

## Bronchial Asthma in Secondary School Students in Assiut

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### Abstract

**Introduction:** Epidemiologic studies have shown that the prevalence of asthma is increasing worldwide, the aim of this study is to identify the prevalence, risk factors and triggering factors of bronchial asthma among secondary school students in Assiut District.

**Subjects and Methods:** The present study was conducted among secondary school students in Assiut district from January 2017 to October 2017 to detect prevalence of asthma. A questionnaire was answered by every student, followed by examination. Peak expiratory flow rate was conducted only for asthmatic children.

**Results:** The prevalence of bronchial asthma among secondary school students in Assiut district was 8.7%. The prevalence rate for males was 4.4% while, that for females was 11.4%.

**Conclusion:** Asthma prevalence was 8.7% in secondary school student in Assiut district. Asthma prevalence increased in Assiut district as in a previous study done in 2012, the prevalence was 6.2% in preparatory school students. As asthma in children tends to improve with age till maturity, it was expected that prevalence in secondary school students to be lower than in preparatory school students, but it was found to be higher.

**Keywords:** *Bronchial Asthma; Secondary School Students; Assiut District*

### Introduction

Bronchial asthma is a disease of chronic airway inflammation characterized by reversible airway obstruction and increased airway responsiveness [1]. Asthma is one of the most common diseases among children worldwide [2]. Epidemiologic studies have shown that the prevalence of asthma is increasing worldwide, especially in non-industrialized countries, and it is currently estimated that approximately 235 million people suffer asthma [3]. Many factors have been proposed to explain the increased prevalence of asthma observed in the past decades, including environmental, nutritional, economic and psychosocial aspects. However, environmental factors are probably the main determiners of the recent growth in the prevalence of this disease [4]. In Egypt, it has been reported that the prevalence of bronchial asthma in children aged 3 to 14 years old is 8.2 - 8.3% [5].

The causes of childhood asthma are multifaceted, with genetic and environmental exposures increasing susceptibility to the development of this condition [6]. Known early life risk factors include preterm birth, infant weight gain and adiposity, in utero and post-natal tobacco smoke exposure, household damp or mould, lower respiratory infections, and pollutants such as sulphur dioxide and particulate matter [7].

The diagnosis and management of asthma in preschool-aged children differs from that of asthma in school-aged children, adolescents, and adults in a number of ways. The natural history of asthma early in life is quite variable and not fully understood, early childhood wheezing and asthma are heterogeneous disorders with many phenotypic and variable expressions during childhood, and the evaluation of asthma in very young children is further complicated by the lack of objective lung function measurements and definitive biomarkers. Asthma management in preschool-aged children is also complex in that anatomic differences in young children, such as smaller airway size and lower inspiratory flow rate, might affect medication deposition in the airways. Furthermore, it is not clear which therapies are effective for particular wheezing phenotypes or whether early intervention can alter the course and outcome of this chronic disease [8].

According to the Global Initiative for Asthma (GINA), detailed history, physical examination, and spirometric lung function tests are vital to the diagnosis and management of asthma [9]. Generally, a reduction in forced expiratory volume in one second (FEV1) and peak expiratory flow (PEF) may be indicative of asthma, with the amount of reduction is proportional to the severity of asthma [10].

### Aim of the Work

- 1- Identify the prevalence of bronchial asthma among secondary school students in Assiut District.
- 2- Identify possible risk factors and triggering factors of childhood asthma in Assiut District.

### Patients and Methods

The present study was conducted among secondary school students (age 15 - 18 years) to include 699 students (270 males and 429 females), in Assiut district from January 2017 to October 2017 to detect prevalence of asthma.

We distributed a questionnaire in Arabic to be answered by them. The questionnaire included the following:

- Name, age, sex, and residence
- Family size
- Number of rooms in the house
- Degree of education of the father
- Degree of education of mother
- Occupation of the father
- Occupation of the mother
- Whether the father is smoker
- Whether the mother is smoker
- Whether the student suffer asthma or not
- Whether the student suffers nasal allergy, dermal allergy, eye allergy or allergy to a specific type of food
- The presence of allergic manifestation of any family member.

