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ORIGINAL ARTICLE

PREVALENCE OF BRONCHIAL ASTHMA AMONG EGYPTIAN SCHOOL CHILDREN

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Background: *Prevalence rate of childhood asthma in urban and rural areas of the Nile Delta region of Egypt need to be determined. This should be based on accurate wordings describing asthma symptoms in questionnaire based surveys.*

Aims: *a) Determination of the prevalence of asthma among Egyptian children in the Nile Delta region of Egypt. b) Determination of the common Egyptian Arabic wordings actually used to describe asthma symptoms corresponding to wheeze, dyspnea, chest tightness and shortness of the breath.*

Subjects and Methods: *This is a two-stage study: 1) Determination of the prevalence of asthma through applying a validated questionnaire based on the ISAAC questionnaire and modified according to validated Arabic Egyptian wordings. This was applied on 3410 children (2515 from urban and 895 from rural regions).*

2) Validation of Arabic wordings used for description of asthma symptoms. Fifty asthmatic children described their asthma symptoms in Arabic. The children then answered an Arabic translation of the International Study of Asthma and Allergies in Childhood (ISAAC) video questionnaire having been shown the attack scenes. The response of asthmatic children was compared to that of 110 healthy children after watching the same clip.

Results: *Of the 2720 positively responding subjects, 209 fitted the diagnosis of asthma with an overall prevalence of 7.7% (8% in urban and 7% in rural areas). Significant association was found with positive family history of allergy and bad housing conditions ($p < 0.01$, OR=4.78 and 5.16 respectively) but not with passive smoking.*

Conclusion: *We found that the prevalence of asthma among school children in the Nile Delta region was 7.7%. A positive family history of allergy and bad housing conditions were found as risk factors for asthma. There was disparity of used terminologies in describing wheeze and chest tightness among Egyptian asthmatics and controls. This makes addition of local language terms of these symptoms to international guidelines is a logic approach with potential impact on asthma diagnosis and treatment.*

Keywords: *Prevalence of asthma, Asthma symptoms, Egyptian children.*

INTRODUCTION

Asthma is a common disease in children that forms a major co-morbidity illness. Under-diagnosis of childhood asthma represented one of the pitfalls in the asthma management. History with interpretation of asthma symptoms is still considered the corner stone in asthma diagnosis. The other limb in diagnosis is through the reversibility and variability of pulmonary function tests (PFTs). However, PFTs require patients' cooperation that may be not fully feasible in children.(1)

Asthma symptoms include wheeze, dyspnea, chest tightness and shortness of breath. Reported wheeze within the last 12 months is considered a surrogate marker for the diagnosis of asthma. This could represent a major difficulty for children in some countries in which no exact equivalent wordings of "wheeze" exist.[2]

The prevalence of asthma and allergies is increasing in both western and developing countries. Despite a large volume of clinical and epidemiological research within affected populations, the etiology and risk factors of these conditions remains poorly understood.[3]

The prevalence of atopic conditions is lower in rural and less-developed areas of the world than that are rapidly urbanizing or modernized. The reasons for these variations are yet to be fully understood. Some researchers have speculated that exposure to infections in early life may have a role in prevention of asthma and atopy in children.[4]

Simple methods for measuring the prevalence of childhood asthma, allergic rhinitis and atopic eczema have been developed by phase one of the International Study of Asthma and Allergies in Childhood (ISAAC). These methods are used for international comparisons and are suitable for different geographical locations and languages.[5]

So far, there have been few studies of the epidemiology of asthma in Egypt. This study was planned to determine the prevalence of bronchial asthma in the Nile Delta region of Egypt through relevant questionnaire. Validation of asthma symptoms was done through evaluation of common Arabic wordings describing wheeze, chest tightness, shortness of breath and dyspnea.

PATIENTS AND METHOD

This work was done in two steps:

1. ***Determination of the Prevalence of Asthma among Egyptian Children:*** For this purpose, a stratified random sample was chosen from schools of 3 urban cities and 2 large villages located in the Nile Delta region of Egypt. This sample was selected to represent different social classes and educational grades. Ethical approval and consent were obtained from formal educational, health authorities and from individual subjects as well.

   This sample comprised 3410 children. Urban sample included 2515 children (46.5 % males and 53.5% females) with a response rate of 76.9%. Rural sample comprised 895 children (49.2% males and 50.8% females) with a response rate of 87.7%. Table 1.

