

Childhood Asthma in Relation to Some Predisposing Factors

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ABSTRACT:

BACKGROUND:

Asthma is the most prevalent chronic condition among children . Both environmental and hereditary factors are important in the pathogenesis of asthma .

OBJECTIVE:

To determine the severity of asthma among the asthmatic patients and its association with some allergens .

METHODS:

A cross sectional hospital based study ; involved 120 patients suffering from asthma during the period from Feb.- Aug 2003. A questionnaire was designed for the purpose as well as clinical examination and serological study to asses the level of IgE against selected allergens .

RESULTS:

The study revealed that 53% of the patients were males . The most age group affected was (2-5) y ; 57(47.5%) of cases . The mild type of asthma is the predominant type; About 39 (32%) of the patients suffering from mild intermittent asthma(MIA) and 53(44%) from mild persistent type . The main age group affected by MIA was (2-5)y ;17(43%) patients. Patients with MIA were more sensitive to H1 allergens 12(40%) and least sensitive to F1 (3%). For moderate persistent asthmatic patients , they were more sensitive to H2 8(34.7%) , then H1 6(26%). Patients from all age groups were sensitive mainly to H1 ; (2-5)y: 18(36%) , for (>5-10)y : 10(38.5%) , for (>10-15)y : 7(33%). There was a significant relation between the mild type of asthma and the family history of asthma , atopy , drug and food allergy . The most important aggravating factor for the age group 2-5y was dust ; 17(31%), while among the age group (5-10)y was exercise , 10 (31%). Among the age group (10-15) y both dust and exercise were important factors 8 (29.6%) for each . Exposure to dust was a significant aggravating factor for MIA 13(38.2%).

CONCLUSION:

Since the majority of patients suffering from mild type of asthma we recommend health education to the parents and patients towards home management of asthma and avoidance of the allergens which exacerbate the acute attacks .

KEY WORDS: Asthma, Allergens , Predisposing factors.

INTRODUCTION:

Asthma is the most prevalent chronic condition in children. The increase in the prevalence of asthma during the past two decades is associated with increase in hospitalization ⁽¹⁾. Asthma describes heterogeneous collection of clinical phenotypes as opposed to a single condition ⁽²⁾.

Both environmental and hereditary factors are important in the pathogenesis of asthma. Bronchial inflammation is the major factor with bronchial hypersensitivity ⁽³⁾. The control of airway diameter may be considered a balance of neural and humeral forces ⁽⁴⁾. Asthma is initiated by type I hypersensitivity reaction that has been triggered by exposure to specific antigen. Exposures to environmental allergen cause lymphocyte to produce IgE antibody which attaches to mast cell. When patient re-exposed to allergen the IgE

Sensitized mast cell, interact and liberate their contents (histamine, D4, E4) which initiate bronchial constriction and mucosal edema ⁽⁵⁾.

Particular allergens are associated with different types of allergic illnesses; grass pollen allergens cause hay fever, allergen derived from house dust , mites , cats or cockroaches cause asthma. This difference is probably due to the physical dimension of the particles as pollen particles are relatively large and don't penetrate low into the bronchial tree ⁽⁶⁾. The most prevalent indoor allergen in the united state is the house hold dust mite of genus *Dermatophagoids*. The dust mite eats skin scales, which are found in large quantities in the bedding, and people become allergic to the mites fecal particles. In order to minimize exposure to dust mites, patients should keep the humidity in the house below 50 % ⁽⁴⁾. The indoor mold equally problematic for asthma exacerbation, it should be cleaned out from under the refrigerator, shower area and basement bedrooms ⁽⁷⁾.

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The allergen carried by cats Fel d₁, is a potent protein found mostly in their saliva. Fel d₂ may also present in the urine of male cats. Cat allergen is light so floats through circulating air and is hard to eliminate.

It takes 9-12 months after a cat has left the house for allergen to be eliminated⁽⁷⁾.

Exercise especially in cold air trigger asthma in 90% of patients⁽⁸⁾. Cigarette smoking is a major preventable trigger for asthma. Maternal smoking affects lung development and increase the infant risk for asthma later. This study aims to determine the severity of asthma and its association with some predisposing factors and to plan for a prevention of asthmatic attack.

PATIENTS AND METHODS:

A cross sectional hospital based study, was conducted in Tikrit Teaching Hospital from Feb2003- Aug2003 with interruption for 2 months because of the war. The sample included asthmatic patients who consulted the outpatient clinic as well as who were admitted to the pediatrics ward. An interview was conducted for each patient through a questionnaire planned for the purpose. All patients were examined clinically. Peak flowmetry is used for patients above 5 years before and after treatment. The diagnosis of asthma was established according to certain criteria⁽⁵⁾.