If the student has asthma: Symptoms that the child suffers (cough, wheezing, dyspnea .....), frequency of symptoms during the day, frequency of night time symptoms, if there is diurnal variation or not and if yes when, the allergens that induces an attack of asthma (viral respiratory infection, house dust, smoking, exercise, laughing, crying, odours, foods, exposure to cold, exposure to animals....), whether the child receives controlling medication or not, if yes what are these drugs and their doses, and what are the drugs used during the attack and their doses. Peak expiratory flow rate (PEFR) was conducted only for asthmatic children. The questionnaire was filled by all students seriously as, second grade students were mature enough to feel the importance of the subject so, it was a valid tool.

### Ethical consideration

Permissions to involve pupils in the study were initially sought from the district educational authorities and Health Insurance authority. During the initial visit to each school, pupils were informed about the study objectives and procedures.

### Statistical analysis

SPSS program version 16 for windows for statistical analysis was used. Continuous data were expressed as mean  $\pm$  SD. Categorical data were expressed as number and percentages. P Value less than 0.05 was considered statistically significant.

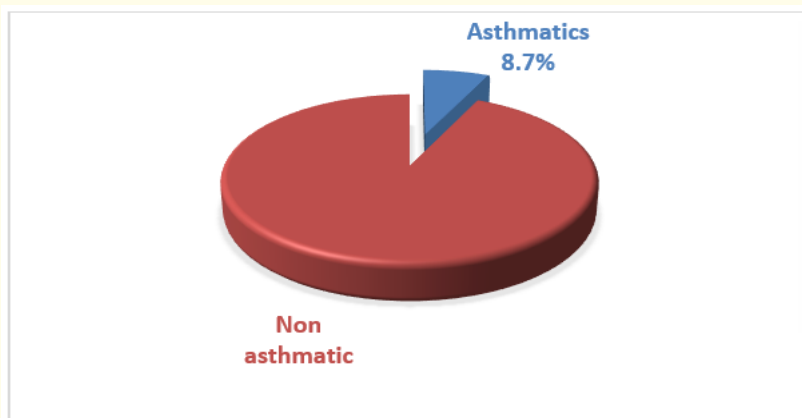
## Results

This study was conducted among secondary school students aged 15 - 18 years in Assiut district from eight schools. This study included 270 boys and 429 girls. Four schools were selected randomly from the urban schools and included in the study (two schools for boys and two for girls). On the other hand, four schools were selected randomly from the rural areas. The rural schools included in the study were mixed (boys and girls). The total number of students included in the study were 699 (372 from the rural areas and 327 from the urban areas). Number of girls was more than boys in our sample due to more compliance and attendance in females. Table 1 Shows the Sociodemographic characteristics of studied students.

Character	Number	Percentage
<b>Sex</b>		
Males	270	36.8%
Females	429	61.2%
<b>Age mean <math>\pm</math> SD 16.5 <math>\pm</math> 0.644</b>		
<b>Residence</b>		
Urban	327	46.8%
Rural	372	53.2%
<b>Family number mean <math>\pm</math> SD 7 <math>\pm</math> 1.8</b>		
<b>House room number mean <math>\pm</math> SD 4 <math>\pm</math> 2.463</b>		
<b>Father education</b>		
Don't read or write	48	6.7%
Just read and write	71	10.2%
Primary learning	37	5.3%
Preparatory learning	26	3.7%
Secondary learning	246	35.3%
University learning	217	31%
Post graduate learning	41	5.9%
PhD	13	1.9%
<b>Mother education</b>		
Don't read or write	133	18.9%
Just read and write	59	8.4%
Primary learning	25	3.6%
Preparatory learning	51	7.3%
Secondary learning	235	33.8%
University learning	154	22%
Post graduate learning	39	5.6%
PhD	3	0.4%
<b>Father job</b>		
Farmer	60	8.6%
Employer	366	52.4%
Private job	37	5.3%
Technician	18	2.6%
Worker	32	4.6%
Free job	135	19.3%
Retired	40	5.7%
Don't work	7	1%
Others	4	0.6%
<b>Mother work</b>		
Working	206	29.5%
Not working	493	70.5%
<b>Father smoking</b>		
Yes	270	36.8%
No	429	61.2%
<b>Other forms of atopy</b>		
Eczema	60	8.6%
Allergic rhinitis	63	9%
Conjunctivitis	43	6.2%
Food allergy	14	2%
No	519	74.2%
<b>Family history of atopy</b>		
Yes	214	30.6%
No	485	69.4%

**Table 1:** Sociodemographic characteristics of studied students.

Figure 1 shows the prevalence rate of asthma among secondary school students in Assiut district. It shows that the prevalence rate was 8.7%, where 61 had asthma out of 699 students. The prevalence rate for males was 4.4% (12 out of 270) while, for females was 11.4% (49 out of 429).



