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A 17-year trend for the prevalence of asthma and allergic diseases among children in Saudi Arabia

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Abstract

The prevalence of childhood asthma and atopic diseases has increased in the recent years in the Kingdom of Saudi Arabia. This study was conducted as a part of a 17 year ongoing program for questionnaire-based periodic assessments of prevalence rates of such conditions. The recent prevalence rates for childhood asthma, rhinitis and eczema in Saudi Arabia and evaluation of the trend have been determined.

A total of 1678 randomly selected schoolchildren comprising of 51.6% males (mean age 11.62 ± 3.08 years) and 48.4% females (mean age 11.79 ± 3.21) was recruited in this questionnaire-based cross-sectional study during the year 2002 in the cities of Riyadh, Jeddah and Hofuf. Results of the present study were compared with the previously published data from two similar surveys conducted in 1986 and 1995 to establish the prevalence trend for asthma and atopic disorders in the Kingdom over a period of 17 years.

Significantly higher prevalence rates ($p \leq 0.0001$) for asthma, rhinitis and eczema were noted in Hofuf (33.7%, 48.2% and 43.5%) compared to Riyadh (17.7%, 29% and 32.6%) and Jeddah (14.1%, 24.3% and 31.9%), respectively. A comparison of the present cumulative prevalence rates for childhood asthma (21.7%), rhinitis (33.8%) and eczema (36%) with those of the past shows that after an initial sharp rise between 1986 and 1995 asthma has reached a plateau. In fact a slight downward trend was rather observed (23% versus 21.7%). Rhinitis, on the other hand, shows a steady upward course and eczema for the first time has shown a dramatic increase over a period of 17 years.

Prevalence of childhood atopic diseases like asthma, rhinitis and eczema was exceptionally high in Hofuf. Although a strong association among allergic diseases is well known, yet long-term prevalence trend for each disorder is variable among atopic children.

Introduction

Asthma is a leading chronic childhood illness in the United States [1] and caused a large burden on affected children and their families. Although, it is a major cause of childhood disability [2,3] and in rare cases causes premature death, asthma-related morbidity and mortality are largely prevent

able when patients and their families are adequately educated about the disease and have access to high-quality health care. [4-6]. Thus, it is important to monitor the trends for asthma prevalence and the health care utilization to estimate the burden caused by the of disease and of the impact of the asthma preven tion programs. In Britain, time trends have shown that the prevalence of childhood asthma and wheeze has risen over the past few decades [7-10]. The size of the increase ie though variable, yet the cohort studies indicate a rise of 70% in the prevalence of wheezing at the age of 16 between the year 1974 and 1986 [10]. As the changing prevalence rates of asthma were observed over a relatively short period of time, environmental factors are thought to have played a major role.

Changes in environmental exposure have been proposed as a possible cause of increasing the asthma and other atopic illeness prevalence and its morbidity [11]. Several reports suggest that urbanization leading to multiple exposures both indoors and outdoors increase the risk of developing asthma and allergic rhinitis [12-20]. However, there is no consensus and the evidence is mixed, since studies have shown no difference between the urban and rural populations undergoing a similar increase in the

prevalence of asthma [21,22]. The issue therefore remains debatable and further research could probably identify the contributing factors responsible for the rising prevalence of childhood atopic condition.

We have in the recent past reported a marked increase in the prevalence of childhood asthma and allergic rhinitis in the Kingdom of Saudi Arabia comparing the results of two separate questionnaire based surveys conducted in 1986 and 1995 [23]. As a part of ongoing program for monitoring the prevalence of allergic diseases including asthma, allergic rhinitis and eczema in the Kingdom of Saudi Arabia, present study describes a third survey conducted in the year 2002. The results of present survey are compared with the perviously published findings [23] to evaluate the trend in the prevalence of asthma and other allergic diseases over a period of 17 years of documentation.

Subjects and Methods

A total of 1678 schoolchildren were recruited in the study. The schoolchildren were selected randomly as subjects of a cross-sectional population-based study conducted in the cities of Riyadh (555), Jeddah (574) and Hofuf (549) in the Kingdom of Saudi Arabia during the year 2002. The demographic details of the schoolchildren are described in Table 1. For the purpose of standardization, same questionnaires comprising of 35 questions as used in the previous studies [23] were distributed among the schoolchildren. Questionnaires is similar to the one used in the International study of asthma and allergies in childhood (ISAAC) [24], were distributed among children, and completed by the parents. Apart from the demographic details the questionnaire included questions on the symptoms and physician diagnosis of asthma, rhinitis and eczema. The family history and exposure to predisposing factors. The prevalence rates of asthma, rhinitis and eczema reported in this study are based on the response where a physician made the diagnosis of the condition. The data were analyzed on an IBM computer at the College of Medicine of King Saud University, Riyadh. Proportions were compared using MedCal version 7 statistical software.

