

Prevalence of Asthma Among Saudi Schoolchildren

A. Al-Frayh, Abdulbari Bener, T. Q. Al-Jawadi

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يهدف هذا البحث الى دراسة مدى انتشار الربو بين أطفال المدارس السعوديين الذين تتراوح أعمارهم بين سبع سنوات واثني عشرة سنة، وفي الفترة الممتدة من يناير 1986م الى يناير 1990م، تم اجراء بحث شامل تناول 3300 طفل يعيشون في ثلاث مناطق جغرافية مختلفة في المملكة (معدل متوسط العمر 9, 32، 56 في المائة ذكور، و44 في المائة اناث) واعتمد البحث على توزيع استبيان يضم مؤشرات تدل على العمر، الجنس، محل السكن، المهنة، المستوى التعليمي للابوين، الاصابة بالربو، حمى الطلع، السعال، الصفير المصاحب للتنفس، وجود حيوانات أليفة، تدخين الابوين، ومعلومات اخرى عن الابوين فيما يخص مرض الربو. أظهرت النتائج أن نسبة الاطفال الذين يعانون من الصفير المصاحب للتنفس كان أعلاها في جدة 12, 6 في المائة ثم الرياض 11, 9 في المائة ثم الدمام 6, 6 في المائة، وأن نسبة انتشار حمى الطلع في كل منطقة من هذه المناطق الثلاثة هي أعلى من نسبة انتشار الصفير المصاحب للتنفس وتبين أن مدينة جدة ايضا كانت أعلى منها من باقي المناطق اذ بلغت 24 في المائة من اجمالي الاطفال اذا ما اضيف الى ذلك العلامات التي تظهر على الانف بينما بلغت في الرياض 17 في المائة وفي الدمام 12, 1 في المائة. كما تبين أن حدوث الربو في الاسر التي يكون فيها الابوان كلاهما مصابان بالربو الفة فاشية على نطاق التنفس تعاني امهاتهم من الربو وان 40, 7 في المائة من نسبة هؤلاء الاطفال يعاني أبأؤهم أيضا من الربو بينما بلغت النسبة في الاطفال الذين لا يعانون من صفير في التنفس 8, 6 في المائة عندما يكون أحد الابوين فقط مصاب بالربو، كما لوحظ أن هناك الفة اخرى في نطاق الاسرة في الربط بين صفير التنفس وحمى الطلع اذ تبين أن نسبة 27, 1 في المائة من الاطفال الذين يشكون من صفير في التنفس تكون أمهاتهم مصابات بحمى الطلع ونسبة 22, 8 في المائة يكون أبأؤهم مصابين بحمى الطلع، بينما بلغت النسبة أقل من 9 في المائة عندما يكون أحد الابوين فقط مصاب بحمى الطلع.

The aim of this paper was to study the prevalence of asthma among Saudi schoolchildren aged 7-12 years. A cross-sectional study of 3300 schoolchildren living in three different regions of Saudi Arabia (average 9.32 years, 56% boys and 44% girls) was conducted between January 1986 and January 1990. A self-administered questionnaire was used to collect details of age, sex, area of residence, occupation, education level of parents, asthma, hay fever, cough, wheezing, exposure to pets and animals, parental smoking, and parental history of asthma. The results showed that children with wheezes occur more commonly in Jeddah with 12.6%, Riyadh with 11.9% and Dammam with 6.6%. The frequency of hay fever is significantly more common in each area than wheeze, but once again is most common in Jeddah, with up to 24% of the children complaining of nasal symptoms compared with 17% in Riyadh and 12.1% in Dammam. A very clear family history of asthma is reported countrywide in that 35.9% of wheezy children have a mother with asthma and 40.7% of these children have fathers with asthma. This contrasts with 8.6% of non-wheezy children with either parent with asthma. A similar pattern is seen with hay fever symptoms with 27.1% of wheezy children having a mother with hay fever symptoms and 22.8% of fathers, compared with 9% of non-wheezy children with either parent with hay fever symptoms.