**Figure 1:** Prevalence of asthma among secondary school students in Assiut district.

Table 2 shows the sex distribution of asthma, it shows higher prevalence rate in females than males with a sex ratio was 1:4 which was statistically significant ( $P > 0.001$ ).

Sex	Total number of studied pupils	Number of asthmatics	Prevalence rate (%) of asthma
Male	270	12	19.7
Female	429	49	80.3
M/F ratio	1/1.9	1/4.1	1/4.1
P. value	0.001		

**Table 2:** Sex incidence of series studies.

Table 3 and figure 2 show the difference in asthma prevalence between urban and rural residence. They show higher prevalence rate in urban than in rural residence.

Residence	Total	Number of asthmatics	Percentage
Urban	327	48	14.6%
Rural	372	13	3.5%
	699	61	
P value	0.000		

**Table 3:** Distribution of asthma in rural and urban students.

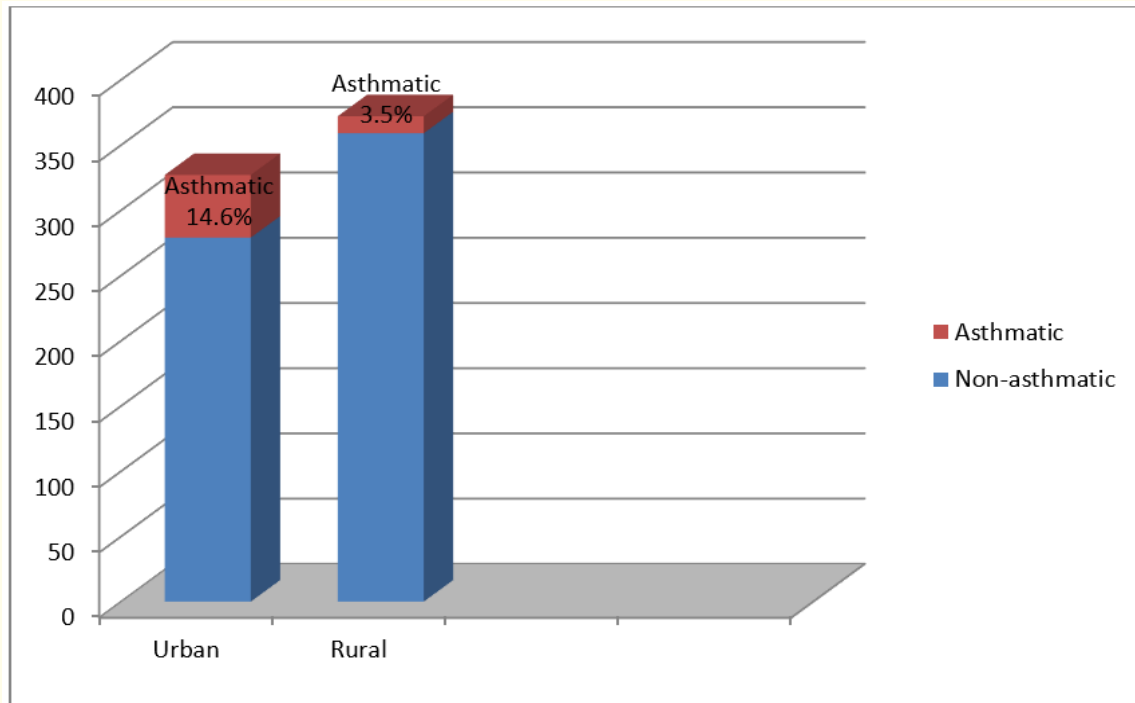


Figure 2: Distribution of asthma in rural and urban students.

Table 4 shows the prevalence of asthma in relation to the educational status of fathers. The highest prevalence was at the group of illiterate fathers (18.8%) while the lowest prevalence was at the group of university graduate fathers (6.5%).

