Immunome Research

Abdel-Baseer et al., Immunome Res 2017, 13:2
DOI: 10.4172/1745-7580.1000138

Research Article Open Access

Some Epidemiological Aspects of Bronchial Asthma in Children in Qena Governorate, Egypt

Abdel-Baseer KA[1*], Hammad EEM[2], Qubaisy H[1], Naser MAAA[3], Ahmed AA[4] and Said AM[1]

[1]*Department of Pediatrics, Qena Faculty of Medicine, South Valley University, Egypt*

[2]*Department of Pediatrics, Faculty of Medicine, Assiut University, Egypt*

[3]*Department of Anaesthesia and ICU, Faculty of Medicine, Assiut University, Egypt*

[4]*Clinical pathology Department, Qena Faculty of Medicine, South Valley University, Egypt*

***Corresponding author:** Khaled Abdel-Baseer Abdalla, Department of Pediatrics, Qena Faculty of Medicine, South Valley University, Egypt, Tel: +20-1027354051; E-mail: khaledabdalla20@yahoo.com

Received date: July 22, 2017; **Accepted date:** August 21, 2017; **Published date:** August 28, 2017

Abstract

Background: Bronchial asthma is one of the most prevalent diseases affecting children in both developed and developing countries. Due to paucity of data, we believe that epidemiological state of asthma should be well-estimated.

Objectives: This study aimed to assess the epidemiology and risk factors of asthma among children with bronchial asthma in Qena Governorate, Egypt.

Methods: A cross sectional study was conducted on children with bronchial asthma in Qena district in Upper Egypt during the period from April 2013 to March 2014. All patients were subjected to clinical and epidemiological data questionnaires including personal and demographic data, precipitating factors for acute exacerbation, clinical manifestations during acute exacerbation, history suggestive for other atopic diseases, asthma grading at diagnosis and course of the disease.

Results: Of the 100 studied asthmatic children, the percentage of males and urban resident asthmatic children was more than females and rural resident children respectively. Regarding socioeconomic status, low socioeconomic level children showed a highly significant effect as risk factors for asthma compared to middle and high socioeconomic level children. Exercise-induced asthma was found in up to 37%, allergic rhinitis in 44%, atopic dermatitis in 67% and food allergy in 22% of asthmatic children. According to asthma severity, mild intermittent cases were the most frequent among total children.

Conclusion: Bronchial asthma is an important public health problem among children and adolescents in Qena district and this necessitates an adequate attention. There is also a need for public health policy in Egypt including upper Egypt planning on reducing environmental triggers, and educating health care personnel on the preventive measures of asthma.

Keywords: Asthma, Epidemiology, Qena district

Introduction

Asthma is a highly prevalent chronic respiratory disease affecting 300 million people world-wide and current trends suggest that an additional 100 million people may be living with asthma by 2025 [1]. The World Health Organization (WHO) estimates about 250.000 deaths from asthma every year, mainly in low- and middle-income countries [2]. Epidemiological studies examining asthma prevalence trends among children in both developed and developing countries suggest that the prevalence of asthma and other allergic diseases is continuing to rise [3]. While causes of the observed increase in asthma prevalence are not clearly understood, current evidence suggests that gene environment interactions underlie most of the increase and worldwide variations [4]. Childhood bronchial asthma varies widely from country to country. The prevalence of asthma among Egyptian children aged 3 - 15 years was estimated to be 8.2% [5]. Apart from being the leading cause of hospitalization for children, it is one of the most important chronic conditions causing elementary school absenteeism [6]. Childhood bronchial Asthma has multifactor causation. Geographical location, environmental, racial, as well as factors related to behaviors and life-styles are associated with the disease [7]. During the childhood period, bronchial asthma is often underdiagnosed and undertreated, which may lead to severe psychosocial disturbances in the family [8]. In a 2001 clinically oriented review, Busse and Lemanske defined asthma as "a complex syndrome with many clinical phenotypes in both adults and children. Its major characteristics include a variable degree of airflow obstruction, bronchial hyperresponsiveness, and airway inflammation". They concluded that, for many people, the disease begins in infancy and that a genetic propensity to be allergic, combined with environmental exposures, contributes to disease development [9]. Symptoms of asthma are exacerbated by exercise, strong emotions, viral infection, airborne allergen exposure, airborne pollutants, and change in the weather [10,11]. Contribution of each risk factor may

vary in different settings and understanding the risk factors associated with asthma such as family history, history of other allergies, pet animals, indoor air pollution, birth order, smoking among family members, and others will help in adopting appropriate preventive strategies [12]. With this background, and with the fact of paucity of information on the epidemiology of asthma in Egypt including Upper Egypt, this cross-sectional study was conducted to assess the epidemiological features and associated risk factors of bronchial asthma among asthmatic children in Qena governorate. Barriers to reducing the burden of asthma include generic barriers like poverty, poor disease education, and poor health services infrastructure and environmental barriers like indoor and outdoor air pollution, tobacco smoking, and occupational exposure [13].

