the diagnosis of allergic rhinitis. Ig-E levels that are higher could mean an allergic reaction because the body is overreacting to allergens[3]. One to three percent of the body's total WBCs are eosinophils (Eos), a subpopulation of WBCs. When a person has a parasite infection, an allergy attack, or experiences persistent inflammation like Eos dermatitis, the amount of Eos may increase in their blood or local tissues [4] .

During active seasonal allergic rhinitis, eosinophils in the target tissue may show more significant degranulation than in many other prevalent diseases marked by tissue eosinophilia, such as inflammatory bowel disease and asthma [5,6]. particularly when the condition advances of from the start active symptomatic symptoms [7], It is widely known that Ig-E can connect to mast cell surfaces that have high affinity Ig-E receptors. causing release of allergic mediators from the mast cells and the resulting allergy reactions[8]. Ig-E content in blood is routinely found to be very elevated in the rhinitis evaluation and therapy [9]. The Eos activation mechanism, however, is still mysterious. [10,11] Eosinophils play critical roles in the development of allergic rhinitis (AR) by release cytokines tumor necrosis factor alfa(TNF-  $\alpha$ ) has been discovered that tumor necrosis factor alfa plays a role in the inflammatory response[12]. TNF-  $\alpha$  is controlled by the TNF-  $\alpha$  gene [13].

Potassium is the main intracellular cation. The concentration of potassium in the erythrocytes is about 23 times the concentration in plasma. For this reason only unhemolyzed sample must be used. Potassium required for equilibrium within the cells, For optimal action, the glycolysis enzyme pyruvate kinase needs  $K^+$ , The propagation of nerve impulses requires potassium, the right amount inside the cell  $K^+$  is required for ribosomes to properly biosynthesize proteins. cardiac muscle activity is influenced by extracellular  $K^+$  [14]. More than 90% of the plasma cation concentration in healthy subjects comes from sodium and modest levels of potassium and calcium are also present. Next to potassium, magnesium ( $Mg^{2+}$ ) is the most abundant intracellular cation (15 mEq/L). and are crucial for healthy cell function. In addition to being crucial for membrane function, it is a crucial cofactor for several enzymes[15]. Furthermore, it plays a structural role in the cell and can compete with calcium in cellular responses. The amount of magnesium in the body is roughly 1 mol (or 25 g). The amount of magnesium in skeletal tissues is roughly 70%. Muscle, the brain, and other tissues hold the remaining amount. Muscle twitching, spasms, and tetany, deficiency symptoms resemble those of hypocalcemia to some extent. When hypokalemia persists despite potassium supplementation magnesium is required, this may become obvious[14] There may also be further electrolyte imbalances present. Recommended Adult diets typically contain 4.5 mg/kg of dietary m, and rich dietary sources include cereal, nuts, and vegetables[16]. Magnesium is particularly important for maintaining immunity and avoiding allergies. [17]

### **Aims of study:**

- 1- Investigate Ig-E, eosinophil and electrolytes (Mg, K) in patients with allergic rhinitis in Babylon province.
- 2- To find the possibility of correlation between Ig-E and electrolyte parameters with age, gender.

### **Materials and Methods:**

All subjects had their antecubital fossas venepunctured, and 2 ml of blood was taken in EDTA anticoagulant under stringent aseptic guidelines. Eosinophil levels were determined by analyzing the blood sample. count by hematology analyzer, Sysmex Japan eosinophil as a percent [18,19]. and 3 mL blood in gel tube. Gel tube of blood was centrifuged for 10-15 min at  $1500 \times g$ . Serum Ig-E was estimated by an enzyme-linked immunosorbent assay (ELISA) based on principle of (sandwich) method [20] An Abbott device was used to measure potassium concentrations using ICT (Integrated Chip Technology) in human serum, plasma[21]. The Magnesium ions concentration

