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### Recommended Citation

Rizk, Ezzat; ElKelany, Khaled; Al Soda, Mohamed F.; and ElShenawy, Salama (2018) "Prevalence of allergic disorders of respiratory system in children in Shebin Elkom," *Journal of Medicine in Scientific Research*: Vol. 1: Iss. 4, Article 8.  
DOI: [https://doi.org/10.4103/JMISR.JMISR\\_90\\_18](https://doi.org/10.4103/JMISR.JMISR_90_18)

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# Prevalence of allergic disorders of respiratory system in children in Shebin Elkom

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## Abstract

### Introduction

Allergic rhinitis is a global health problem that causes significant illness and disability worldwide. Interactions between the lower and the upper airways are well known and have been studied since 1990. More than 80% of asthmatics have rhinitis, and 10–40% of patients with rhinitis have asthma. Indoor and outdoor allergens, as well as occupational agents, cause rhinitis and other allergic diseases.

### Aim

A trial was done to determine or distinguish the causative agents, either one or multiple agents, in allergic patients. We hope this will help us in the management of allergic patients by avoiding this causative agent(s) if possible.

### Patients and methods

A total of 97 individuals were recruited from the outpatient clinics of Shebin Elkom teaching hospital.

### Results

Pigeon and pollens showed the highest prevalence at 56.7%, whereas wheat showed the least incidence at 5.15%. As for ingestant, the cacao showed the highest incidence at 16.49%, and the least one was strawberry at 5.15%.

### Conclusion

The importance of our research that If we recognize the causative allergen that triggers the allergic disorder, we can try to avoid it and protect the patient from the hazards of an allergic disorder.

**Keywords:** Allergic rhinitis, immunoglobulin E level, pediatrics

## INTRODUCTION

Allergic rhinitis is a global health problem that causes significant illness and disability worldwide [1].

Interactions between the lower and the upper airways are well known and have been studied since 1990. More than 80% of asthmatics have rhinitis, and 10–40% of patients with rhinitis have asthma [2].

Indoor and outdoor allergens, as well as occupational agents, cause rhinitis and other allergic diseases.

The treatment of allergic rhinitis combines allergen avoidance, pharmacy therapy, immunotherapy, and education [3].

Allergens are antigens that induce and react with specific immunoglobulin (IgE) antibodies. They originate from a wide range of animals, insects, plants, fungi, or occupational sources [2].

Aeroallergen is greatly implicated in allergic rhinitis and asthma. They are usually classified as indoor (principally mites, pets, insects, or from plants origin focus), outdoor (pollens and molds), or occupational agents. Classically, outdoor allergens appear to constitute a higher

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DOI:  
10.4103/JMISR.JMISR\_90\_18

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**How to cite this article:** ElKelany K, ElShenawy S, Rizk E, Al Soda MF. Prevalence of allergic disorders of respiratory system in children in Shebin Elkom. J Med Sci Res 2018;1:255-60.

risk for seasonal rhinitis than indoor allergens, and indoor allergens constitute a higher risk for asthma and perennial rhinitis. Mite allergen in dust is associated with a prevalence of sensitization and control of the disease. The presence of 100 mites per gram of house dust is sufficient to sensitize an infant. For approximately 500 mites, the sensitized patient shows a higher risk of developing asthma at a later date. Storage mites are present in stoked grains and flour. These species are abundant in the dust of very damp houses. Surprisingly, pollen sensitization is lower in rural than in urban areas, whereas the degree and clinical relevance of sensitization to common allergen among individuals are higher in the developed countries [4].

The number and variety of domestic animals have considerably increased over the past 30 years, especially in the urban environment of western countries. The danders and secretions carry or contain powerful allergens capable of constant allergic reactions [2].

Cats and dogs are the major source of allergens in asthma, rhinitis, or rhinoconjunctivitis, and also, though more rarely, in urticaria and angioedema [5].