Group number	Degree of education of fathers	Total number of fathers	Asthmatics		Non-asthmatics		P. value
			No.	%	No.	%	
1	Don't read or write	48	9	18.75	39	81.25	< 0.001
2	Read and write	71	4	5.63	67	94.37	< 0.001
3	Primary	37	5	13.51	32	86.49	< 0.001
4	Preparatory	26	2	7.69	24	92.31	< 0.001
5	Secondary	246	19	7.72	227	92.28	< 0.001
6	University	217	14	6.45	203	93.55	< 0.001
7	Post graduate	41	6	14.63	35	85.37	< 0.001
8	PhD	13	2	15.38	11	84.62	0.027

Table 4: Prevalence of asthma in relation to education of the fathers.

Table 5 and figure 3 show the prevalence of asthma in relation to work of mothers. Prevalence of asthma was higher in students with working mother.

Group number	Work of mothers	Number of mothers	Asthmatics		Non-asthmatics		P. value
			No.	%	No.	%	
1	Worker	206	20	9.71	186	90.29	< 0.001
2	Don't work	493	41	8.32	452	91.68	< 0.001

Table 5: Prevalence of asthma according to work of mothers.



Figure 3: Prevalence of asthma according to work of mothers.

Table 6 and figure 4 show the prevalence of asthma in relation to family size. It shows increased prevalence with increasing number of family members.

Family size	Number of families	Asthmatics		Non-asthmatics		P. value
		No.	%	No.	%	
3	13	2	15.38	11	84.62	0.027
4	53	6	11.32	47	88.68	< 0.001
5	121	10	8.26	111	91.74	< 0.001
6	198	17	8.59	181	91.41	< 0.001
7	130	9	6.92	121	93.08	< 0.001
8	76	4	5.26	72	94.74	< 0.001
9	56	3	5.36	53	94.64	< 0.001
10	32	8	25.00	24	75.00	0.008
11	10	2	20.00	8	80.00	0.114
12	5	0	0.00	5	100.00	-
13	2	0	0.00	2	100.00	-
14	1	0	0.00	1	100.00	-

Table 6: Prevalence of asthma in relation to family size.

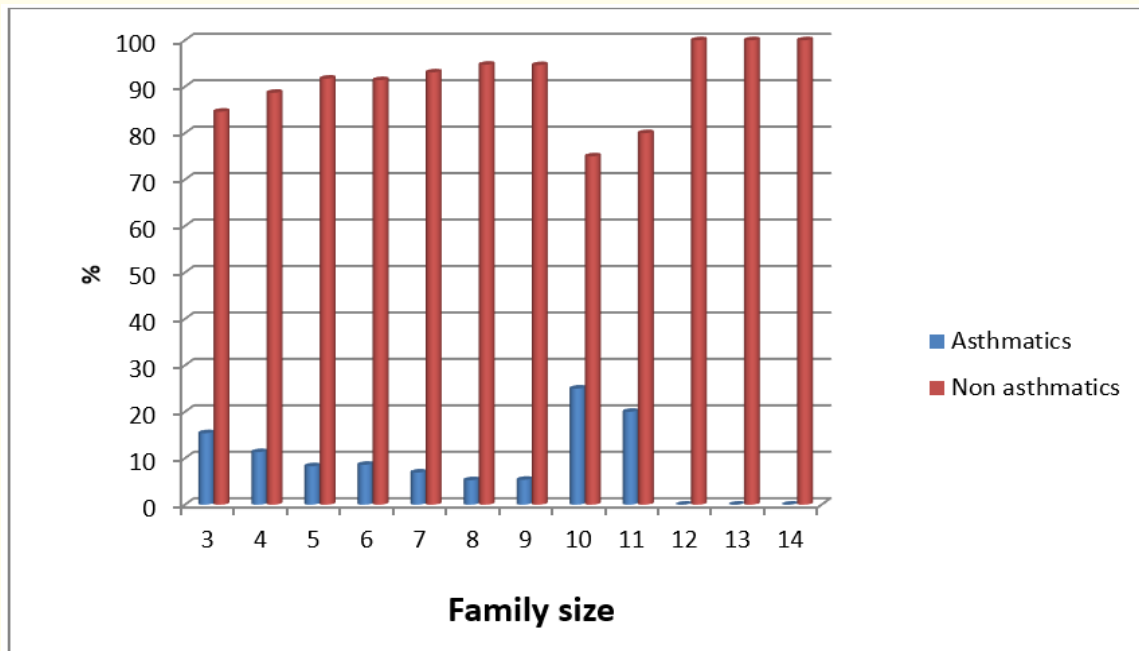


Figure 4: Prevalence of asthma in relation to family size.