Patients and Methods

This study was conducted on children with bronchial asthma attended pediatric clinic of Qena University Hospital, Qena general hospital and health insurance clinics at Qena governorate during the period from April 2013 to March 2014. All patients were subjected to clinical and epidemiological data questionnaires including personal and demographic data as age, sex, residence, socioeconomic status according to El-Gilany et al. [14]. Duration of follow-up, and precipitating factors for acute exacerbation including environmental factors, foods, viral infections, endocrinal factors, psychological factors, irritants such as cold air, parental smoking, noxious fumes and drugs such as aspirin and sulfonamide. Clinical manifestations during acute exacerbation as cough, dyspnea, cyanosis, low grade fever and profuse sweating and symptoms of other atopic diseases in the child such as atopic dermatitis, allergic rhinitis and food allergy were recorded. Additionally, asthma grading at diagnosis according to the Global Initiative of Asthma (GINA) [15], course of the disease and also treatment data were reported.

Ethical considerations: The study protocol was approved by the ethical committee, Faculty of Medicine, Qena University, Egypt.

Results

The present study includes 100 children with bronchial asthma. The patients were 55 males and 45 females, their ages ranged from 2 years to 12 years with a mean of 4.86 ± 2.31. The duration of follow up among the studied group was 3.19 ± 1.81years. On comparing the prevalence of asthma in the patients groups of the present study, we found that the prevalence of asthma was higher among males (55%) compared to females (45%) and in Urban asthmatic children (52%) as compared to Rural ones (48%). Concerning the socioeconomic groups, a significantly higher prevalence of asthma was found among children with low socioeconomic status (85%) as compared to those children with moderate (12%) and high (3%) socioeconomic status. Regarding family history of asthma, we found statistically non-significant increase in asthmatic children with positive family history (55%) as compared to those with negative family history (45%). Regarding exercise tolerance, the percentage of asthmatic children who tolerate exercise was more than those of exercise intolerance where intolerance was determined by worsening of asthma symptoms or increased its severity on running for 5 minutes. Regarding factors precipitating acute exacerbations of bronchial asthma, there was a statistically significant increase in asthmatic children exposed to noxious fumes inhalation, exposure to house dust, viral upper respiratory tract infections, cold air exposure, and parental smoking Tables 1 and 2.

Features		No. (total=100)	%	P-value
Age(years)	Range	02-Dec	-	-
	Mean ± SD	4.86 ± 2.31		
Duration of follow up(years)	Range	0.5 ± 10	-	-
	Mean ± SD	3.19 ± 1.81		
Sex	Male Female	55	55	NS
		45	45	
Residence	Rural	48	48	NS
	Urban	52	52	
Socioeconomic level	Low	85	85	<0.001
	Middle	12	12	
	High	3	3	
Exercise tolerance	Intolerance	37	37	<0.01
	Tolerance	63	63	
Family history	Positive	55	55	NS
	Negative	45	45	
Course of disease	Regressive	17	17	<0.001
	Progressive	83	83	

Table 1: Epidemiological and demographic features of asthmatic children.

	Negative		Positive		Chi-square	
	N	%	N	%		P-value
Noxious fumes	7	7	93	93	73.96	<0.001*
Exposure to house dust	12	12	88	88	57.76	<0.001*
Environmental factors	14	14	86	86	51.84	<0.001*
Viral infections	20	20	80	80	36	<0.001*
Cold air	21	21	79	79	33.64	<0.001*
Parental smoking	35	35	65	65	9	0.003*
Foods	74	74	26	26	23.04	<0.001*
Psychological factors	84	84	16	16	46.24	<0.001*

Drugs	96	96	4	4	84.64	<0.001 *

Table 2: Precipitating factors for acute exacerbation.