Asthma is the most common chronic illness of childhood, affecting about 10% of school age children.^{1,2} Hospital admissions for asthma are, however, increasing steadily.³⁻⁵ An increase in the

incidence and severity of bronchial asthma in both children and adults has been noted in recent years. This observation has been supported by both prevalence surveys and hospital admission data.⁶

It has been a general impression that bronchial asthma is much less common in developing countries than in industrialized countries especially among children. However, the increase occurred not only in Western countries⁷⁻⁹ but also in Asia Pacific areas.⁶

In Saudi Arabia, a few studies have been done on some aspects of bronchial asthma.¹⁰⁻¹² There is no study on the prevalence or aetiology of childhood asthma in Saudi Arabia. The aim of the present study was to investigate the prevalence of asthma among Saudi schoolchildren aged 7-12 years.

Materials and Methods

The schoolchildren studied were the subjects of a cross-sectional population study conducted in three different places namely: Riyadh, Dammam and Jeddah, the main cities of the Kingdom of Saudi Arabia, between January 1986 and February 1990. Three regions were chosen because of their different climates. Riyadh, which has a dry temperate climate, is the capital of Saudi Arabia and has a population of 2.5 million. Jeddah, which has a very humid temperate climate, is a city of 1.5 million people in the western coastal region of Saudi Arabia. Dammam has a humid temperate climate, and a population of 1 million people in the eastern coastal region of Saudi Arabia.

The methods used included a self-administered questionnaire to parents. The schoolchildren were selected randomly. The sample was a representative survey of the three cities. The questionnaires were completed by the parents with the help of senior medical students and under supervision of the co-investigators and clinician. The questionnaires and administration team were the same in all three areas. A total of 3300 Saudi schoolchildren were recruited into the study to give details of personal data such as age, sex, area of residence, social class, father's occupation, mother's occupation, history of asthma, history of wheeze, cough, hay fever, eczema, family history of respiratory allergy, family pets (dog, cat, bird, poultry), parental smoking habits separately and overall, family smoking and cigarette consumption at home by parents per day.

College of Medicine & King Khalid University Hospital, King Saud University, PO Box 2925, Riyadh 11461, Saudi Arabia

ABDULRAHMAN AL-FRAYH FACHARZT,
Professor

Department of Community Medicine, Faculty of Medicine & Health Science, United Arab Emirates University, PO Box 17666, Al-Ain, United Arab Emirates

*ABDULBARI BENER PhD FRSS, Associate Professor
Department of Paediatrics, College of Medicine & King Abdulaziz University Hospital, King Abdulaziz University, PO Box 9025, Jeddah 21413, Saudi Arabia
TAHA QASIM AL-JAWADI MD

*Correspondence

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Data were analysed on the IBM computer of the College of Medicine at the King Saud University. The statistical package program SAS was used to calculate χ^2 values to assess the statistical significance of contingency table.^{13,14}

Results

In the population study, questionnaires, with a letter of explanation, were distributed to the parents of 3300 children. Parents of 3041 children (93.3%) gave consent for study. There was no difference in the consent rate in the three regions (Dammam, Jeddah and Riyadh). The age and sex distribution are identical in the three regions. The age range of the children studied was 7-12 years, with a mean 9.32 years; 56% males, and 44% females in Dammam region; 47% males and 53% females in Riyadh region, and 47% males and 53% females in Jeddah region. The sex differences were not statistically significant. Also, there were no significant differences in areas of residence.

Results for three cities are summarized in Table 1. This table shows that children with wheeze occur more commonly in Jeddah with a prevalence rate of 12.6%, Riyadh with 11.9% and Dammam with 6.5% of the children examined, ($p < 0.05$). The attacks of breathlessness or tightness occur more commonly in Jeddah with 19.8, than in Riyadh 12.1% and in Dammam with 6.1%, ($p < 0.01$). Similarly, the prevalence rate of respiratory symptoms (cough) is higher in Riyadh with 7.9%, than in Jeddah with 6.8%, and 5.9% in Dammam. When a formal diagnosis of asthma is sought, this made by a doctor, the figures are 9.3% for Riyadh, 9.8% for Jeddah, and 3.6% for Dammam ($p < 0.05$). The frequency of hay fever is significantly more common in each region than wheeze but once again more common in Jeddah with the prevalence rate of 23.96% with Riyadh 17.0% and 12.9% in Dammam.