The skin prick test is simple, quick, and inexpensive. The forearm or back is coded to indicate drops of solution containing known allergens, and then the skin beneath each drop is pricked with a lance so the solution can reach mast cells. If a wheal and flare reaction occurs within 20–30 min, it demonstrates an IgE reaction. An adverse reaction is when the skin remains normal.

An allergy can only be confidently diagnosed if clinical symptoms correlate with the allergens that tested positive. Not all allergies can be identified through this method and testing food allergens such as dust and pollen [6].

## PATIENTS AND METHODS

Ethics committee approval was taken. A total of 97 individual was recruited from the pediatric and ENT outpatient clinics of Shiben Elkom teaching hospital.

Of them, 47 were male and 50 were female, with age ranging from 4 to 20 years old. We selected our patients having allergic rhinitis only or bronchial asthma only or both; there was a group having another form of allergy such as skin allergy and eye allergy.

Skin test and serum IgE level were performed for all patients. IgE level was measured by Rast technique.

Skin test was done by using a battery of allergens, both ingestants and inhalants. Overall, 0.1 ml of each allergen is injected intradermally. Redness and swelling more than 10 mm is considered positive for this allergen.

The radioallergosorbent test (Rast) is a blood test to measure the blood level of IgE antibodies produced in response to a particular antigen. This test is thought to be more accurate

than skin testing because it can measure the exact amount of allergen antibody in the blood [7].

## Objective

The objectives of this study were to determine or distinguish the causative agents, either single or multiple agents, in allergic patients. We hope this will help us in the management

**Table 1: Descriptive demographic data of the studied sample**

Total number	n=97 [n (%)]
Age [mean±SD (range)] (years)	31±13 (4-60)
Sex	
Male	47 (48.5)
Female	50 (51.5)

**Table 2: Descriptive clinical and laboratory data of the studied sample**

Items	n (%)	95% CI
Diagnosis		
Allergic rhinitis only	26 (26.8)	2-50%
Asthma only	50 (51.5)	22-87%
Both	11 (11.3)	6-37%
Others	10 (10.1)	0.5-23%
Classification of patients according to sensitization		
Sensitized to ingestants only	1 (1.0)	0.4-5%
Sensitized to inhalants only	56 (57.7)	36-90%
Sensitized to both	35 (36.1)	24-50%
Not sensitized	5 (5.1)	2-8%
IgE level [mean±SD (range)]	425.89±298.8	(72-1200)
Skin test result		
Positive	92 (94.9)	
Negative	5 (5.1)	
IgE test result		
Positive	87 (89.8)	
Negative	10 (10.2)	

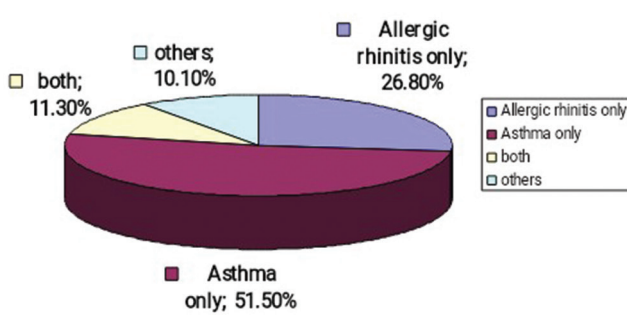
IgE, immunoglobulin E.

**Table 3: Classification of patients according to the number of allergens they are sensitized to**

Number of allergens	n (%)
None	5 (5.1)
One allergen	2 (2)
Two allergens	9 (9.3)
Three allergens	14 (14.3)
Four allergens	16 (16.5)
Five allergens	8 (8.2)
Six allergens	11 (11.3)
Seven allergens	4 (4.1)
Eight allergens	5 (5.1)
Nine allergens	7 (7.1)
Ten allergens	3 (3.1)
Eleven allergens	5 (5.1)

