Prevalence of bronchial asthma in primary school students in Assiut

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Objective
Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheezing, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory airflow limitation.

Patients and methods
This study was conducted on primary school students of Assiut Governorate and some villages connected with Assiut Pediatric Hospital from April 1, 2017, to October 1, 2017; students aged 9–12 years were eligible for the study. On the basis of the International Study of Allergy and Asthma in Childhood, a modified questionnaire was formulated to fulfill the aims of the study. We distributed the questionnaire (in Arabic) to be answered by students and their caregivers after explaining the questions.

Results
This was a study carried out on the prevalence of bronchial asthma in Assiut district among primary school children, and it shows that Assiut children have a prevalence of asthma of 7.6%.

Keywords:
bronchial asthma, epidemiology, questionnaire

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Introduction

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation [1]. It is defined by the history of respiratory symptoms such as wheezing, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory airflow limitation [2].

According to WHO [3] between 100 and 150 million people around the globe suffer from asthma, and this number is rising. Worldwide, deaths from this condition have reached over 180 000 annually.

Risk factors for asthma can be classified into the following (and they are):
(1) Host factors involved in the development of asthma.
(2) Environmental factors that may influence the susceptibility to the development of asthma in predisposed individuals cause exacerbations of asthma and/or cause symptoms to persist [4].

Diagnosis of asthma is based on identifying both a characteristic pattern of respiratory symptoms such as wheezing, shortness of breath (dyspnea), chest tightness or cough, and variable expiratory airflow limitation [5].

If possible, the evidence supporting a diagnosis of asthma should be documented when the patient first presents, as the features that are characteristic of asthma may improve spontaneously or with treatment; as a result, it is often more difficult to confirm a diagnosis of asthma once the patient has been started on controller treatment [5].

The aims of this study were as follows:
(1) Identify the prevalence of bronchial asthma among primary school students in Assiut Governorate.
(2) Trial to identify possible risk factors and triggering factors of childhood asthma in Assiut.

Patients and methods

Research design: this was a retrospective descriptive study conducted on primary school students of Assiut Governorate and some villages.

Duration of the study: 6 months for collecting data from students in primary schools in Assiut Governorate.

Inclusion criteria

All primary school students aged 9–12 years were eligible for the study.

Exclusion criteria

If there was an accentuated second heart sound, the patient was referred for echocardiography to exclude pulmonary hypertension.

The questionnaire consisted of three papers (Fig. 1):

Paper I included sociodemographic characteristics [name, age, sex, the residence of school child, family size, number of rooms in the house, degree of parent's education, parent's occupation (working or not), source of water, sewage disposal, and household pets or animals].

Paper II included questions for history related to asthma (whether the father or mother was a smoker or not, whether the child was suffering from nasal allergy, dermal allergy, eye allergy or allergy to a specific type of food, and the presence of allergic manifestations in any family member, including asthma, nasal allergy, dermal allergy, or conjunctiva allergy and nocturnal exacerbation of symptoms).

Paper III was with regard to whether the child had a physician-diagnosed asthma (symptoms that the child suffers with, such as cough, wheezing, and dyspnea; what the allergen is that induces an attack of asthma, such as viral respiratory infection, smoking, exercise, and house dust; whether the child receives controlling medication or not and, if yes, what are these drugs; and whether the child was admitted in hospital suffering from an asthmatic attack and for how long).

Results

This study was conducted on primary school students of Assiut Governorate and some villages in 2016/2017.

The total sample included 1100 children representing 30 classes from 10 schools.

The schools were selected randomly for the study, with proportionate representation from both government and private schools, as well as from urban and rural areas.

The study showed that children in Assiut have a prevalence of asthma of 7.6%.

More than half (55.3%) of screened children had a wheezing chest in the past, but the majority of them were suffering from a wheezy chest in the last 12 months. The majority of them had two to three attacks of wheezy chest in the last 12 months, and about 80% of them were suffering from disturbed sleep in less than one night per week (Tables 1–8 and Fig. 2).

Discussion

In this current study, by using a translated and adapted version of the ISAAC questionnaire, which was distributed to a sample of 1100 students, 9–12 years' old school children in Assiut district were evaluated. It is revealed that wheezing during the last year was 45.7%, and physician-diagnosed asthma was 7.6%.

