



Pediatric Asthma and its Relation to Socio-demographic Factors in Baghdad

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Abstract

Asthma is one of the most common chronic diseases of children, causing a huge burden on family and society. Its prevalence has risen sharply over the past 30 years in many parts of the world with large geographical variations. However, in Iraq there is no national database which could be obtained. Due to the increasing number of cases and the burden of this health problem we investigated the sociodemographic and other risk factors related to asthma among primary school children. Modified ISAAC questionnaires were completed by the parents of 2262 children randomly chosen. We found males having higher rate of asthma. Being male, being more at risk of developing asthma steadily increasing (27.4%), (28.3%) and (39.5%) with increased (CR) crowding rate (<3, 5 - 5, and >5) respectively. Only CR of >5 acts as a significant risk factor for asthma. Urbanization acts as significant risk for developing asthma.

Keywords: Asthma, Environment, Social, Children

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1.0 Introduction

Childhood asthma is a major clinical concern worldwide. It causes a huge burden on 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. Childhood asthma also places strain on healthcare resources as a result of doctor and hospital visits and cost of treatment (Von, 2000). The prevalence of childhood asthma is increasing worldwide, consequently morbidity and mortality and cost of care continue to increase (Partridge& Alwan, 1997; Ece et al, 2001 and Rorstad &Bhatt, 2000.)It has been documented that the prevalence of pediatric asthma has risen sharply over the past 30 years in many parts of the world with large geographical variations (Wood, 2002; Yuan, Basso Sorensen & Oslen, 2002; Douwes &Pearce. 2002). The reasons for this dramatic increase are not yet clear and likely to include multiple contributing factors (Wood, 2002; Anonymous-1-, n.d). These variations are possible due to different exposure to respiratory infections, indoor and /or outdoor pollution, and diet (Von, 2000; Partridge&Alwan,1997). Genetics, lifestyle and environmental factors also may play a role in these variations (Ece. et al, 2001).The prevalence of asthma seems to be higher in affluent than non – affluent populations(Partridge& Alwan, 1997; Al-Dagwood, 2001).

No one really knows why more and more children are developing asthma. Some experts suggest that children are being exposed to more and more allergens such as dust, air pollution, and passive smokers. These are factors that trigger asthma. Others suspect that children are not exposed to enough childhood illnesses to build up their immune system. It appears that a disorder of the immune system where the body fails to make enough protective antibodies may play a role in causing asthma. And still others suggest that decreasing rates of breast feeding has prevented important substances of the immune system from being passed on to babies (Wood, 2002).

In Iraq, asthma is not an uncommon disease, particularly among primary school children. Unfortunately, no national database could be obtained, in spite of the increase in the burden of this health problem that was observed during our clinical work. In order to close the gap concerning asthma among primary school children, we conducted this study to investigate the relationship between asthma occurrence and socio demographic characteristics and also to determine other risk factors for this disease.

2.0 Literature Review

Asthma is one of the most common important chronic diseases of children. Von.(2000). For some children, asthma is a disease whose symptoms seem to remit with time. Numerous children however develop this disease that is persistent throughout their lifetime and is associated with more severe symptoms, increased airway reactivity and loss of lung function (Partridge & Alwan, 1997). Asthma has dramatically increased worldwide over the last few decades, in both developed and developing countries (Anonymous-1- (n.d.).