As regards history of other allergies, our study detected statistically significant increase in asthmatic children with atopic dermatitis (67%) as compared to those without (33%) and statistically significant lower percentage of food allergy (22%) in asthmatic children compared to those without (78%) but non-significant difference between asthmatic children with allergic rhinitis (44%) and those without (56%) Table 3.

%	N	Asthma grade at diagnosis
80	80	Mild intermittent asthma
12	12	Mild persistent asthma
5	5	Moderate persistent asthma
3	3	Sever persistent asthma
100	100	Total
163.12	X2	Chi-square
<0.001*	P-value	

Table 3: Asthma grade at diagnosis.

On studying the severity of bronchial asthma, there was statistically significant increase in asthmatic children with mild intermittent asthma (80%) than those with mild persistent (12%), moderate persistent asthma (5%) and severe persistent asthma (3%) Table 4.

	No		Yes		Chi-square	
	N	%	N	%		P-value
Cough	0	0	100	100		-
Dyspnea	2	2	98	98	92.16	<0.001*
Cyanosis	87	87	13	13	54.76	<0.001*
Low grade fever	11	11	89	89	60.84	<0.001*
Profuse sweating	28	28	72	72	19.36	<0.001*
Allergic rhinitis	56	56	44	44	1.44	0.23
Atopic dermatitis	33	33	67	67	11.56	<0.001*
Food allergy	78	78	22	22	31.36	<0.001*

Table 4: Symptoms during acute exacerbation and other atopic diseases.

Additionally, there was statistically significant increase in asthmatic children with progressive course (83%) as compared to those children with regressive course (17%) and cough and dyspnea were the most frequent symptoms of bronchial asthma exacerbation Table 4. The most commonly used medications were theophyllines and β2 agonist compared to steroids Table 5.

	No		Yes		Chi-square	
	N	%	N	%		P-value
Inhaled corticosteroids	82	82	18	18	40.96	<0.001 *
Salmeterol	66	66	34	34	10.24	<0.001 *
Long acting theophylline	1	1	99	99	96.04	<0.001 *
Prednisone	78	78	22	22	31.36	<0.001 *

Table 5: Distribution of asthmatic children on regular asthma medications.

Discussion

Pediatric asthma is a major clinical concern worldwide and represents a huge burden on the family and society. It accounts for a large number of lost school days and may deprive the child of both academic achievement and social interaction [16]. Asthma has a varied distribution and expression between countries and even between different areas of the same country [17]. Thus, in the nineties, the International Study of Asthma and Allergies in Childhood (ISAAC) was designed to compare the prevalence of asthma and allergic diseases in different parts of the world [18]. It was the first international multicenter study to assess the prevalence and severity of these conditions in 2 age groups (6-7 years and 13-14 years) using standardized validated questionnaires. The results of Phase I revealed widely varying prevalence of asthma between countries and between different centers in the same country [19]. In the Middle East, asthma prevalence is reported to be lower than in "developed" countries (ranges 5-23%) [20,21]. Few studies evaluated asthma prevalence in Egypt. In a survey including 115 health centers in five governorates, Khallaf et al. [22] reported that asthma prevalence was 4.8% in Egypt. El-Hefny [5] found that asthma prevalence was 8.2%, using a questionnaire among 13028 children 3-15 years old. Regarding upper Egypt, the prevalence of questionnaire-diagnosed asthma in two governorates were 6.2% in Assiut district [23] and 1.4% in Sohag district [24]. This difference may be due to the different geographical, social and environmental factors between these two localities.

Our study showed that, the prevalence of asthma in male children was 55% and in female children was 45 % and this was in accordance with other several results [25-27]. The exact reason for male predominance is not known but several explanations have been offered. Male predominance may be related to a greater degree of bronchial lability in males. Airways in boys are also smaller in comparison to their lung sizes when compared to girls [28]. Another study from the New Zealand showed higher rates of sensitivity to indoor allergens among males than females counterparts as assessed by the skin prick test [29]. Additionally, we found a higher prevalence of asthmatic children living in urban areas compared to rural areas and the difference was statistically insignificant and this was similar to other studies [23,30]. On the contrary to our study, some researchers detected that rural children had increased asthma prevalence compared with urban children [31]. There is a suggestion that families who live in rural environments develop a level of immunity to plant and animal allergens that are typically associated with asthma [32,33] although others suggests that lower asthma rates in rural areas

reflect lower urban-related risks rather than a rural protective effect [34]. The influence of environmental factors, especially air pollutants, has also been correlated with higher prevalence of asthma in the urban regions. Although air pollution is undoubtedly related to the worsening of allergic diseases, other factors, such as living conditions, may play an important role in the development of asthma in industrialized regions [35].

