

Bronchial Asthma and Wheeze in a Desert Country

A. Bener, T.Q. Al-Jawadi,* F. Ozkaragoz*, A. Al-Frayh** and J. Gomes

*Department of Community Medicine, Faculty of Medicine and Health Sciences, United Arab Emirates University, U.A.E., *Department of Pediatrics, College of Medicine and KAAUH, King Abdulaziz University, Jeddah, Saudi Arabia and **Department of Pediatrics, College of Medicine and KCUH, King Saud University, Saudi Arabia*

Abstract. A cross-sectional, population-based study was conducted among school children (3300), aged 7-12 years, in the Kingdom of Saudi Arabia, during the period January, 1988 - February, 1990. The aim of the study was to investigate the association between asthma, allergic rhinitis, wheeze and eczema among Saudi school children. The relationship between pet-ownership and respiratory allergy was also studied. Detailed information was collected about wheeze and asthma in 3041 children and history of asthma and allergic rhinitis in their parents. The population sample had a high prevalence rate of diagnosed asthma (6.8%), history of wheeze (10.5%), allergic rhinitis (17.9%), and eczema (10.8%). Allergic rhinitis was the most frequently seen respiratory illness when compared to other respiratory symptoms. The prevalence rate of asthma, allergic rhinitis and eczema among parents reflected the same pattern as that seen in the children. Prevalence rate for asthma in children with pets is twice that of children without pets (OR : 2.4; 95% CI : 1.8-3.1). The odds of having chronic cough (OR : 3.9; 95% CI : 2.8-5.2), chronic wheeze (OR : 4.2; 95% CI : 3.3-5.4), allergic rhinitis (OR : 8.0; 95% CI : 6.3-10.3) and eczema (OR : 2.8 : 95 CI : 2.1-3.7) was higher in children with pets than in children without pets. The present study revealed that pet-ownership was associated with increased respiratory symptoms.

(Indian J Pediatr 1993; 60 : 791-797)

Key words : *Asthma; Allergic rhinitis; Wheezy bronchitis; Cough; Pets and asthma; Saudi population.*

The family histories relating to asthma and wheezy bronchitis have not been documented very well. Studies on the natural history of allergic diseases during childhood have mainly dealt with aspects of asthma and wheezy bronchitis, and shown that the recovery rate from wheezy bronchitis is high during childhood.^{1,2} although many of the children with

wheezy bronchitis develop asthma later. Moreover, wheezy bronchitis is known to precede asthma in many childhood asthmatics.³ Strong similarities between asthmatics, and wheezy bronchitic children in the family histories of asthma and wheezy bronchitis suggest that these two illnesses share a common defect.^{1,3,4}

The natural history of the more prevalent allergic diseases, such as eczema, and allergic rhinitis is less well known.^{5,6} It was reported that the incidence of asthma and eczema was highest during the first years of life, but the incidence of allergic rhinitis was fairly constant throughout childhood.⁶

Reprint requests: Dr. Abdulbari Bener, Associate Professor, Department of Community Medicine, Faculty of Medicine and Health Sciences, P.O. Box 17666, Al Ain, United Arab Emirates.

Hay fever is also, an allergic condition, that is believed to have been affecting people for several centuries. It is medically defined as seasonal allergic rhinitis.⁷ There are thought to be many allergens for hay fever, asthma and wheeze, and pollen is most frequently reported.⁸ Figures for the prevalence of asthma, hay fever and wheezing vary from one country to another. Much of this variation can be attributed to different factors, e.g. pollution, presence of allergens, socio-economic factors, environmental influences, study design and method of diagnosis.

The strong association of asthma, hay fever, wheezing and eczema has been reported by several authors.^{1,5,9,10} It is well documented that asthma and wheezy bronchitis have a hereditary basis,^{3,11} based on family¹² and twin studies.¹³

Some population studies have also addressed the issue of pet-allergy.¹⁴ Several pets like cats, dogs, birds and poultry are known to produce allergen which may cause or aggravate respiratory allergy. The relationship between pet-ownership and respiratory allergy was investigated in a population of 3,344 Dutch children.¹⁵ Parents reported that 5.8% of children had an asthma attack, 5.8% had pet-allergy and 10.1% had chronic wheeze.