Table 1: Demographic details of the children enrolled in2002 survey

Age (years)	Males No. (%)	Females No. (%)	Total No. (%)
	146 (16.9)	133 (16.4)	279 (16.6)
9-10	225 (26.0)	215 (26.5)	440 (26.2)
11-12	161 (18.6)	135 (16.6)	296 (17.7)
13-14	135 (15.6)	128 (15.8)	263 (15.7)
15-16	162 (18.7)	144 (17.8)	306 (18.2)
17-18	37 (4.3)	56 (6.9)	93 (5.5) ?
	Mean age	Mean age	Mean age
	11.62 ±3.08	11.79±3.21	11.70±3.15

N= 1678; Total number of males= 867 (51.6%)
Total number of females= 811 (48.4%)

Results

A total of 1847 questionnaires was distributed among the schoolchildren and only 1678 completed questionnaires were returned with a response rate of 90.8%. Of the these 1678 schoolchildren, 51.6% were males (mean age 11.62 ± 3.08) and 48.4% were females (mean age 11.79 ± 3.21). The majority of the schoolchildren (72.6%) were aging between 7 and 14 years (Table 1). The prevalence of asthma, rhinitis and eczema among schoolchildren varied between the cities (Figure 1). The highest prevalence rates for asthma, rhinitis and eczema were noted in Hofuf (33.7%, 48.2% and 43.5%) followed by Riyadh (17.7%, 29% and 32.6) and Jeddah (14.1%, 24.3 and 31.9) , respectively. Whereas no significant difference was found when data from Riyadh and Jeddah were compared. The prevalence of asthma, rhinitis and eczema was found to be significantly higher ($p \leq 0.0001$) when data from Hofuf were compared to those of either Riyadh or Jeddah. The cumulative prevalence rates for asthma, rhinitis and eczema were 21.7%, 33.8% and 36%, respectively. Figure 2 shows the cumulative prevalence of childhood asthma, rhinitis and eczema of three surveys performed over a period of 17 years including the results of the present study. The data recorded in 1986 and 1995 have already been published and are mentioned here for the evaluation of the trend. After the initial sharp rise ($p \leq 0.001$), the prevalence of childhood asthma appears to reach a plateau showing no significant difference between the present survey and the one that was performed in 1995. The prevalence of rhinitis in the children appears to increase steadily and significantly ($p \leq 0.0001$) in the successive surveys. Whereas no change in the prevalence of eczema was observed in the surveys of 1986 and 1995. However, a surge in the prevalence of childhood eczema was noted in the survey of 2002 ($p \leq 0.0001$).

Discussion

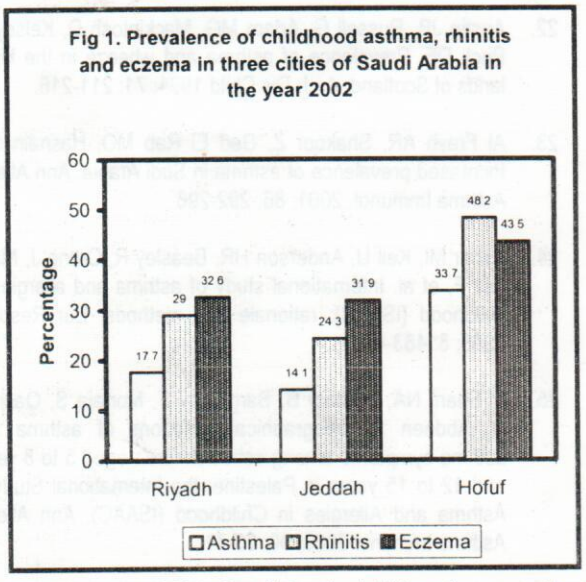
This study describes prevalence of childhood asthma, rhinitis and eczema in three cities of Saudi Arabia and the data are compared with two similar surveys conducted in the past. The prevalence of childhood asthma is evidently varied in all the cities with the maximum number of children recorded with asthma residing in Hofuf. The findings of the present study are in agreement with other reports documenting the regional variations in the prevalence of asthma [25-27]. The cumulative prevalence rate for childhood asthma was 21.7%, which appears to be much higher compared to several international reports [26-29]. Although the prevalence of childhood rhinitis and eczema was found to be variable among the cities, yet the highest prevalence rates were once again noted in Hofuf indicating that the children residing in the area are more prone to develop allergic diseases. There is evidence that exposure to increased environmental allergen load may be responsible for allergic symptoms in a community [30]. Assessment of environmental allergen load by aerobiological surveys and the level of sensitization of the population residing in different regions therefore appear to be important clues of the regional variations in the prevalence of allergic disorders.