was measured manually with Magnesium kit using a spectrophotometer (Taytec, Canada) [22-23]. This study was conducted in Babylon Maternity and Hilla surgical Hospital and Imam Sadiq Hospital in the laboratory of Biochemistry Department, College of Medicine, University of Babylon. The present case control study included 50 patients with Allergic rhinitis with a mean age  $37.5 \pm 7.1$  years and an age range of 30-45 years. Besides, the study included 50 apparently healthy individuals with a mean age of  $36 \pm 7.6$  years and an age range of 29-44 years. The age of subjects is stratified into 2 groups to elucidate the effect of age on study parameters; The gender of Allergic rhinitis patients and control groups. In the present study was include both male and female the percentage of male was 66 % a count (34) and percentage of females was 34% (16 )for patients .

### **Statistical Analysis:**

In the current study a test was performed to determine whether group variance was significant or not, P values less than 0.05 were used to determine whether the difference was significant. Data was presented as a mean. $\pm$  standard deviation in expression of results. Statistical analyses were performed with SPSS (version 20).

### **Results**

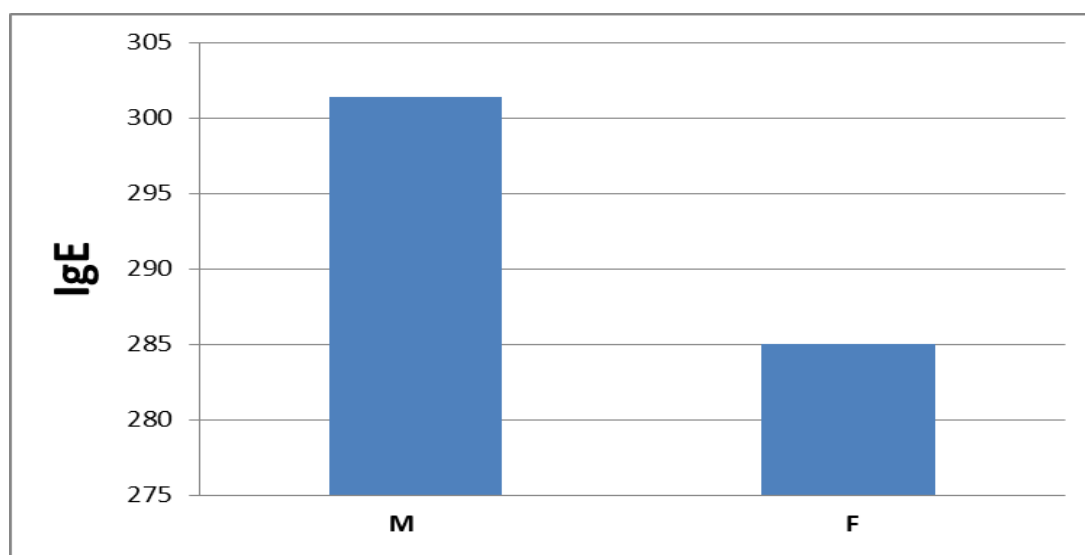
The present case control study included 50 patients with Allergic rhinitis with a mean age  $37.5 \pm 7.1$  years and an age range of 30-45 years. Besides, the study included 50 control, The age of subjects is stratified into 2 groups to elucidate the effect of age on study parameters

Eosinophils found to be significantly ( $p \leq 0.05$ ) increase in patients compared to control, as mean 4.50 and SD 3.98 for patient compare to control as mean 2.40 and SD 1.19 ,  $p < 0.05$  also Immunoglobulin-E (Ig-E) levels were observed significantly higher in patients mean  $297.1 \pm 15.2$  and SD 281.9 compare with control mean  $93.2 \pm 12.3$  and SD 80.9 and there was deficiency of magnesium ions in AR patients mean  $1.6 \pm 0.10$  compare with control  $1.6 \pm 0.10$  ( $p < 0.05$ ) while no- significant difference in the level of potassium ions.