The aim of the present study was to investigate the association between asthma, allergic rhinitis, and wheeze among Saudi school children aged 7-12 years. The relationship between pet-ownership and respiratory allergy was also studied.

MATERIAL AND METHODS

This cross-sectional, population-based study was conducted among school children, aged 7-12 years, in the Kingdom

of Saudi Arabia. The field survey was conducted during the period January, 1988 - February, 1990.

Approval for the study was obtained from the Director General of Education of the Ministry of Education, and the Medical Ethics Committee of the College of Medicine at the King Saud University in Riyadh. Consent was also obtained from the regional Directors of Education and from individual school principals at the selected schools. Signed consent was obtained from a parent of each child before the study was begun.

Three thousand and three hundred school students aged 7-12 years were randomly selected in Saudi Arabia. Multi-stage sampling technique was performed. We have adopted and used Professor A.J. Woolcock's standardized questionnaire to determine the prevalence and severity of bronchial asthma in Saudi Arabia.¹⁶ A standardized questionnaire along with a letter of explanation was distributed among the randomly selected students. The questionnaire was completed by the student's parents with the help of one nurse, senior medical student, allergy consultant and one co-investigator. Information obtained from the respondents included: area of residence and social class of family; father's and, mother's occupation; age, sex, history of asthma, history of wheezy bronchitis, and allergic rhinitis in the target child; family history of respiratory allergy, and pet-ownership.

Prior to the study, the repeatability of the questionnaire was determined in a separate study of primary school children in grades 1-6. Of 100 respondents, 85 completed the first questionnaire, 85 completed the questionnaire a second time, four weeks later. When the first questionnaire was

vadmir
the sec
was ma
use in t

This
was co
and ret
defined
questio
from at
cise-wh
tion co
was "I
suffere
"what
first di
needec
due to

Data
puter c
Univer
gram 5
square

20

15

10

5

0

administered, parents were not told of the second questionnaire. No alteration was made to the questionnaire prior to its use in the main study sample.

This self administered questionnaire was completed by the parents of each child and returned to the school. Wheezing was defined as an affirmative answer to the question "has child at any time suffered from attacks of wheezy breathing?", "exercise-wheeze", or "night-cough". The question concerning the diagnosis of asthma was "has the child at any time in his life suffered from an attack of asthma?", "what was the age at which asthma was first diagnosed?" and "has the child ever needed treatment or hospital admission due to asthma?"

Data were analyzed on the IBM computer of College of Medicine at King Saud University. The statistical package program SAS¹⁷ was used to calculate the Chi-square values to assess the statistical sig-

nificance of contingency table, and to estimate odds ratio.¹⁸

RESULTS

Parents of 3,300 school children were invited to participate in the study of whom 3,041 (93.3%) responded positively. Response to the questionnaire administered on two occasions, showed a high degree of repeatability between the first and second questionnaires. The question concerning diagnosed asthma (90%) and wheeze (87%) showed excellent agreement. The age of children studied ranged between 7 and 12 years (mean 9.32 years). Of the study children 1,581 (52%) were males and 1,460 (48%) were females. The sex difference was not statistically significant.

Results are summarized in Figure 1 which show the population sample had a high prevalence rate of diagnosed asthma (6.8%), history of wheeze (10.5%), allergic rhinitis (17.9%) and eczema (10.8%). All-