As regards socioeconomic status, the results of this study found that the prevalence of asthma in children of high socioeconomic status was (3%), (12%) in children of moderate socioeconomic status and (85%) in those of low socioeconomic status with significant statistical difference. Georgy et al. [36] in a study of prevalence and socio-economic associations of asthma and allergic rhinitis in Egypt found a higher prevalence and increased severity of asthma symptoms in children of lower socio-economic groups. Children from lower socioeconomic status are at greater risk for asthma as well as adverse asthma-related events, such as hospitalizations. This may be explained by greater exposure to allergens, reduced access to care, and gene by environment interactions [36]. Recently, psychosocial factors and stress in low income families, in particular, has been suggested to be an important contributor to asthma [37]. Our study demonstrated that exercise-induced asthma (EIA) occurs in up to (37%) of asthmatic children and this came in agreement with others [38]. It was estimated that more than 10% of the general population and up to 90% of persons previously diagnosed with asthma have exercise induced bronchoconstriction (EIB). Furthermore, the prevalence of EIB in athletes ranges from 11 to 50%, while it approaches 90% in athletes with asthma [39]. In our cases, factors precipitating acute exacerbations of bronchial asthma were noxious fumes inhalation, exposure to house dust, environmental factors, viral upper respiratory tract infections, cold air exposure, parental smoking, food allergy, psychological factors, and drugs like sulfonamides and aspirin. We found that 80% of asthmatic episodes in children were attributed to viral infections. This data are close to those reported by other researchers [40,41] who reported that respiratory viral infections precipitated acute exacerbations of asthma and were the most common reason for hospital admissions. Additionally, an Egyptian study by El-Gamal et al. [42] revealed that 71% of asthmatic episodes in children were attributed to viral infections. It is well known that Environmental tobacco smoke (ETS) increases both the prevalence and severity of asthma. Our study revealed that (65%) of children were exposed to smoking inside the house. This was in accordance with Jesse et al. [43] who added that the associations between asthma symptoms and passive tobacco exposure were stronger than the associations between asthma symptoms and active tobacco exposure. As they explained, the reason may be that those children who are exposed to ETS at home have probably endured more long-term tobacco smoke exposure than those children who actively smoke. In our study, cough and dyspnea were the most frequent symptoms of bronchial asthma exacerbation. This was in agreement with others [24,44].

As regards the presence of other atopic diseases among asthmatic children there was (44%) of asthmatic children had allergic rhinitis and (33%) had atopic dermatitis and (22%) had food allergy. Several epidemiological studies have established an association between allergic diseases and asthma. In Gustafsson et al. study [45], thirty-eight percent of rhinitis patients have been reported to have asthma and 78% of asthmatics have rhinitis [45]. They documented that rhinitis has twice been associated with an increased risk of asthma at age 11 years and interpreted this by the influence of early atopic sensitization on the development of childhood asthma [45]. In a study, allergic rhinitis was found in 75% of patients with atopic asthma and 80% of those with nonatopic asthma [46]. On classifying our patients according to severity of asthma, we found that (80%) of asthmatic children had mild intermittent asthma, (12%) had mild persistent asthma, (5%) had moderate persistent asthma and (3%) had severe persistent asthma. This was in agreement with other study that reported mild form of asthma in 73.4% of children and added that childhood asthma is more frequent, more symptomatic, and less well controlled in children than in adults [47]. The level of asthma severity used in our study was based on the asthma symptom frequency (daytime, night time, and exertional) as estimated by the National Asthma Education and Prevention Program's (NAEPP) Guidelines [48]. The Global Initiative for Asthma Guidelines recognized the importance of including medication use (both controller and reliever medications) in determining asthma severity and have developed an algorithm for incorporating symptom frequency, pulmonary function, and medication use in determining asthma severity [15]. This denotes that there is no gold standard for determining asthma severity.

Conclusion

Bronchial asthma is an important public health problem among children and adolescents in Qena district and this necessitates an adequate attention. Noxious fumes inhalation, exposure to house dust, environmental factors, viral upper respiratory tract infections, cold air exposure, parental smoking, food allergy, psychological factors and drugs were significantly associated exacerbating factors for bronchial asthma. There is also a need for public health policy in Egypt including upper Egypt planning on reducing environmental triggers, and educating health care personnel on the preventive measures of the disease.

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