Table 7 and figure 5 show the personal history of other allergic diseases in asthmatics and non-asthmatics. They show that the prevalence of allergic rhinitis and allergic dermatitis were significantly higher in asthmatic than non-asthmatics ( $P < 0.001$ ).

Allergic disease	Asthmatics		Non-asthmatics	
	No.	%	No.	%
Eczema	17	27.9	43	6.7
Allergic rhinitis	19	31.1	44	6.9
Conjunctivitis	4	6.6	39	6.1
Food allergy	5	8.2	9	1.4
No	16	26.2	503	78.8
P. value	$< 0.001$			

Table 7: Personal history of other allergic manifestations in asthmatics and non-asthmatics.

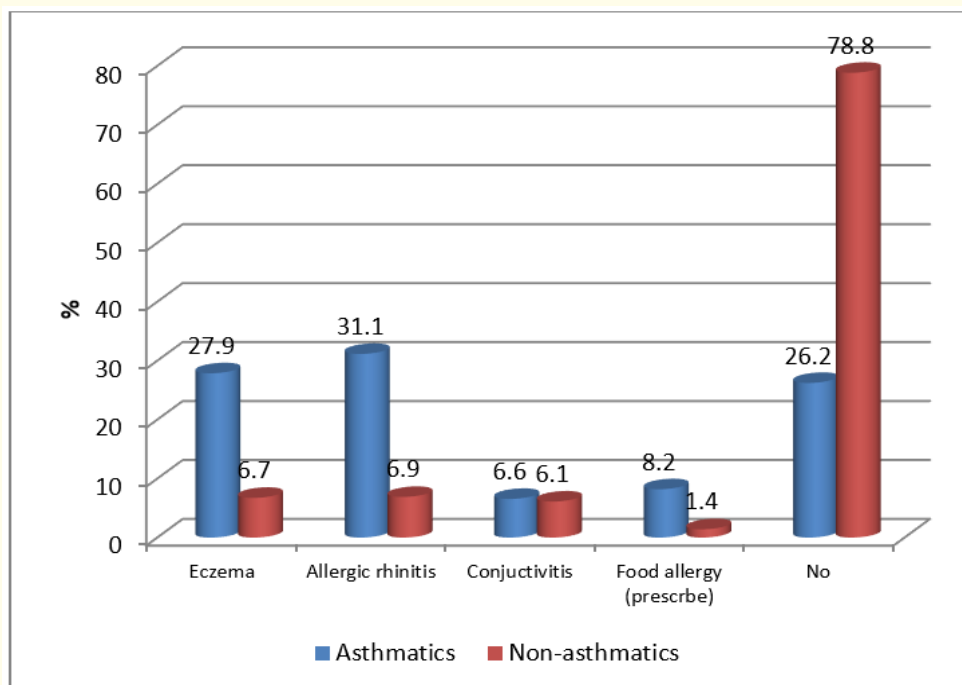


Figure 5: Personal history of other allergic manifestations in asthmatics and non-asthmatics.

Table 8 and figure 6 show family history of allergic diseases in asthmatics and non-asthmatics. Among the 699 student studied (214) had positive family history of other allergic diseases, 34 of them had asthma, while among the students with no family history of allergic disease (485), 27 only had asthma ( $P < 0.001$ ).

Family history of allergic disease	Total number	Asthmatics		Non-asthmatics	
		No.	%	No.	%
Yes	214	34	15.89	180	84.11
No	485	27	5.57	458	94.43
P. value		$< 0.001$			

Table 8: Family history of allergic diseases in asthmatics and non-asthmatics.