2. ***Validation of Arabic wordings describing asthma symptoms***: For this purpose, a group composed of 50 asthmatic Egyptian children aged 13±1.2 years were compared to 110 healthy controls of matched age and sex. Those asthmatic cases were diagnosed according to GINA guidelines, 2006.[6]

   Asthmatic children described their asthma symptoms in Arabic and then answered a pre-outlined Arabic translation of the international ISAAC video questionnaire after viewing the attack scenes, whereas healthy controls responded only to the pre-outlined questionnaire after viewing the same video scenes (AVQ3.0).[7]

   We have utilized Phase I International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire translated into validated Arabic language.[8] Translation of the original ISSAC questionnaire into Arabic was carried out by an independent professional translator with the help of a panel of asthma specialists. The questionnaire was then back translated by a second independent translator to English. We added questions dealing with risk factors of asthma as family history of allergy, presence of other types of allergy, housing condition including animal contact, and passive smoking.

   The written questionnaire was distributed by the attending school physician in the selected schools after giving complete explanations of the questionnaire items and terminology. The questionnaires were completed by older children themselves or by the help of guardians of younger children.

   Statistical Analysis: Data were processed and analyzed using the Statistical Package for Social Science software (Version 11; SPSS, Inc., Chicago, IL). In addition to descriptive analysis of the frequency of asthma, Chi-square test was used to compare the prevalence rates of asthma and asthma symptoms among different studied groups. Odds ratios (ORs) and 95% confidence interval (95% CI) were calculated to test for the association of risk factors. p value was considered significant if less than 0.05.

RESULTS

Out of the 2720 responding children, 209 children fitted the diagnosis of asthma including 106 (8.6%) males and 103 (6.9%) females. Thus, the overall prevalence of asthma was 7.7 % (8% in urban and 7% in rural areas) Table 1, Fig. 1. Their mean age was 7.4 ± 2.1 years. Positive family history was given by 67.6%, passive smoking by 47.8% and unfavorable housing by 81.3% of cases.

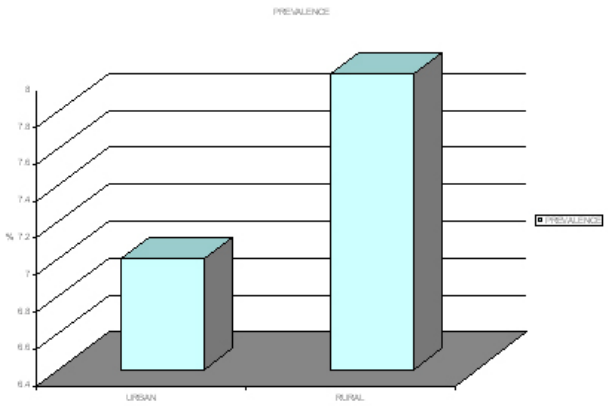

Fig 1. Prevalence of asthma in urban and rural areas.

Furthermore, analysis of symptomatology of asthma revealed that wheeze was reported by 98.6%, nocturnal cough by 78.9% and exertional dyspnea by 38.3% of diagnosed asthmatic cases according to the used questionnaire Table 2.

Analysis of Egyptian Arabic terminologies corresponding to Arabic translation of ISAAC, revealed a marked overlap of different terminologies. Regarding the symptom of wheeze, most of the cases (50%) used the term "rattle", whereas most of the control group (60%) used the term "whistle". (p significant <0.01). Shortness of breath was interpreted as "blocked breathing" by 26% of cases whereas, 30.9% of healthy controls used the term "I can't take a breath" (p non-significant =0.59). Dyspnea was referred to as "difficulty of breathing" in 52% of cases vs. 49.1% of controls (p non-significant =0.2). Chest tightness was referred to as "narrow chest" in 50% of cases vs. 79% of controls (P significant <0.01) Table 3.

Comparing asthmatic cases to unaffected children, positive significant association was found with family history of allergic conditions as well as unfavorable housing (p <0.01, OR= 4.78, 95% and p <0.01, OR= 5.16 respectively), whereas no significant association was found with passive smoking Table 4, (Fig. 2).