**Table 4: Prevalence of each type of allergens in the studied sample**

Category	Allergen	Number of sensitized patients	Percentage to all patients	Percentage to all positive sensitizations detected
Inhalant allergens	Pigeon	55	56.70	11.70
	Mixed pollens	55	56.70	11.70
	Mite	47	48.45	10.00
	Mixed molds	41	42.27	8.72
	Cotton dust	33	34.02	7.02
	House dust	25	25.77	5.32
	Grass	23	23.71	4.89
	Hay dust	21	21.65	4.47
	Straw	21	21.65	4.47
	Rabbit hair	18	18.56	3.83
	Maize dust	16	16.49	3.40
	Wool	14	14.43	2.98
	Feather	14	14.43	2.98
	Goat hair	13	13.40	2.77
	Tobacco	8	8.25	1.70
	Wheat	5	5.15	1.06
	Total number of positive sensitizations to inhalants		409	
Ingestant allergens	Cacao	16	16.49	3.40
	Banana	14	14.43	2.98
	Fish	11	11.34	2.34
	Milk	9	9.28	1.91
	Eggs	6	6.19	1.28
	Strawberry	5	5.15	1.06
Total number of positive sensitizations to ingestants		61		12.98
Total number of all positive sensitization		470		100



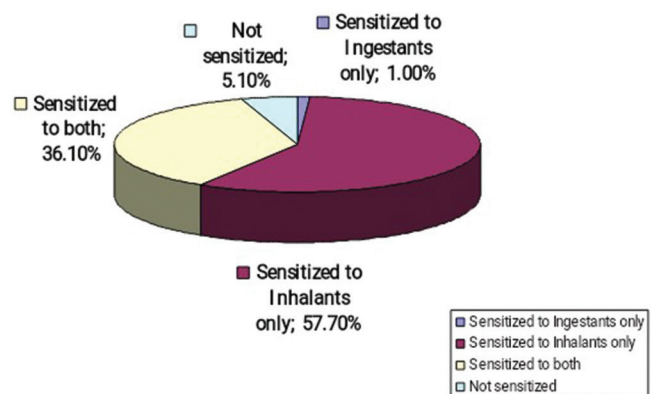
**Figure 1:** No significant difference between IgE levels and skin test result positive and negative for food allergen (ingestants).

of allergic patients by avoiding these causative agents if possible.

## RESULTS

From Jan 2017 to August 2017, 97 allergic patients were collected from the outpatient clinic of Shebin ElKom teaching hospital. Of them, 47 were male and 50 were female (Table 1).

In Table 2, descriptive clinical and laboratory data of the studied sample are presented. This table shows that bronchial asthma was seen in more than half of the allergic cases.

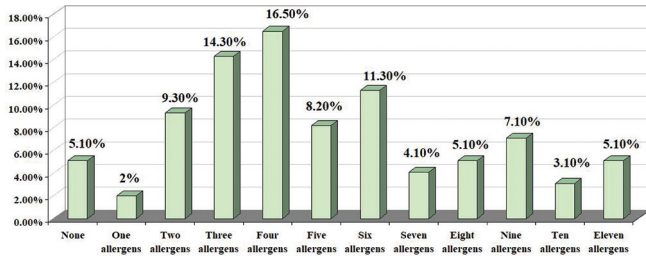


**Figure 2:** No significant difference between IgE levels and skin test result positive and negative for food allergen (ingestants).

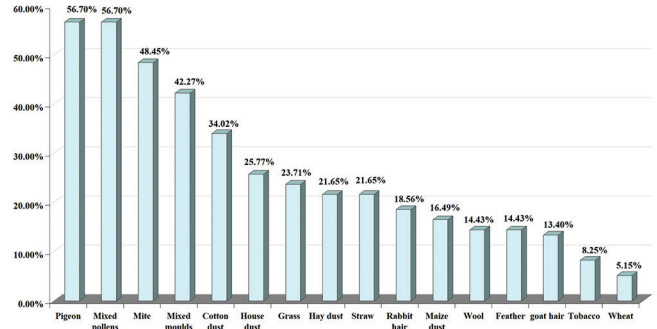
Sensitivity to inhalants only was seen in 57.7%, whereas to both ingestants and inhalants in 36.1%, and to ingestants only, it was 1%. IgE test was positive in 89.8% in the all-allergic patients, whereas the skin test was positive in 94.9%.