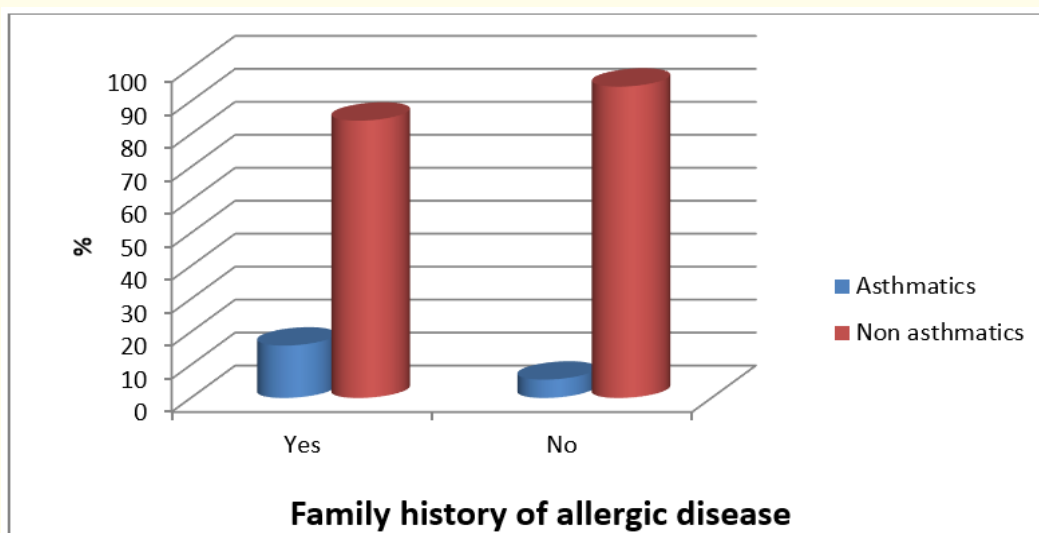


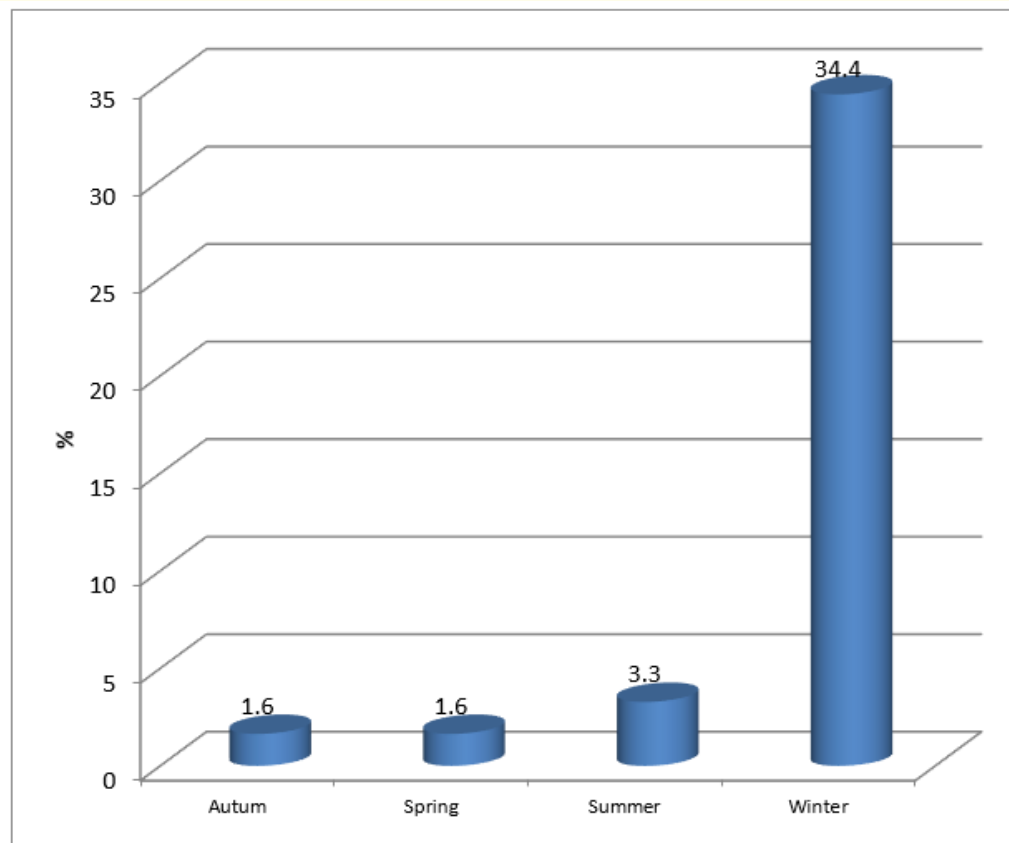
Figure 6: Family history of allergic diseases in asthmatics and non-asthmatics.