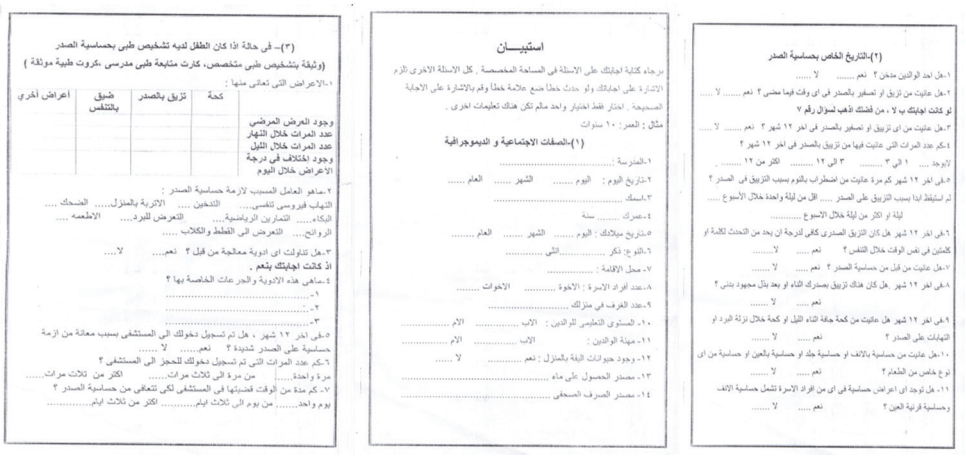
Table 1 Sex and residence differences among screened students

	n (%)
Sex	
Boys	474 (43.1)
Girls	626 (56.9)
Residence	
Urban	636 (57.9)
Rural	464 (42.1)

Table 2 Prevalence of asthma among screened students

	n (%)
Have you ever had asthma?	
Yes	84 (7.6)
No	1016 (92.4)

Figure 1



Questionnaire (in Arabic) to diagnose asthma.

Table 3 Presence of bronchial asthma in relation to sex, residence and number of rooms in houses

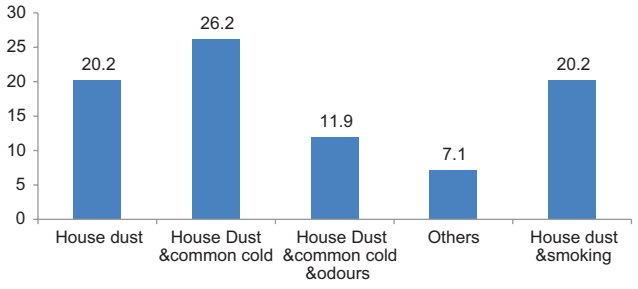
Have you ever had asthma?	Sex [*n* (%)]	
	Boys	Girls
	28 (33.3)	56 (66.7)
	Residence	
	Urban [*n* (%)]	Rural [*n* (%)]
	50 (59.5)	34 (39.5)
	Number of rooms in houses among asthmatic students	
	From 1 to 2 rooms [*n* (%)]	More than 2 rooms [*n* (%)]
	50 (59.5)	34 (40.5)

Table 4 Association between asthmatic screened children and number of siblings

	Have you ever had asthma? [*n* (%)]		
	Yes	No	*P*
Number of siblings			
No sibling	0 (0.0)	11 (1.1)	
One sibling	0 (0.0)	67 (6.6)	<0.001**
2-3 siblings	28 (33.3)	497 (48.9)	
More than 3 siblings	56 (66.7)	441 (43.4)	

**Statistically highly significant correlation (P<0.01).

Figure 2



Distribution of different types of allergen-inducing asthma.

This is nearly similar to the results reported by Hassan and Hagrass [6], as they revealed that the prevalence of asthma was 7.2% among primary school children in Assiut city by using a questionnaire among 1170 pupils; otherwise, this rate was less than that estimated in Cairo in 2006 by Georgy *et al.* [7], as they revealed asthma prevalence as 8.2%, using a questionnaire among 13 028 children aged 3–15 years. This may be due to the different geographical, social, and environmental factors between these two localities.