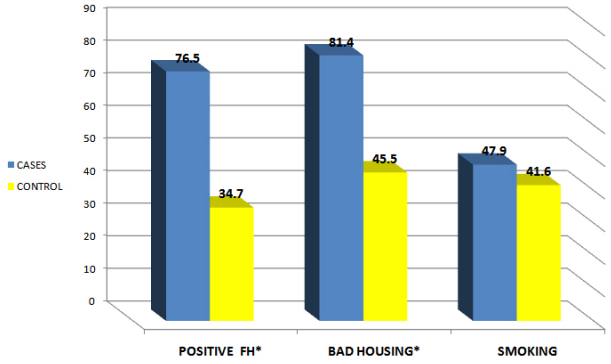

Fig 2. Risk factors in cases and control
**Family history of allergy and bad housing showed a significant risk factor in cases compared with controls, whereas passive smoking carried non significant effect.*

Regarding the frequency of day-time asthma symptoms per year as well as night symptoms per week, cases from rural areas expressed higher frequency rates, although statistically non-significant Table 5.

Table 1. Distribution of the sample population in urban and rural areas according to gender, response to written questionnaire and prevalence of asthma.

	Urban		Rural		Total		Grand Total
	M	F	M	F	M	F	
Total targeted	1170	1345	440	455	1610	1800	3410
Response rate	75.2 %	78.4%	78.2 %	96.9%	76.2%	82.9%	79.8%
Responders	880	1055	344	441	1227	1493	2720
Asthma cases	80	74	26	29	106	103	209
Prevalence	9.1%	7%	7.6%	6.6%	8.6%	6.9%	7.7%
Total prevalence	154/1935 (8%)		55/785 (7%)		209/2720 (7.7%)		

M = male F = female.

Table 2. Demographic data and risk factors of children fitting the diagnosis of asthma (n = 209).

Age Range	5-16years
Mean age ± SD	7.4 ± 2.1 years
Risk Factors	
Male	106/209 (50.7%)
Female	103/209 (49.3%)
Positive family history of allergy	160/209 (76.6%)
Passive smoking	100/209 (47.8%)
Unfavorable housing	170/209 (81.3%)
Clinical presentations	
Recent wheeze	206/209 (98.6%)
Nocturnal cough	165/209 (78.9%)
Exertional dyspnea	80/209 (38.3%)

Table 3. Asthma symptomatology described by Egyptian Arabic terminologies through the video questionnaire validation.

Asthma symptomatology		Cases (n = 50) n (%)	Control (n = 110) n (%)	p
Wheeze				
Creaking	(تزييق)	17 (34)	16 (14.5)	< 0.01*
Rattle	(تشحيير)	25 (50)	22 (20)	
Whistling	(صفارة)	3 (6)	66 (60)	
Jingling	(خرقشة)	5 (10)	7 (6.4)	
Shortness of breath				
Can't take a breath	(لااستطيع اخذ النفس)	10 (20)	34 (30.9)	0.59
Blocked breathing	(كتمة نفس)	13 (26)	14 (12.7)	
Short breath	(نفس قصير)	13 (26)	22 (20)	
Feeling suffocated	(مخنوق)	12 (24)	25 (22.7)	
Rapid breathing	(نفس سريع)	2 (4)	16 (14)	
Dyspnea				
Feeling tired	(إحساس بالتعب)	8 (16)	22 (20)	0.2
Rapid breathing	(سرعة بالنفس)	11 (22)	32 (29.1)	
Difficult breathing	(ضيق بالنفس)	26 (52)	54 (49.1)	
Rapid breathing	(جان)	5 (10)	3 (2.7)	
Chest tightness				
Chest discomfort	(شعور بعدم الارتياح)	5 (10)	0 (0)	< 0.01*
Chest pain	(الم بالصدر)	6 (12)	1 (0.9)	
Referred pain to the shoulder	(لم متجه نحو الكتف)	2 (4)	2 (1.8)	
Burning sensation	(حرقان بالصدر)	5 (10)	12 (10.9)	
Narrow chest	(ضيق بالنفس)	25 (50)	87 (79)	
Heavy breath	(طبقة بالصدر)	7 (14)	9 (8.2)	

*P Significant if <0.05.

Table 4. Risk factors of developing asthma in the studied population.

Risk factors	Cases n (%)	Control n (%)	OR (95% CI)#	p
Positive family history	160/209 (76.6)	498/1435 (34.7)	4.78 (3.4-6.68)	<0. 01*
Unfavorable housing	170/209 (81.3)	760/1659 (45.8)	5.16 (3.5-7.53)	<0. 01*
Passive Smoking	100/209 (47.8)	846/2034 (41.6)	1.29 (0.96-1.73)	0.08

* Significant if p <0. 05.
# OR = Odds ratio, 95% CI= 95% Confidence interval.

Table 5. Frequency of day and night asthma attacks among studied cases.