The prevalence of pediatric asthma has risen sharply over the past 30 years in many parts of the world with large geographical variations (Wood, 2002; Yuan, Basso, Sorensen & Oslon, 2002; Douwes & Pearce, 2002). Asthma affects about 5.3 million American children between the ages of 5 and 14, and some experts believe that about half of American children may be undiagnosed (Anonymous-1- (n.d.)). The reasons for this dramatic increase in asthma are not yet clear and they are likely to include multiple contributing factors (Wood, 2002; Yuan, Basso, Sorensen & Olsen, 2002). Atopy, "the tendency to become allergic", is the most important predictor for the development of asthma (Wood, 2002). While atopy is largely genetically determined, genetic changes in a population occur slowly and this cannot explain the increase in asthma and atopy (Wood, 2002, Yuan Basso, Sorensen & Olsen, 2002; Douwes & Pearce, 2002; Mochizuki & Morikawa, 2001). Recent research has therefore shifted its attention from allergens that may cause sensitization and / or provoke asthma attacks, to factors that may 'program' the initial susceptibility to asthma through allergic or non - allergic mechanism (Douwes & Pearce, 2002). Several studies have indicated that certain exposure to infectious agents early in life, may stimulate the immune system in opposite direction thereby protect against asthma and atopy, which in turn had led to the "Hygiene Hypothesis" (Wood, 2002; Yuan Basso, Sorensen & Olsen, 2002; Douwes & Pearce, 2002). There is evidence that exposure to both allergens and irritants early in life, including air pollution and environmental tobacco smoke may play a pivotal role in the development of asthma rather than genetic factors (Wood, 2002; Yuan Basso, Sorensen & Olsen, 2002; Douwes & Pearce, 2002; Mochizuki & Morikawa, 2001)

Therefore, generally speaking risk factors can be from personal characteristics whether inherited or acquired- as well as from environmental characteristics. Moreover, several authors observed that there is an increased risk among males with lower socio-economic status. Males tend to predominate in the youngest age group: the sexes are equally represented from age 12-14, and females predominate through the rest of the age range. With regards to socio-economic status, asthma is more common in urban compared to rural communities and in more affluent than in poorer communities (Jan, .n.d.). Urban life is strongly associated with a higher risk. Although poverty plays a significant role, urban life, in fact, has been associated with a higher risk for asthma in any income group and among both children and adults. In some urban areas, as many as 25% of children have asthma or show signs of wheezing. In fact, it may be greatly under diagnosed (Johnson et al, 2002; Anonymous -1- (n.d.))

On the other hand Several European cross-sectional studies have suggested a reduced risk of asthma with early-life exposures to a farming environment (Riedler, et al. 2001; Von et al, 2000). It has been suggested that exposure to a farming environment (e.g. livestock, dust, crop) causes higher levels of bacterial endotoxin exposure, and the latter eventually leads to the production of several cytokines (e.g. interleukin-12, interferon- γ) that tip the balance toward the TH1- over TH2-mediated immunity, thereby reducing asthma risk (Braun, 2001; Muhammad, Yu-Fen Bryan, & Frank, n.d.).

Other studies in the United States and Canada have found that growing up in a farming

environment is associated with increased risk of asthma and that endotoxin exposures may increase asthma risk.(Braun-Fahrlander ,2001; Muhammad Towhid et al, n.d.) Explanations for this discrepancy between studies include differences in farming practices, crops, and differences in dietary, lifestyle, and other unrecognized “rural” factors that might influence this risk.

Interestingly, several authors also observed that children with no siblings were at lower risk for asthma than children with one or two siblings: a finding that suggests the need for a more complex “hygiene hypothesis” (Burke, Fesinmeyer, Reed, Hampson &Carlsten, 2003).

In conclusion, environmental exposures and lifestyle factors are important for early-life asthma development while both indoor and outdoor environmental exposures in the first years of life may play crucial roles in the etiology of childhood asthma. Thus, there is emerging evidence, suggesting, that the etiology of childhood asthma is complex and may include early-life environmental exposures as well as factors related to early allergic sensitization (Johnson, et al, 2002; Muhammad Yu-Fen Bryan, & Frank, n.d.).

3.0 Methodology

A cross – sectional study was conducted in Baghdad for the period between October 2000 and June 2002. The study was carried out on primary school children. A list of primary schools all over Baghdad was obtained from the Ministry of Education. Twenty schools (from both urban and rural regions) were chosen randomly out of 1494 total primary schools located around Baghdad. The total number of students in all these1494 schools was 100,004. A cluster random sample of 3362 primary school children was collected.Official approval was obtained from all the authorized and responsible individuals prior to the study. In the beginning, we took the opportunity of the parent day of the schools to clarify the purpose of current study to the parents, and the way to answer the questions in the questionnaires.

A well constructed standardized questionnaire was distributed through all (3362) the chosen children to be completed by their parents, which is a modification of the ISAAC (International Study of Asthma and Allergies in Childhood) questionnaire and then translated to Arabic. The questionnaire included socio-demographic characteristics like sex, residency and crowding rate of the index child as well as the educational level of parents.