In contrast, in this study, the prevalence of wheezing during the last year was 55.4% (609 out of 1100) and 45.7% (503 out of 1100), respectively. These rates are more than what has been previously estimated by Georgy *et al.* [7] who revealed that the prevalence of wheezing was 26.5% (697 out of 2631) and that wheezing during the last year was 14.7% (379 out of 2570).

Table 5 Differences of parents' education level, occupation level, presence of household pets, and source of water and sewage disposal among screened asthmatic students

	Have you ever had asthma [*n* (%)]
Father's education	
Educated	62 (73.8)
Noneducated	22 (26.2)
Mother's education	
Educated	56 (66.7)
Noneducated	28 (33.3)
Father's occupation	
Working	84 (100.0)
Nonworking	0 (0.0)
Mother's occupation	
Working	28 (33.3)
Nonworking	56 (66.7)
Source of water	
Tap	84 (100.0)
Sewage disposal	
Bathroom	84 (100.0)
Presence of household pets or animals	
Yes	22 (26.2)
No	62 (73.8)

Table 6 Association between asthmatic children and parental smoking

	Have you ever had asthma [*n* (%)]		
	Yes	No	*P*
Whether the father or mother is a smoker			
Yes	39 (46.7)	452 (44.5)	<0.001**
No	45 (53.3)	564 (55.5)	<0.001**

**Statistically highly significant correlation (P<0.01).

This may be due to an increase in exposure to risk factors and dust and the use of fast foods and food additives.

This work shows that the majority of asthmatic children were girls (66.7%), which is contrary to the findings of Hassan and Hagrass [6], who reported that most asthmatic children were boys (53.6%).

The increased risk for male individuals in childhood is probably related to narrower airways, increased airway tone [7] and positive higher IgE [8] in boys, which predispose them to enhanced airflow limitation in response to a variety of insults, but the difference in this recent study's results may be due to a combined contribution of environmental and epigenetic (the result of environmental insults) changes, accounting for the increased prevalence of this emerging health risk. Because childhood asthma is correlated with chronic comorbid diseases such as increased respiratory infections, bronchitis, cystic fibrosis, pneumonia, atopic dermatitis, otitis media (middle ear effusion), olfactory disorders and lung cancer [9].

Table 7 Association between presence of bronchial asthma and presence of allergy and family history of allergy

	Have you ever had asthma? [*n* (%)]		
	Yes	No	*P*
Whether you are suffering from nasal allergy, dermal allergy, eye allergy, or allergy to any specific type of food			
Yes	22 (26.7)	128 (12.6)	<0.001**
No	62 (73.3)	888 (87.4)	<0.001**
Presence of allergic manifestations in any family member, including nasal allergy or conjunctival allergy?			
Yes	34 (40.0)	274 (26.9)	<0.001**
No	50 (60.0)	742 (73.1)	<0.001**

**Statistically highly significant correlation (*P*<0.01).

Table 8 Rate of hospital admission with regard to sex

	Sex [*n* (%)]	
	Boys	Girls
In the last 12 months, whether the child was admitted in hospital suffering from an asthmatic attack		
Yes	17 (20.2)	17 (20.2)
How many times that child was admitted in hospital suffering from an asthmatic attack		
One time	6 (7.1)	11 (13.1)
From 2 to 3 times	0 (0.0)	0 (0.0)
More than 3 times	11 (13.1)	6 (7.1)
How long that child was admitted in hospital suffering from the asthmatic attack		
1 day	6 (7.1)	6 (7.1)
From 1 to 3 days	0 (0.0)	11 (13.1)
More than 3 days	11 (13.1)	0 (0.0)

In this recent study, there was a significant association between number of siblings of screened children (family size) and asthmatic students, with *P* value 0.001, and this may have an effect on the prevalence of asthma, as most of the asthmatic students (66.7%) had more than three siblings.

In this current study, there was a significant negative association between the number of rooms of houses where the screened children lived and their residence (urban and rural), with *P* value 0.003, and this was associated with about 60% of screened asthmatic students who lived in houses with only one to two rooms. That result is different from that by Hassan and Hagrass [6], which showed that there was no significant association between asthma and room number; this may be due to change in shapes of buildings in rural than those were in the past.