The severity of asthma was classified into four groups: mild intermittent, mild persistent, moderate persistent, severe persistent^(1,9).

A blood was aspirated from each patient to estimate IgE level of some selected allergen in the serum. We choose 5 common allergens H₁= house dust greer labs, H₂ = house dust holister -stier, D₁= Dermatophagodes pteronyssinus, D₂= Dermatophagodes farinue, F₁= Iten egg white.

RESULTS:

The study included 120 asthmatic patients; 64(53.3%) males and 56(46.7%) females.

Rural formed 69 (57.5%) while 51 (42.5%) were from urban areas. The age group 2-5 years was the main group affected 57 (47.5%) , followed by the age group 5-10 years 36(30%) , while the least age group affected by asthma was 10-15 y 27(22.5%). The distribution of patients according to the severity of disease is shown in table-1-; 39 (32.5%) suffered from MIA (mild intermittent asthma), 53 (44.2%) from MiPA (mild persistent asthma), 23 (19.18%) from MoPA (moderate persistent asthma) and 5 (4.16%) suffered from SPA (severe persistent asthma). The relation between age groups and the severity of asthma is shown in table -2- ; MIA mainly affected age group 2-5 y 17 (43.5%) and to a lesser extent the age group 5-10y 12 (30.7%) and 10-15 y 10 (25.8%). MiPA

affected; 27(50.9%) of the age group 2-5 y, 14(26.5%) of the age group 5-10y .

MoPA affected 10(43.4%) of the age group 2-5y, 9(39.3%) of the age group 5-10y. SPA affected 3(60%) of the age group 2-5 y.

The relation between severities of asthma to some types of allergens is shown in table-3- . For all types of asthma H₁ was the most common allergen to which patients were sensitive to; 12(40%) patients with MIA were sensitive to H₁, 6 (20%) to H₂ and D₁. For MPA; 15(34.1%) were sensitive to H₁, 14(31.8%) to H₂, 7 (15.9%) to D₁. Patients with MoPA; 6(26.1%) were sensitive to H₁, 8(34.7%) were sensitive to H₂, 4(17.4%) to D₁. Five patients were presented with SPA, 2(40%) were sensitive to H₁, 1(20%) for each H₂, D₁ and F₁.

The relation between age group and some types of allergens is shown in table -4 -.

In general the age group 2-5y was more sensitive to the allergens than other age groups. It was more sensitive to H₁ , followed by H₂ , D₁ ,D₂ ; 18(32.7%) , 15(27.3%) , 9 (16.4%), 8(14.5%) respectively . To a lesser extent, 26 patients of the age group 5 -10 y were sensitive to the selected allergens mainly H₁, H₂, D₁, 10(38.55), 8(30.7%), 5(19.45) respectively. The age group 10-15y was mainly sensitive to H₁ and H₂; 7(33.3%) and 6(28.5%) respectively. The relation between severities of asthma to family history is shown in table-5-. There was significant relation between MIA, MiPA and positive family history of some allergic conditions.

For example positive family history of asthma was detected in 14(46.6%) patients with MIA and 25(53.2%) with MiPA. To a lesser extent there were significant relations with positive history of atopy, drug allergy and food allergy.

The relation of age groups to some aggravating factors is shown in table -6- . For the age group 2-5y; exposure to dust is the main factor 17(31.5%) followed by exercise 14(25.9%).

Exposure to smoke was the least aggravating factor for all age groups. For the age group 5-10y exercise was the main aggravating factor in 10(31.2%) patients. The relation between the severities of asthma to some aggravating factors is shown in table -7-. For MIA; exposure to dust was the most aggravating factor in 13(38.2%) patients, followed by exercise 10(29.4%) patients.

So as for MiPA; exposure to dust was an aggravating factor in 18(34.6%) patients and exercise intolerance was a factor in 14(26.9%) patients. To a lesser extent exposure to animal and smoke were aggravating factors for MIA and MiPA but the relations were not significant for MoPA and SPA.