	Urban (n = 154)	Rural (n = 55)	Total (n = 209)	p
Frequency of attacks	(%)	(%)	(%)	
3 times / year	117/154 (76.0)	35/55 (63.6)	152/209(72.7)	0.23
4-12 times / year	26/154 (16.9)	13/55 (23.7)	39/209(18.7)	
More than 12 times / year	11/154 (7.1)	7/55 (12.7)	18/209 (8.6)	
Night symptoms %				
No night symptoms	91/154 (59.1)	30/55 (54.6)	121/209 (57.9)	0.65
Less than once / week	43/154 (27.9)	17/55 (30.9)	60/209 (28.7)	
More than once/ week	20/154 (13.0)	8/55 (14.5)	28/209 (13.4)	

DISCUSSION

Worldwide, the prevalence of asthma among children has increased steadily during the last 2 decades. Considerable evidence indicates that there is a significant regional variation in the prevalence of asthma and in the relative weight of risk factors.[9]

Few studies evaluated asthma prevalence in Egypt. Khallaf et al, reported that asthma prevalence was 4.8 % in Egypt, using a survey including 115 health centers in five governorates provided morbidity figures for acute respiratory infections from 75.789 records of Egyptian infants and children aged less than 4 years.[10] El-Hefny et al. found that asthma prevalence was 8.2%. Using a questionnaire among 13.028 children 3-15 years old.[11] Georgy et al used translated and adapted version of the ISAAC questionnaire was distributed to a sample of 2.645, 11-15 year-old in schools in Cairo. They revealed that wheeze during the last year was 14.7% and physician diagnosed asthma was 9.4%.[12]

In the present study estimation of prevalence of questionnaire-diagnosed asthma revealed that the overall prevalence of childhood asthma was 7.7 % in the Nile Delta region of Egypt. This rate was different from previously estimated in Cairo, 2006, of 9.4%.[12] This may be due to various different geographical, social and environmental factors in these localities.

In the Middle East, asthma prevalence was previously reported to be lower than in "developed" countries (ranges 5–23%) Table 6.[12-18] The lowest 12-months wheezing prevalence rate was seen in rural Palestinian (5.5%)[15]. and the highest was in the desert population of Saudi Arabia (23%).[17]

Table 6. Variation of prevalence of asthma between countries in the Middle East.

	Wheeze in the last 12 months (%)	Physician diagnosed asthma (%)
Our study(Egypt, Nile Delta)	7.7	8 (urban) 7 (rural)
Egypt (Cairo) [12]	14.7	9.4
Israel [13-14]	20.1 (Jewish) 10.1 (Arab)	7.8 (Jewish) 4.9 (Arab)
Palestine (refugee camps) [15]	8.8	9.4
Oman [16]	8.9	20.7
Saudi Arabia [17]	11.2 13.2 (urban) 6.4 (rural)	12.1 15.1 (urban) 5.0 (rural)
Kuwait [18]	16.1	16.8

In this study there was no great difference between prevalence of childhood asthma in urban and rural areas that may be explained by similarity in environmental conditions in both areas due to close proximity to each other in the crowded Nile Delta region. Similarly, an Australian study reported no protective effect of farming among children living in a primarily crop farming region.[19] On the contrary, however, another cross-sectional survey of children in Austria, Germany, and Switzerland, revealed a decreased prevalence of asthma, hay fever, and atopic sensitization among children living in farms.[20]

Moreover, this study showed, interestingly, that both family history of allergy and bad housing were significantly associated risk factor with asthma, whereas passive smoking, unexpectedly, showed a non-significant association. In addition, the frequency of day and night asthma attacks was found to be higher in rural than urban areas, though statistically non-significant.

This study showed the importance of validation of asthma symptoms in terms of locally used language terminologies. This was evidenced by the disparity of used terminologies in describing wheeze and chest tightness among Egyptian asthmatics and controls.

Based on this study, the observation of a positive significant overlap in description of asthma symptoms makes addition of local language terms of these symptoms to international guidelines is a logic approach with potential impact on asthma diagnosis and treatment.

In conclusion we found that the prevalence of asthma among school children in Delta region was 7.7%. A positive family history of allergy and bad housing conditions were found as a risk factors for asthma. There was disparity of used terminologies in describing wheeze and chest tightness among Egyptian asthmatics and controls. This makes addition of local language terms of these symptoms to international guidelines is a logic approach with potential impact on asthma diagnosis and treatment.

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