In this work, there was no association between education of parents and asthma of children, as most of the fathers and mothers of asthmatic students were educated (73.8 and 66.7%, respectively), similar to the study by Abdallah *et al*. [10] that reported no significant association between asthma and parental educational level.

Moreover, in the current study, there was no association between source of water and sewage disposal and asthma, as all of the screened children had a tap in their houses as the source of water and a bathroom for sewage disposal.

In this study, about 26, 7% of screened asthmatic students had household pets or animals in their houses, and there was a significant association between asthma and the presence of household pets or animals in the screened children's houses, with *P* value less than 0.001. This is similar to the study by Hassan and Hagrass [6] who revealed that there was a significant association between asthma and the presence of family pets in the home, such as birds (83.3%), dogs (7.1%), and cats (13.1%).

This work shows that about 46.4% of screened asthmatic children lived with a smoker father, and there was a significant association between suffering of screened children from asthma and passive smoking (*P* value ≤ 0.001), this result was contrary to the study by Zedan *et al*. [11], which reported no significant association between asthma and passive smoking; it is also contrary to the study by Abdallah *et al*. [10], which reported no significant association between asthma and father's smoking.

In this study, the allergens that induced an attack of asthma the most among screened children were house dust and common cold (26.2%), followed by house dust only (20.3%), then passive smoking and house dust and (20.3%), finally, house dust and common cold and odors (11.9%). This was in agreement with the study carried out by Abdallah *et al*. [10] who revealed that the most common triggering factors for asthma were exposure to house

dust (84.6%), exposure to cigarette smoke (81.5%), playing and physical activity (58.5%).

In this recent study, the prominent symptoms of asthma among screened asthmatic children were cough (100%) then wheeze (98.8%) and dyspnea (46.4%); this is slightly different from that reported by Hassan and Hagrass [6] who reported that the prominent symptoms of asthma among studied children were wheezing 100%, cough 96.4%, and dyspnea 40.5%.

In this study, there was a significant association between suffering of the students from nasal allergy, dermal allergy, eye allergy, or allergy to any specific type of food and the presence of asthma with *P* value 0.001. Also, there was a significant association between the presence of allergic manifestations in any family member of asthmatic children with *P* value = 0.001.

This work shows that about 40.5% of screened asthmatic children were receiving controlling medications; the majority of them did not continue treatment.

In this recent study, there was no significant association between severity of asthma and number of times of hospital admission due to asthmatic attacks with regard to sex and residence; this is in agreement with the study carried out by Pauwels *et al.* [12], as severe exacerbations can occur in patients with mild or well-controlled asthma.

In this study, there were no differences between boys and girls suffering from an asthmatic attack with regard to the rate of admission to hospitals, although more girls were admitted to hospitals only once on suffering from asthmatic attacks than boys. Boys were more recurrently admitted more than three times on suffering from asthmatic attacks than girls.

Moreover, the majority of boys spent more than 3 days in hospital for recovering from asthmatic attacks in comparison with the majority of girls who spent from one to three days in hospital for recovering from asthmatic attacks.

Conclusion

In this study, the prevalence of bronchial asthma among primary school students in Assiut Governorate was 7.6%. It was higher in girls compared with boys.

There were no effects on the prevalence of asthma with regard to the residence of screened children and with respect to whether their parents were educated or not.

There were associations between the prevalence of asthma and number of siblings, level of housing, presence of household pets or animals, and also with parental smoking.

There was a significant association between screened asthmatic children and presentation of any other types of allergy, and there was also a significant association with positive family history for presence of allergic manifestation.

The main allergen that induced an attack of asthma among screened children was first house dust and common cold, then house dust alone, followed by smoking and house dust and, lastly, house dust and odors.

The main symptoms that screened asthmatic children were suffering from during asthma attacks was cough (100%), followed by wheezing (98.8%) and lastly dyspnea (46.4%).

Only 34 from 84 screened asthmatic children were receiving controlling medication. About 34 asthmatic students were admitted in hospital suffering from asthmatic attack, with no differences between boys and girls in the rate of admission. Girls were admitted more to hospitals only once, but boys were more recurrently admitted.

Recommendations

This study recommends that parental smoking be prohibited or avoided inside homes, and, also, dealing with household pets or animals must be forbidden, especially among those with allergic history.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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