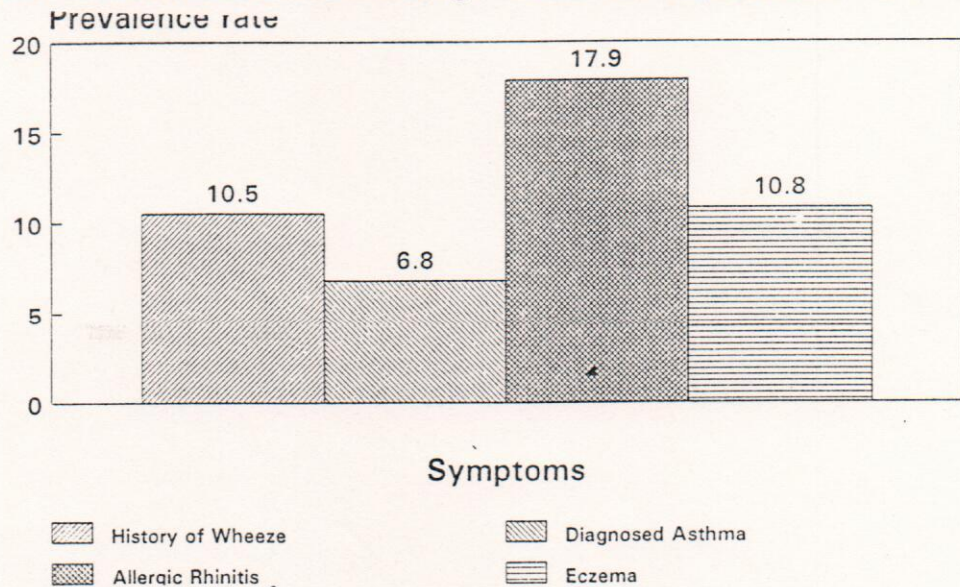


Fig. 1 Prevalence rate of bronchial asthma, allergic rhinitis and eczema

TABLE 1. Prevalence of Asthma and Allergic Rhinitis, Among First Degree Relatives

	Wheezy children (%)	Non-wheezy children (%)	Odds ratio (95% CI)
Father with asthma	39.42	8.40	7.2 (4.9-10.7)*
Mother with asthma	33.58	8.47	5.5 (3.7-8.2)*
Father with rhinitis	29.94	8.49	2.9 (2.1-3.9)*
Mother with rhinitis	25.55	8.87	4.0 (3.0-5.4)*

* ($p < 0.0001$)

gic rhinitis was the most frequently seen respiratory illness when compared to other respiratory symptoms.

Table 1 shows the prevalence of asthma and allergic rhinitis in the parents of children with and without wheeze. A very clear family history of asthma was noted countrywide; 33.58% of wheezy children had mothers with asthma and 39.42% had fathers with asthma. In comparison only 8.5% of non-wheezy children had either parent with asthma. A similar parental prevalence pattern was seen with allergic rhinitis. The odds of having wheezy bronchitis were 7.2 (95% CI : 4.9-10.7) times greater for children of asthmatic fathers compared with those whose fathers did not have asthma. The odds ratio for having [wheezy bronchitis among the children] of asthmatic mothers was 5.5 (95% CI : 3.9-8.2) times greater than for children whose mothers did not have asthma. Both these associations were highly significant ($p < 0.0001$). Highly significant ($p < 0.0001$) association was also seen between wheezy bronchitis in the study child, and paternal

(OR : 2.9, 95% CI : 2.1-3.9) and maternal allergic rhinitis (OR : 4.0, 95%, CI : 3.0-5.4).

Figure 2 shows the prevalence rate of bronchial asthma associated with different pets. The prevalence of asthma was highest (14.57%) among children who had cats as pets.

Prevalence rates for asthma, allergic rhinitis, wheeze, cough and eczema in children from families with and without pets are shown in Table 2. Children from families with pets had a higher prevalence rate of respiratory symptoms. Prevalence rate for asthma in children with pets was twice that of children without pets (OR : 2.4; 95% CI : 1.8-3.1). The odds of having chronic cough (OR : 3.9; 95% CI : (2.8-5.2), chronic wheeze (OR : 4.2; 95%, 3.3-5.4), allergic rhinitis (OR : 8.0; 95% CI : 6.3-10.3) were higher in children with pets than in children without pets. Similarly, the risk of having eczema was higher among children

TABLE 2. The Prevalence of Asthma, Allergic Rhinitis, Wheeze, Cough and Eczema Associated with Pet Ownership

Symptom	Family with pet (%)	Family without pet (%)	Odds ratio (95% CI)
Diagnosed asthma	21.5	10.4	2.4 (1.8-3.1)*
Allergic rhinitis	40.0	7.7	8.0 (6.3-10.3)*
Chronic wheeze	32.7	10.4	4.2 (3.3-5.4)*
Chronic cough	23.4	7.4	3.9 (2.8-5.2)*
Eczema	18.5	7.5	2.8 (2.1-3.7)*