The International Study of Asthma and Allergies in Childhood (ISAAC) has established a standardized methodology to compare

the prevalence and severity of asthma and atopic diseases in children, both within and between countries [24]. The study aims to describe the prevalence of these diseases and their symptoms, to provide a baseline for assessing future trends, and to identify whether there is sufficient variation in prevalence of symptoms to allow efficient testing of aetiological hypotheses either within or between countries. The series of assessments for prevalence of childhood allergic disorders have been started in the Kingdom of Saudi Arabia before the initiation of ISAAC and a baseline is established in 1986. The present study being the third of its kind over a period of 17 years thus contributes significantly to evaluate the trend in the prevalence of childhood allergies in the Kingdom which may again be considered as one of the longest international surveys.

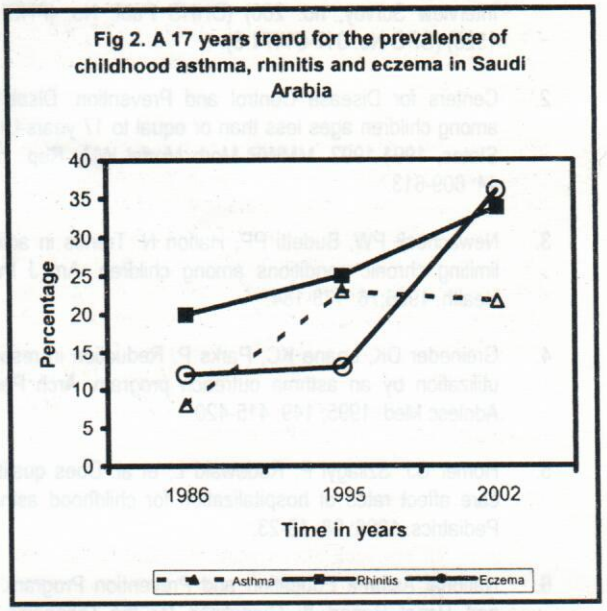
After the initial sharp rise between 1986 and 1995, it appears that the prevalence of childhood asthma has reached a plateau; in fact a downward trend was noted in the present study. A study on US children while describing trends in asthma prevalence has shown a similar trend as it has been observed in the Kingdom of Saudi Arabia [31]. After an initial period of increasing the prevalence of asthma attack among the children between 1980 and 1996, a lower prevalence rate with a plateau have been reported between the years 1997 and 2000.

The trend for the prevalence of childhood rhinitis and eczema is peculiar. When prevalence of rhinitis has shown a steady upward trend over the years, the prevalence of eczema has been shown consistently low in the previous studies, but increased dramatically in the present study. Results of two surveys conducted be



tween 1979 and 1991 in Swedish schoolchildren, however, show a continuous upward trend in the

prevalence of allergic diseases [32]. This may be due to the fact that a strong association probably exists between rhinitis and atopic disorders [33]. Inhaled allergens apart from having their effect on asthma and rhinitis may constitute a significant risk for



the development of eczema. There is some food allergens, particularly cow's milk exposure in early infancy and an early deprivation of breast feeding may play a significant role in the development of eczema and other atopy evidence supports an etiological link between allergic rhinitis and eczema. Exposure to the birch pollen has been shown to be a risk factor for having both the allergic rhinitis and eczema, whereas allergens from animals such as dog and cat have been associated with the risk for developing asthma [34]. The dichotomy of trends observed in our surveys might be due to a shift in allergen driven responses influencing changes in the prevalence rates of different allergic disorders. However, the contribution of the geographical, genetic or other environmental factors influencing either individually or in combination cannot be ignored.

Apart from the steps taken to increase the general awareness of asthma, one of the many measures adopted in response to the alarmingly high prevalence of childhood asthma in the Kingdom of Saudi Arabia observed in the recent years is the formulation and introduction of the National Protocol for the Management of Asthma by the Ministry of Health in 1995 [35]. A recent survey from Jeddah, has confirmed that patients with chronic asthma are benefited remarkably from a simple protocol followed in outpatient clinic, with regards to the morbidity associated with the disease [36]. It is though premature to assess the impact of the National Protocol on the prevalence of asthma in the Kingdom, but the benefits of the efforts undertaken at the national level regarding mass education and awareness of asthma in the recent years appear to be surfacing in the Kingdom.

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