There was a key question directed to the parents to confirm the children as asthmatic; whether their children have ever been diagnosed by a physician as having asthma. The response will be either (Yes) or (No). In addition, we had contacted the parents of the children when there was a positive response in order to confirm the diagnosis of asthma more by the type of medications used by the child.

Data is presented in simple measures of frequency (%), the significance of difference between proportions was tested using chi square test (χ^2), with P value <0.05 as the level

of significance, moreover the strength of association was evaluated through comparing Odds Ratio (OR) and 95% Confidence Interval (CI).

4.0 Results And Discussions

Completed questionnaires were returned by 2889 respondents, so the response rate was 86%. Of those, only 2262 questionnaires had complete information. Our study found that asthma prevalence was (22.3%), with 644 children had been previously diagnosed by physicians as asthmatic.

Although there is no significant association ($\chi^2 = 0.63$, $P = 0.49$) between sex of the pupil and occurrence of asthma, but we detected that, being a male means one will be more exposed to the risk of developing asthma. (OR = 1.08, 95% CI = 0.9 – 1.3). Comparatively, females show marginal significance as shown in table 1. There is a controversy about gender and asthma. Some authors suggested a positive association (Guilbert & Krawiec, 2003; Ronmark, Jonsson, Platts & Lundback, 1999; Chatkin, Menezes, Victora & Barros, 2003 and Anonymous-2- (n.d.) While others did not find any association (Wickens et al, 2002; Alba & Alsina, 1999 and Ece et al, 2000). The explanation of gender variation in relation to the childhood asthma is not clear. Cultural habits of our society to keep females more indoor and being less exposed to the outdoor environment may play a role in this respect. In addition, infection among females during infancy and childhood may protect them against asthma (Partridge & Alwan, 1997 and Wickens et al, 2001).

With respect to the crowding status illustrated in table 1, we could see that the prevalence of asthma is increasing steadily (27.4%, 28.3%, 39.5%) with increased crowding rate (CR) (<3, 3 – 5, >5) respectively. And statistically significant association has been found between CR and asthma ($\chi^2 = 9.52$, $P=0.009$). Moreover, an attempt to identify whether CR acts as a risk factor for asthma occurrence, by calculating ORs for CR (3 - 5 vs <3) and (>5 vs <3) detected that only when the CR is >5 acts as a significant risk factor for asthma occurrence (OR = 1.65, 95% CI = 1.1 – 2.4). Our finding confirmed with the study from Turkey which demonstrated that crowding index acts as a risk for asthma occurrence (Yazicioglu et al, 1998). On the other hand overcrowding and large number of siblings combined with unhygienic environmental conditions and increase infections would have a protective effect against asthma (Hygiene Hypothesis) (Douwes & Pearce, 2002; Lau, Kalberg, & Yeung, 1995 and Rona, Duran, & Chinn, 1997). Thus, negative association between crowding and asthma was reported by several studies (Alba & Alsina, 1999). The positive association found in our study between crowding index and asthma can be related to genetic etiology and sharing of the same environment.

Studying the residency of the students and its relation to asthma, we found that those who are residing in the urban area were having higher rate of asthma similar to results of two studies from UK and Sri Lanka (Karunasekera, Jayasinghe & Alwis, 2001). Our

study exhibited that students who reside in urban areas have higher rate of asthma, (29.2%) compared to those in rural area (25.2%). However, this difference was not significant. ($\chi^2 = 2.84$, $P = 0.09$). This finding could be attributed to exposure to ambient air pollution (Von, 2000; Yazicioglu et al, 1998 and Busse, 2000). In addition to changes in life style and building, increasing indoor allergens exposure like house dust mite, pets, plants and chemical agents in the indoor environment also contribute to the increase in asthma cases (Douwes & Pearce, 2002 and Carrer, Maroni, Alcini & Cavallo, 2001). Moreover, our study detected that those residing urban area were at marginal significantly higher risk of exposure to asthma (OR = 1.23, 95% CI = 0.96 – 1.57) {table 1}. Thus it has been documented in several studies, that children living within a farming environment have less atopy and asthma (Douwes & Pearce, 2002 and Von, 2000). This was explained that through specific microbial exposures either via ingestion or inhalation which can modify the immune development into a non – atopic direction(Douwes & Pearce, 2002).