Table 9 and figure 7 describe pattern of distribution of asthmatic in relation to seasonal variation. It shows that 59% of asthmatic students had no seasonal variation. In cases having positive history of seasonal variation, winter was the most common season.

Seasonal variation	Asthmatics	
	No.	%
Autumn	1	1.6
Spring	1	1.6
Summer	2	3.3
Winter	21	34.4
No seasonal variation	36	59

**Table 9:** Distribution of asthmatic in relation to seasonal variation.

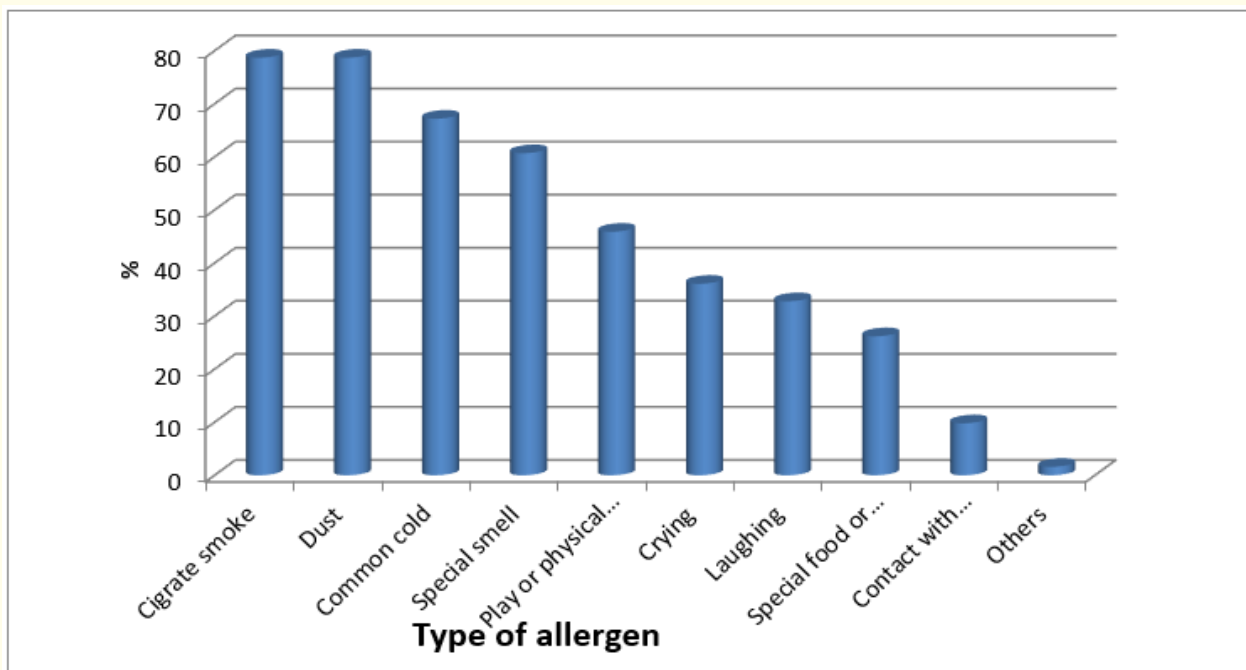


**Figure 7:** Distribution of asthmatic in relation to seasonal variation.

Table 10 and figure 8 describe pattern of distribution of asthmatic cases in relation to precipitating allergens. It shows that the majority of cases (78.7%) stated dust and smoke as precipitating allergen followed by infection (67.2%).