Table 3 shows that most of the cases were allergic to more than an allergen.

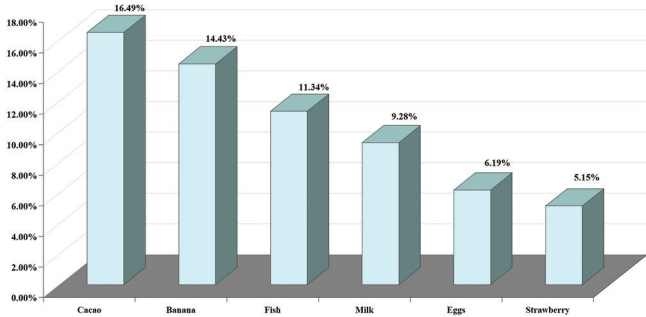
Table 4 shows the prevalence of each type of allergen in the studied sample.



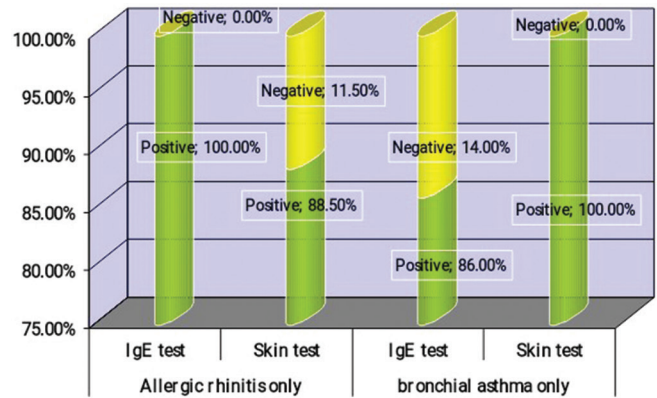
**Figure 3:** No significant difference between IgE levels and skin test result positive and negative for food allergen (ingestants).



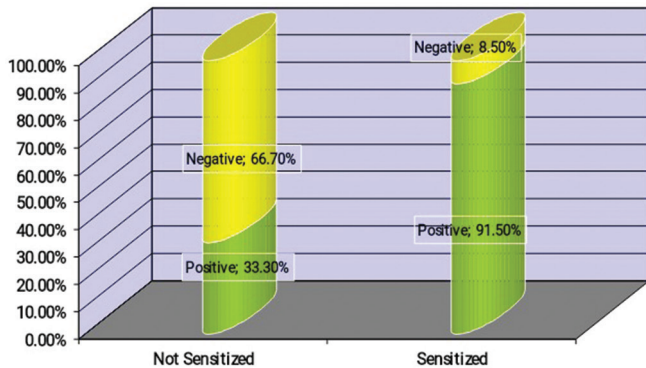
**Figure 4:** No significant difference between IgE levels and skin test result positive and negative for food allergen (ingestants).



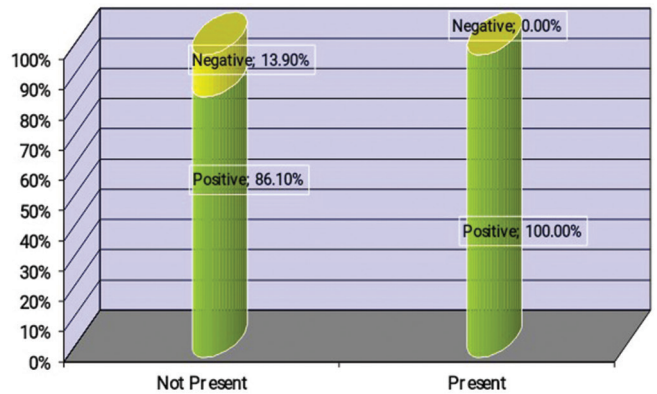
**Figure 5:** No significant difference between IgE levels and skin test result positive and negative for food allergen (ingestants).