The frequency of asthma among parents reflects the same pattern seen in the children, with Dammam once showing the lowest level with 2.3% of the fathers compared with 5.5% in Jeddah and 5.4% in Riyadh. Then, the hay fever symptoms are more common, the lowest level with 8.3% in Dammam, 11.2% in Jeddah and 11.7% in Riyadh. The frequency of asthma among mothers reflects the same pattern in children, Dammam showing the lowest level with 2.6% of the mothers compared with 4.3% in Jeddah and 6.3% in Riyadh. The same pattern is shown when relatives with asthma are identified with Dammam showing only 6.1% of the children reporting relatives with asthma compared with 13.7% in Jeddah, and 12.4% in Riyadh.

Table 2 shows the wheezy children with family history of asthma, hay fever, fathers smoker and family pets. A very clear family history of asthma is reported countrywide, 35.9% of wheezing children have a mother with asthma and 40.7% of these children have fathers with asthma. This contrasts with 8.6% of non-wheezy children with either parent with asthma. A similar pattern is seen with hay fever symptoms with 27.1% of the wheezy children having a mother with hay fever symptoms and 22.8% of fathers, compared with less than 9% of non-wheezy children with either parent with hay fever symptoms. Also, as can be seen from Table 2, 21.9% of wheezy children have fathers who smoke compared with only 10.2% of non-wheezy children. Similarly, 25.7% of

Table 1

Prevalence rate of bronchial asthma and hay fever in Dammam, Jeddah and Riyadh regions of Saudi schoolchildren

Variables	Dammam (n=918) Prevalence rate (%)	Jeddah (n=1035) Prevalence rate (%)	Riyadh (n=1088) Prevalence rate (%)	Significance differences p*
History of wheeze	6.5	12.6	11.9	p<0.05
Attack of breathlessness or tightness	6.1	19.8	12.1	p<0.01
Cough	5.9	6.8	7.9	p>0.05
Diagnosis of asthma	3.6	9.8	9.3	p<0.05
Hay fever	12.9	23.9	17.0	p<0.001
Father with asthma	2.3	5.5	5.4	p<0.05
Father with hay fever	8.3	11.2	11.7	p>0.05
Mother with asthma	2.6	4.3	6.3	p<0.001
Mother with hay fever	9.6	11.6	9.8	p>0.05
Relative with asthma	6.1	13.7	12.4	p<0.05
Relative with hay fever	8.1	12.6	10.6	p<0.05
Father who smokes	9.6	14.5	9.8	p<0.05
Mother who smokes	2.9	5.7	3.9	p>0.05
Family pets (dog, cat, bird)	14.9	12.5	14.7	p>0.05

*Overall significance differences between three cities determined by the χ^2 method

Table 2

Wheezy children: family history of asthma and hay fever.
Countrywide data

	Wheezy children (%)	Non-wheezy children (%)
Fathers with asthma	40.7	8.6
Mothers with asthma	35.9	8.6
Fathers with rhinitis	22.8	8.8
Mothers with rhinitis	27.1	8.3
Father who smokes	21.9	10.2
Family with pets (dog, cat, bird, poultry)	25.7	12.8

wheezy children have pets compared with less than half this number (12.8%) of non-wheezy children.