Type of allergen	No.	%
Cigarette smoke	48	78.7
Dust	48	78.7
Common cold	41	67.2
Special smell	37	60.7
Play or physical effort	28	45.9
Crying	22	36.1
Laughing	20	32.8
Special food or drink	16	26.2
Contact with animals	6	9.8
Others	1	1.6

**Table 10:** Distribution of asthmatic cases in relation to the type of precipitation allergens.



**Figure 8:** Distribution of asthmatic cases in relation to the type of precipitating allergens.

## Discussion

Prevalence of asthma among secondary school students in Assiut district is (8.7%). This result is nearly similar to other study, done by Halim., *et al.* (2013) in Ismailia in Abu Khalifa village which was (9.6%). However, our result was much higher than that found in other countries like Jordan which was (4%) [11].

In our study we found that asthma prevalence was more common among female student than male students, where asthma prevalence was 11.4% in females and 4.4% in males. Our results are compatible with other several studies, in which asthma is more prevalent among girls during adolescence [12,13]. This would be possibly a result of hormonal and behavioral changes in female teenagers [14].

This study showed that more asthma sufferers lives in urban than rural areas, similar to other studies [15-17]. This could be explained as the traditional rural life style and early childhood exposure to infectious agents in rural areas are believed to be protective against asthma and allergic diseases [18]. Urbanization on the other hand is associated with a reduction in the frequency of childhood infections, due to the increased use of antibiotics, improved personal and public hygiene, and changes in diet [19]. In addition, urbanization is associated with increased environmental pollution, sedentary lifestyle, obesity and unhealthy diet; factors associated with increased risk of asthma [20,21].

In our study, asthma was more common among students of illiterate fathers which is similar to the results by Halim., *et al.* (2013), but different from Al-Binali., *et al.* (2010) results that showed more prevalence of asthma among students of educated fathers. Prevalence of asthma may be higher in students whose fathers were illiterate due to low socioeconomic status and poor hygiene.

In our study, we found that asthma was more common in students whose mothers were working. Our result is similar to Al-Binali., *et al.* (2010). This may be due to bad hygiene in nursery care, more exposure to infection and smoke than good care could be given by mother to her own child in a clean house.

Our study showed that asthma prevalence was more common with increased family number, which is correlated with Halim., *et al.* (2013). The crowding enhances recurrent chest infection either viral or bacterial and this lead to increased nasal and bronchial hyper-sensitivity [22].

Family history of asthma and atopy is one of the strongest risk factors for childhood asthma [6]. We observed that there was a high significant correlation between positive family history of asthma and other atopy and prevalence of asthma among students. Our results were similar to that found by Halim., *et al.* (2013) and Anwar., *et al.* (2008).

In our study there was a significant relation between presence of other allergic disease and asthma (especially allergic rhinitis and atopic dermatitis). Our results were similar to Hosny., *et al.* (2009) and Mansour., *et al.* (2014) and other studies [23,24].

This study showed that the most common season for asthma exacerbations was winter, which is similar to Abd-Elmoneim., *et al.* (2013), and Mansour., *et al.* (2014). Prevalence of asthma in our study was higher in winter, presumably due to the higher frequency of upper respiratory tract infections, which are an important precipitating factor in childhood asthma [25].

This study showed that the most common triggering factors were dust, cigarette smoke and common cold, our results are similar to that of Anwar., *et al.* (2008) and AbdElmoneim., *et al.* (2013). On the other side, Al-Binali., *et al.* (2010) found that weather changes and insecticides were the most aggravating factors of bronchial asthma, While Mansour., *et al.* (2014) stated that contact with birds and animals at home was significantly associated risk factors for asthma.

Exposure to common allergens (including pollens, dust mites, and animal furs) and indoor and outdoor air pollution from various sources (e.g. traffic pollution, combustion of fossils, workplace dust) have all been implicated as triggers of the disease [26]. On other hand tobacco smoking is a confirmed risk factor in pediatric patients [27]. Viral infections, a major cause of upper respiratory tract infections and “common cold,” are also a common risk factor in children [28].

Triggers differ between individuals and may change overtime. Overall the top five triggers for asthma symptoms are cold or infection, exercise, tobacco smoke, dust, and pollen [29-34].

### Conclusion

Asthma prevalence was 8.7% in secondary school student in Assiut district. Asthma prevalence increased in Assiut district as in a previous study done in 2012, the prevalence was 6.2% in preparatory school students. As it is well known that asthma in children tends to improve with age till maturity where most asthmatics are cured, it was expected that prevalence in secondary school students to be lower than in preparatory school students, but it was found to be higher.

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