**Table 1 Cases had higher serum Ig-E and eosinophil levels than controls and decrease level of magnesium( p< 0.05) while potassium level no significant .**

Parameters	Group	NO.	Mean	SD	95% confidence interval	P value
Eosinophil (%)	Patients	50	4.50	3.98	3.691 - 5.180	P<0.05
	control	50	2.40	1.19	1.980 – 2.740	
Ig-E IU/ml	Patients	50	297.1	15.2	281.9-313.3	P<0.05
	control	50	93.2	12.3	80.90-105.5	
Mg meq/L	Patients	50	1.6 ± 0.102	0.102	1.56 - 1.65	P<0.05
	control	50	1.85 ± 0.51	0.51	1.8-1.9	
Potassium	Patients	50	4.5 ± 0.2	0.2	4.7	P>0.05
	control	50	4.4 ± 0.15	0.15	4.55	

Our results are consistent with previous research on the differences in prevalence according to sex. AR prevalence were higher in males in comparison to females as showed in Fig 1.



**Fig 1. Mean of Ig-E in two groups( M and F)**

The results show no significant differences ( $p > 0.05$ ) in age between control group and Allergic rhinitis.

**Table 2: Means Age  $\pm$  SD of Allergic rhinitis and control groups.**

Subjects	Number	Age (Years) Means $\pm$ SD	Range	P value
Allergic rhinitis group	50	37.5 $\pm$ 7.1	30-45	P>0.05
Control group	50	36.5 $\pm$ 7.6	29-44	P>0.05

SD: standard deviation; non-significant at  $p > 0.05$

The frequency distribution of patients with AR according to age was as following: 35 (70 %) cases from 30-37 years, 15 (30%) cases and between 38- 45 year.

## Discussion

Allergic rhinitis is an inflammation of the nasal mucosal membranes that is followed symptoms include sneezing, nasal mucosal edema, nasal discharge, itching, and other signs. Allergens, which are typically harmless substances but can produce an allergic reaction in some people, are the cause of allergic rhinitis, a chronic condition cytokines play a crucial role in the inflammatory process.

In the current investigation, patients with allergic rhinitis had higher serum Ig-E and eosinophil levels was found ( $R=0.78$ ), indicating the importance of these cells in allergic rhinitis. Eosinophilia can be viewed as a result of the entire process because Ig-E is involved early in the inflammatory cascade and can be regarded a cause of allergic rhinitis[24].

The biological background that is "driving" the inflammation should be taken into account when choosing a course of treatment because it will likely indicate how well the patient will respond[25].

When magnesium and potassium levels were examined, we discovered that individuals with chronic allergic rhinitis had lower amounts of magnesium in their

bodies as well as low serum and no significant potassium levels, Magnesium can aid in bronchiole expansion and the maintenance of relaxed airway smooth muscles. Additionally, magnesium aids in reducing inflammation moderators in the lungs and airways generally[26].

According to Prevention Magazine, magnesium "helps relieve constrictions in the lungs' airways." [27].

Our results are consistent with previous research on the differences in prevalence according to sex. AR prevalence were higher in males in comparison to females .Differences in condition prevalence is explained by higher levels of endogenous sex steroids hormones with increased Th2 response in women, whereas in men, testosterone works by suppressing the Th2 response

Age distribution of our study showed that most people were in the age range of 30-37 years, and this is relabel with another reviews like Yang Liu,et al (2022) [28]who said that the peak of prevalence of allergic rhinitis with regard to age gradually.

## **Conclusions:**

Analyzing serum Ig-E and eosinophils to identify allergic rhinitis as a diagnostic Ig-E were positively correlated with age ,gender , and BMI , a reduction in the amount of magnesium has been seen in seasonal allergic rhinitis sufferers .While no significantly difference in levels of Potassium in patients with allergic rhinitis compared with control group ( $p > 0.05$ ).

supplementation in this disease should start at least two months before treatment. Additionally, magnesium therapy should be continued throughout the progression of the illness since it has a more comprehensive effect on allergic ability and symptom reduction than drugs and less frequently requires a prescription to lower allergic reaction severity

Our results are consistent with previous research on the differences in prevalence according to sex. AR prevalence were higher in males in comparison to females .

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