Table (1): Sociodemographic risk factors related to asthma

Risk Factor	Asthmatic = 644 No. (%)		Non asthmatic = 1618 No. (%)		X	P value	OR	95% CI
	No.	(%)	No.	(%)				
Sex								
Male (n=933)	274	29.4	659	70.6	0.63	1.49	1.08	0.9 – 1.3
Female (n=1329)	370	27.8	959	72.2				
Crowding Rate					9.52	0.009	0.96	0.78 – 1.17
<3	381	27.4	1010	72.6				
3 – 5	205	28.3	519	71.7				
>3	58	39.5	89	60.5				
Residency					2.84	0.09	1.23	0.96 – 1.57
urban	533	29.2	1291	70.8				
Rural	110	25.2	32.7	74.8				
Maternal educational level					4.23	0.04	1.45	1.02 – 2.07 1.13 – 2.42 0.85 – 1.75
Class 1	240	39.1	534	38.8				
Class 2	138	22.5	269	18.5				
Class 3	186	30.3	491	33.8				
Class 4	49	7.9	158	10.9	1.17	0.278	1.22	
Paternal Educational level					5.36	0.02	1.41	1.05 – 1.9 1.18 – 2.00 1.22 – 2.07
Class 1	137	22.7	327	22.6				
Class 2	110	18.2	229	15.8				
Class 3	250	41.4	532	36.8				
Class 4	106	17.6	358	24.7	11.88	0.0006	1.59	

Class 1= illiterate or read and write only

Class 2=primary school

Class 3= Secondary school or intermediate school

Class 4= college and higher

Out of total 2262, 197 (8.7%) questionnaires were discarded because of insufficient

information about educational level of both parents. Our study found a significant difference in asthma prevalence among children with variations of parental education. The lowest percentage of asthma was among children when their mother or father having college certificate or more (7.9%) and (17.6%) respectively. Taking college degree and above, as a reference group and calculating OR for each level of education, our study found that children whose mothers or fathers were illiterate were at significant risk of developing asthma (OR = 1.45, 95% CI = 1.02 – 2.07 and OR = 1.41, 95% CI = 1.05 – 1.9) respectively, Simelar results were obtained with parent with primary education (OR = 1.65, 95% CI = 1.13 – 2.42 and OR = 1.62, 95% CI = 1.18 – 2.22) respectively. On the other hand, only fathers (OR = 1.59, 95% CI = 1.22 – 2.07) or (OR = 1.22, 95% CI = 0.85 – 1.75) with high school education have children at a significant risk of asthma occurrence (refer to Table 1). Therefore, our results provided an evidence that the lower the education of either mother or father, the higher the risk of asthma occurrence among their children. In addition, we provide an evidence that, parents' level of education acts as a significant risk factor for development of asthma. This finding supported that of Brazil, Turkey, Sri Lanka and Canada's studies (Ronmark Jonsson,Platts & Lundback, 1999; Alba &Alsina, 1999; Kar unasekera,Jayasinghe,& Alwis, 2001 and Chen & Millar, 1999).This could be explained that , with less educated families, adverse environmental factors such as tobacco smoke, crowding, bad nutrition and housing conditions, also LBW and prematurity exist . These factors will make children of less educated parents more susceptible to aeroallergens in addition to less medical care (Strachan et al, 1994 and Martinez Cline &Burrows, 1992).

5.0 Conclusions & Recommendations

Asthma is a major public health problem among Iraqi children in Baghdad. Prevalence rates of asthma are comparable to industrialized, developed countries. Gender differences are present reflected by male predominance Environmental factors as urbanization, crowding as well as low education of parents were risk factors in development of pediatric Asthma. In conclusion environmental exposures and lifestyle factors are important may play crucial roles in the etiology of childhood asthma. Thus, there is an emerging evidence, suggesting that the etiology of childhood asthma is complex and may include early-life environmental exposures as well as factors related to early allergic sensitization. Therefore efforts must be concentrated for hygienic environment in order to overcome this health problem.

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