Table 1 : Distribution of patients according to the severity of asthma

Severity	No.	%
Mild intermittent	39	32
Mild persistent	53	44.16
Moderate persistent	23	19.18
Severe persistent	5	4.16
total	120	100

Table 2: The relation of age group to the severity of asthma

Age group (year)	2-5		>5-10		>10-15		Total	P value
	No.	%	No.	%	No.	%		
Mild intermittent	17	43.5	12	30.7	10	25.8	39	>0.05
Mild persistent	27	50.9	14	26.5	12	22.6	53	< 0.05
Moderate persistent	10	43.3	9	39.3	4	17.3	23	> 0.05
Severe persistent	3	60	1	20	1	20	5	> 0.05
Total	57		36		27		120	

Table3: Relation between the severities of asthma to some types of allergens

Allergen severity	H ₁ No(%)	H ₂ No(%)	D ₁ No(%)	D ₂ No(%)	F ₁ No(%)	Total	negative	P value
Mild intermittent	12 (40)	6 (20)	6 (20)	5 (16.6)	1 (3.41)	30	9	<0.05
Mild persistent	15 (34.1)	14 (31.8)	7 (15.9)	6 (13.7)	2 (4.5)	44	9	<0.05
Moderate persistent	6 (26.1)	8 (34.7)	4 (17.4)	2 (8.69)	3 (13.1)	23	-	>0.05
Severe persistent	2 (40)	1 (20)	1 (20)	-	1 (20)	5	-	>0.05
Total	35	29	18	13	7	102	18	

Table 4: Relation between age group and some types of allergens

Allergen Age group	H ₁ No(%)	H ₂ No(%)	D ₁ No(%)	D ₂ No(%)	F ₁ No.(%)	Total	Negative	P value
2-5	18 (36)	15 (30)	9 (18)	8 (16)	5 (10)	55	2	<0.05
>5-10	10 (38.5)	8 (30.7)	5 (19.4)	1 (3.84)	2 (7.7)	26	10	>0.05
>10-15	7 (33.3)	6 (28.5)	4 (19.1)	4 (19.1)	-	21	6	>0.05
Total						102	18	

Table 5 : Relation between severity of asthma to family history of some allergic disease

positive severity	Family history of asthma	Family history of atopy	Family history of drug allergy	Family history of food allergy	total	negative	P value
	No(%)	No(%)	No(%)	No(%)	No(%)	No(%)	
Mild intermittent	14 (46.6)	9 (30)	4 (13.4)	3 (10)	30 (29.7)	9 (47.3)	<0.05
Mild persistent	25 (53.2)	12 (25.6)	5 (10.6)	5 (10.6)	47 (46.5)	6 (31.5)	<0.05
Moderate persistent	7 (35)	4 (20)	5 (25)	4 (20)	20 (19.8)	3 (15.7)	>0.05
Severe persistent	2 (50)	1 (25)	-	1 (25)	4 (3.9)	1 (5.4)	>0.05
Total					101 (100)	19 (100)	

Table 6: relation of age group to some aggravating factors

Factors Age (years)	Food intake	Dust	Exercise	Exposure to animal	Exposure to smoke	Total	negative	P value
	No. (%)	No. (%)	No.(%)	No.(%)	No.(%)	No.(%)	No. (%)	
2-5	8 (14.8)	17(31.5)	14 (25.9)	8 (14.9)	7 (12.9)	45(47.7)	2 (28.5)	<0.05
>5-10	5 (15.6)	9 (28.2)	10(31.2)	5(15.6)	3 (9.37)	32 (28.3)	3(42.8)	>0.05
>10-15	3 (11.1)	8 (29.6)	8 (29.6)	5(18.8)	3 (11.1)	27(23.8)	2(28.5)	>0.05
Total						113(100)	7(100)	

Table 7 : Relation between severity of asthma to some aggravating factors

Factors severity	Food intake	Dust	Exercise	Exposure to animal	Exposure to smoke	Total	negative	P value
	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)	
Mild intermittent	3(8.8)	13(38.20)	10 (29.4)	3(8.8)	5(14.7)	34(29.8)	5(83.34)	<0.05
Mild persistent	4(7.6)	18(34.6)	14(26.9)	7(13.5)	9(17.3)	52(45.6)	1(16.67)	<0.05
Moderate persistent	2(8.6)	8(34.7)	4(17.3)	6(26.1)	3(13.1)	23(20.1)	-	>0.05
Severe persistent	-	2(40)	2(40)	-	1(20)	5(4.38)	-	>0.05
Total						114(100)	6(100)	

DISCUSSION:

Asthma is common in children and its prevalence in this age group is increasing while the reason remain unclear, there was no doubt that asthma is now a major health problem in children world wide⁽¹⁰⁾. A retrospective review of hospital admissions from 1976 to 1996 in Finland reveals that there is increase in hospital admission among age group 0-4y for both sexes $P(<0.001)$. In contrast to significant reduction in hospital admission among the 10-14y age group ($P<0.001$)⁽¹¹⁾. Similarly, the current study showed that younger age group 2-5y was the most common affected group $P (<0.05)$. Also there was male predominance, the same result obtained by Shatha H⁽¹²⁾.