In this study, the results show that two environmental factors have been identified which seem strongly to influence the expression of wheeze and asthma in children. For example, 15.9% of wheezy children have fathers who smoke compared with only 5.1% of non-wheezy children in Dammam. Also, 17.7% of wheezy children have fathers who smoke compared with only 5.88% of non-wheezy children in Jeddah. Similarly, 23.36% of wheezy children have fathers who smoke compared with only 8.79% of non-wheezy children in Riyadh. However, we did not find statistically significant differences between three regions in the frequency of wheezy children who have fathers who smoke ($p>0.05$). But, we have found a statistically significant association asthma and the number of cigarettes smoked per day at home by both parents, ($p<0.001$). It was found that 16.79% of wheezy children have pets compared with 4.73% of non-wheezy children in Dammam. Also, 18.13% of wheezy children have pets compared with 10.67% of non-wheezy children in Riyadh region. Similarly, 22.42% of wheezy children have pets compared with 14.25% of non-wheezy children in Jeddah region.

Discussion

The results are summarized in Table 1. When a formal diagnosis of asthma was sought (having been made by a doctor) the figures were 9.8% for Jeddah, 9.3% for Riyadh, and 3.6% for Dammam. These figures show a major difference between the regions in the frequency of wheezing with Dammam being a relatively low risk area.

These data established that frequency of wheeze, and the incidence of asthma established by a formal diagnosis by a doctor, is very significant in Saudi Arabia and in particular, shows strong regional differences ranging from most in Jeddah and least common in Dammam. The secondary evidence, that fathers who smoked and owning pets were major contributing factors to the expression of wheeze strongly imply that other factors in the environment are likely to contribute to the higher frequency of asthma in Jeddah compared with Dammam.

The prevalence of bronchial asthma in various parts of the world seems to vary widely. A comparison of studies is usually difficult because of lack of uniformity between methodologies, definition of asthma, and designations of prevalence. Most recently, the majority of prevalence studies of asthma came from Western countries.⁷⁻⁹

The impact of childhood asthma on the health delivery system is considerable. As the most common chronic disease of children, asthma is the most common frequent cause for emergency room visits and hospital admissions.^{15,16} There have been many prevalence studies of asthma among children, results ranging from 1% to 1.5% in Scandinavian countries, 2.5% percent in the USA, to as high as 7-20% in New Zealand schoolchildren, but little information on asthma epidemiology has

been reported from the rest of the world. Childhood asthma may be uncommon in some developing countries. For example, a population survey in Zimbabwe¹⁷ found no asthmatics under the age of 10 years and childhood asthma was rare among hospital attenders in South Africa,¹⁸ Nigeria,¹⁹ and Kenya.²⁰ None was found in a survey of 191 children in the Gambia.²¹ Childhood asthma seems common, however, in Barbados and Cuba.²² Bronchial asthma has been surveyed in two different climatic areas (dry and humid) in New South Wales in Australia.²³ Preliminary findings showed differences in the prevalence of both bronchial hyperresponsiveness and respiratory symptoms, which appeared to be related to exposure environmental allergens.

In this study, the prevalence rates of asthma 11.5% for Saudi Arabia was above the range reported for Western countries. In the UK the range was from 1.2% to 9%, in the USA from 2.6% to 9%, in France 2.5%, Germany 0.43%, Swiss 4%, Japan 3.5%. Unfortunately, we have to note that our values are significantly higher than those Western countries.⁷⁻⁹

Also, our study results were higher than some other Asian Countries:⁶ for example India 0.2%, Indonesia 1.3%, Taiwan 1.3-5.07%, Israel 0.4%, Japan 0.7-7.9%, Nepal 2%, Singapore 1.6%, Turkey 2.4%, Tahiti 11.5%. The difference in prevalence may reflect differences in the prevalence of asthma or a difference in the diagnostic habits of medical practitioners. In the Asian Pacific area, the prevalence of childhood asthma was comparable to that in Western countries. The increase in asthma has occurred not only in Western countries but also in the Asian Pacific countries.^{7-9,24}

Although there are big difficulties in comparing different populations, the study of the same population may provide some clues for the increase in the prevalence. During the last few decades, profound changes have occurred in the environments of most westernized societies, including urbanization, an enormous increase in motor vehicles and factories, changes in lifestyle, and exposure to new allergens.

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