**Figure 6:** There was no significant difference between two groups regarding IgE level.



**Figure 7:** Patients sensitized to inhalants have a significantly higher percentage of IgE positive test result than those not sensitized.



**Figure 8:** There was no significant difference between patients sensitized to food allergens and those not sensitized regarding IgE test and level.

**Table 5: Comparison between skin test results and immunoglobulin E results in the whole sample**

	Skin test [n (%)]		Test value	Significance
	Negative	Positive		
IgE test				
Positive	1 (20.0)	9 (9.8)	$\chi^2=0.535$	>0.05
Negative	4 (80.0)	83 (90.2)		
IgE level (mean±SD)	429±404	425±295	$U=0.269$	>0.05

IgE, immunoglobulin E; U, Mann-Whitney test.

Pigeon and pollens showed the highest prevalence at 56.7%, whereas wheat showed the least incidence at 5.15%. As for ingestants, the cacao showed the highest incidence at 16.49%, and the least one was the strawberry at 5.15%.

Table 5 shows a comparison between skin test results and IgE results. This table showed no significant difference between them, as P value is greater than 0.05.

Table 6 shows the comparison between patients with only allergic rhinitis and those with only bronchial asthma regarding IgE test and skin test.

There was a significant difference between IgE level between allergic rhinitis and bronchial asthma, as it was 100% in allergic

**Table 6: Comparison between patients with only allergic rhinitis and those with only bronchial asthma regarding immunoglobulin E test, skin test, and immunoglobulin E level**

	Patient diagnosis [n (%)]		Test value	Significance
	Allergic rhinitis only	Bronchial asthma only		
IgE test				
Positive	26 (100.0)	43 (86.0)	$\chi^2=4.01$	<0.05*
Negative	0 (0.0)	7 (14.0)		
Skin test				
Positive	23 (88.5)	50 (100.0)	$\chi^2=6.01$	<0.05*
Negative	3 (11.5)	0 (0.0)		
IgE level (mean±SD)	474±230	423±342	U=1.69	>0.05

IgE, immunoglobulin E; U, Mann-Whitney test. \*Significant at the level of 0.05.

**Table 7: Comparison between patients sensitized to an inhalant allergen and those not sensitized regarding immunoglobulin E test and level**

	Inhalant sensitization [n (%)]		Test value	Significance
	Sensitized	Not sensitized		
IgE test				
Positive	86 (91.5)	1 (33.3)	$\chi^2=10.63$	<0.01*
Negative	8 (8.5)	2 (66.7)		
IgE level (mean±SD)	434±299	144±94	U=2.09	<0.05*

IgE, immunoglobulin E; U, Mann-Whitney test. \*Significant at the level of 0.05.

**Table 8: Comparison between patients sensitized to food allergens and those not sensitized regarding immunoglobulin E test and level**

	Food sensitization [n (%)]		Test value	Significance
	Sensitized	Not sensitized		
IgE test				
Positive	33 (91.7)	54 (88.5)	$\chi^2=0.242$	>0.05
Negative	3 (8.3)	7 (11.5)		
IgE level (mean±SD)	458±319	406±287	U=0.945	>0.05

IgE, immunoglobulin E; U, Mann-Whitney test.

rhinitis only, and it was 86% in bronchial asthma only, whereas the skin test result was positive in 88.5% in allergic rhinitis only and 100% in bronchial asthma only.

Table 7 shows that there was a highly significant difference between IgE levels in positive and negative skin test result patients for inhalants (positive and negative skin test were sensitized and non-sensitized respectively).

Table 8 shows no significant difference between IgE levels and skin test result positive and negative for food allergen (ingestants) (Figs. 1-5).

Patients with allergic rhinitis have a significantly higher percentage of positive IgE test result; however, asthmatic patients tend to have significantly higher percentage regarding

skin test. There was no significant difference between two groups regarding IgE level (Fig. 6).