Nasih; in his study in 2000 concluded that 40% of asthmatic patients had MIA, 43% had MiPA, 11% MoPA and 5% suffered from SPA⁽¹³⁾. Similarly the current study showed that asthma tends to be in the mild side While Joseph CL concluded that asthma has become more common and grown more severe as measured by higher rates of hospitalization and mortality⁽¹⁴⁾. Most of patients in the current study were sensitive to H1 and H2 and for all age group but mainly for mild type of asthma. Indoor allergens from dust mite, cockroach and cat can be associated with asthma exacerbation in children sensitized to the specific allergens. The precise role is less well understood⁽¹⁵⁾.

The prospective birth cohort study done by Lau-S et al did not support the hypothesis that exposure to environmental allergens causes asthma in childhood, but rather that the induction of specific IgE responses and the development of childhood asthma are determined by independent factors⁽¹⁵⁾. A study of 1041 children aged 5-12 y with mild to moderate asthma was conducted to determine risk factors associated with cases having positive skin test responses to indoor allergens. Its results revealed that San Diego (78%) and Toronto (59%) had the topmost percentages of homes allergens with moderate to high house dust mite levels⁽¹⁶⁾. The immediate family history is relevant. Atopic allergen manifested by allergic rhinitis, asthma, atopic dermatitis or urticaria and the specific manifestations of these disorders tend to be familial. Asthma tends to be familial whether or not is due to allergy⁽¹⁾. According to the current study, the most important factor that is significantly associated with asthma was the positive family history of asthma and atopy 46% and 30% respectively. A case control study was carried out to evaluate the genetic and environmental risk factors of childhood asthma in a group of Sirilankian children ; it showed that parental asthma , asthma in a sibling and in a relative, parental allergic rhinitis , living in a dusty environment and other variables were independently associated with increased risk of asthma($P<0.05$)⁽¹⁶⁾ . So the study reinforces the view that asthma has a multifactorial etiology. Many epidemiological studies have indicated that maternal phenotype influences the inheritance of asthma and allergy. The presence of asthma, eczema, elevated serum IgE levels and positive skin pricks tests in children have all been accompanied by an increased prevalence of asthma or atopy in mothers⁽¹⁵⁾. The onset of attacks as it was revealed by the current study , were mainly at morning for the age group 5-10y (63%) , and at night for the age group 2-5y (43.9%). This is explained in view of the relation between age group and aggravating factors (table -6-). Moreover children of younger age group spend their time mainly indoor so they are more prone to be exposed to house dust while older age group spend their time out doors playing and practicing exercises .It was mentioned that almost 30% of asthmatic patients reported awakened with breathing problems at least once a week, 41% of participants in one study reported symptoms more than two times a week, 48% of asthmatic patients reported that asthma limits their ability to participate in sports⁽¹⁷⁾. To a less extent; (8.8%), (14.7%) of patients with MIA had significant

Relation between their attacks and the aggravating factors; as food allergy, contact to animal and Smoke, respectively. The role of food allergy as a major cause of obstructive airway during early life is controversial⁽¹⁾. A 5 years randomized clinical trial of treating childhood asthma , has enrolled and characterized a cohort of 1041 children with mild and moderate asthma. Of patients reporting that cigarette smoking frequently causes asthma symptoms; (26%) reported having at least one parent smokes cigarettes ,(39%) reported that animal contacts as presence of furry pet in door; frequently exacerbates asthma symptoms. Although environmental modification of asthmatic homes may occur ,many children remain exposed to agents that are known to trigger their asthma⁽¹⁸⁾. A questionnaire- based study carried out in nine randomly selected schools in Delhi. The age range was 5-17 y. The results revealed that the prevalence of asthma was (11.9%) and the exclusive exercise induced asthma was (2.1%)⁽¹⁹⁾. In comparison to the current study; Exercise was an aggravating factor in 25.9% of children aged 2-5y. This percent increased with age group to reach to (31.2 %) and (29.6 %) of children with age group 5-10y and 10-15y respectively.

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