Patients sensitized to inhalants have a significantly higher percentage of IgE positive test result than those not sensitized; moreover, those sensitized to inhalants have higher IgE levels than those not sensitized to inhalants (Fig. 7).

There was no significant difference between patients sensitized to food allergens and those not sensitized regarding IgE test and level (Table 9).

Patients with allergic rhinitis have significant higher IgE level mean than those without, with no significant difference regarding IgE test and skin test (Table 10).

Patients with bronchial asthma have a significantly higher percentage of positive skin test results than nonasthmatic patients, and no significant difference between groups regarding IgE test and IgE level (Fig. 8).

**Statistical method**

Using SPSS v18.0 and Microsoft Excel 2003 for Windows 7 (SPSS Inc., Chicago, Illinois, USA), statistics were computed where prevalence rate was calculated at 95% confidence interval. The relation between risk factors and food sensitization was performed by univariate analysis using  $\chi^2$ -test. A P value less than 0.05 was considered significant. Comparison between different means was performed by analysis of variance test for parametric data and Mann–Whitney and Kruskal–Wallis test for nonparametric data. Correlation between food and inhalant allergens was performed using Pearson’s correlation coefficient.

**DISCUSSION**

Allergic rhinitis and bronchial asthma are a severe medical problem. The conventional treatment was not a curative treatment; it was only symptomatic and reduced the problem and its complication.

The causative causes of allergy were our interest in this study. Allergens were an essential factor in triggering the allergic disorders. Our study was a trial in preventing the occurrence of allergic disorders by avoiding the causative allergens.

**Table 9: Comparison between patients with allergic rhinitis and those without regarding test, skin test, and immunoglobulin E level**

	Allergic rhinitis [n (%)]		Test value	Significance
	Present	Not present		
IgE test				
Positive	36 (97.3)	51 (85.0)	$\chi^2=3.74$	>0.05
Negative	1 (2.7)	9 (15.0)		
Skin test				
Positive	34 (91.9)	58 (96.7)	$\chi^2=1.07$	>0.05
Negative	33 (8.1)	2 (3.3)		
IgE level (mean±SD)	467±257	399±321	$U=2.16$	<0.05*

IgE, immunoglobulin E; U, Mann-Whitney test. \*Significant at the level of 0.05.

**Table 10: Comparison between patients with bronchial asthma and those without regarding immunoglobulin E test, skin test, and immunoglobulin E level**

	Patient diagnosis [n (%)]		Test value	Significance
	Present	Not present		
IgE test				
Positive	53 (86.9)	34 (94.4)	$\chi^2=1.39$	>0.05
Negative	8 (13.1)	2 (5.6)		
Skin test				
Positive	61 (100.0)	31 (86.1)	$\chi^2=8.93$	<0.01**
Negative	0 (0.0)	5 (13.9)		
IgE level (mean±SD)	439±338	401±220	$U=0.620$	>0.05

IgE, immunoglobulin E; U, Mann-Whitney test. \*\*Significant a level of 0.01.

Our study includes essential diagnostic tools (IgE level and skin test) to diagnose the causative allergen.

We found that the inhalant allergens were much common than ingestant allergens, as shown in the Table 2. According to skin test, the sensitized individuals were much familiar than not

sensitized individuals (our participant were allergic individuals).

Moreover, IgE level was positive in 89.8% of our patients (whom they experience a manifestation of allergic disorders).

The most common inhalant allergen was a pigeon in 56.7%. Moreover, for ingestant allergens, it was cacao in 16.49%.

We found that there was no significant difference between skin test and IgE level in the diagnosis of allergens.

The importance of our research is that if we can recognize the causative allergen that triggers the allergic disorder, we can try to avoid it and protect the patient from the hazards of an allergic disorder.

#### Financial support and sponsorship

Nil.

#### Conflicts of interest

There are no conflicts of interest.

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