* ($p < 0.0001$)

nal al-
5.4).
rate of
fferent
high-
d cats

llergic
na in
ithout
i from
alence
alence
ts was
(OR :
aving
8-5.2),
3-5.4),
3-10.3)
han in
risk of
ildren

Allergic
eczema

dds
atio
% CI)

2.4
3-3.1)*
8.0
-10.3)*
4.2
3-5.4)*
3.9
3-5.2)*
2.8
1-3.7)*

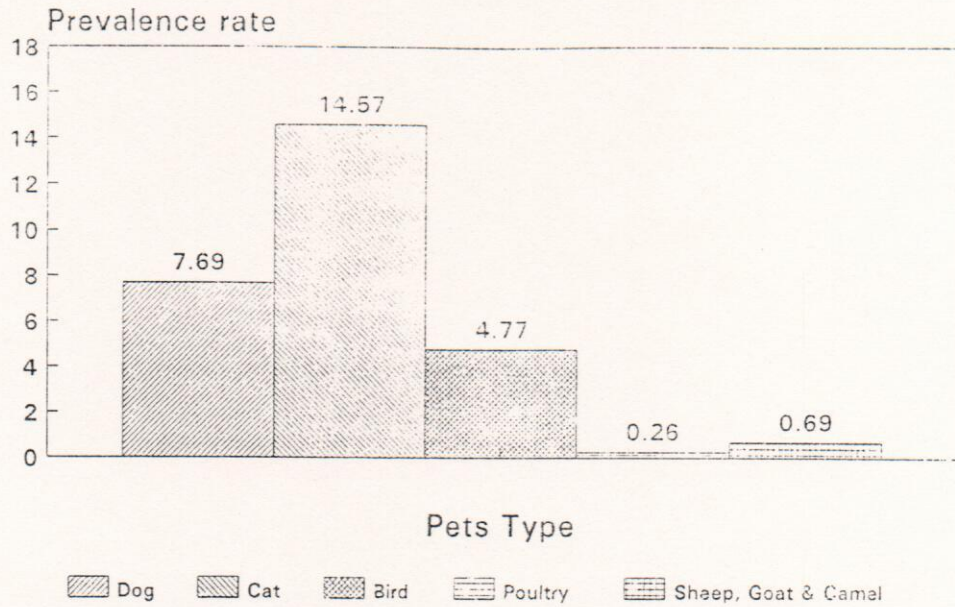


Fig. 2. The prevalence rate of bronchial asthma associated with different pets

with pets (OR : 2.8; 95% CI : 2.1-3.7) than without pets. All these differences were statistically significant ($p < 0.0001$).

DISCUSSION

Our findings of higher prevalence of wheeze among offspring of parents with allergic respiratory diseases support the hypothesis that wheeze might be inherited, as reported previously.^{3,12,13} The findings of this study showed that the occurrence of asthma, allergic rhinitis and wheeze in the same children and in their parent suggest that these diseases share a common genetic defect. The association of asthma, allergic rhinitis and wheeze in combined allergic disease found in the present study is in conformity with reports from other studies.^{1,3,4,5,10}

In many children asthma is diagnosed

by the presence of wheeze.¹⁹ The overlap of diagnosis of asthma and wheezy bronchitis in children has been reported earlier also.²⁰

It is important to note that we have found a significant relationship between parental history of asthma and allergic rhinitis and wheeze in children. Other family studies have showed that parental history clearly affects the influence of childrens symptoms.²¹

Most of the family studies on asthma, wheeze and chronic cough suggest that there is a considerable genetic component in the etiology of these illnesses.^{3,22} There is also, much evidence, that the prevalence of asthma and wheezy bronchitis in the first degree relatives of asthmatics was significantly higher than in the relatives of normal controls.⁴

This study shows that cross-sectionally, pet-ownership was associated with a

higher prevalence of respiratory symptoms such as asthma, chronic cough, chronic wheeze, allergic rhinitis, and eczema, as suggested in some previous studies.^{14,15}

Overall, our study confirms previous findings,^{3,12,13} suggesting a strong similarity between children with asthma and wheezy bronchitis with regard to their family histories of these two allergic disorders. Our study also suggests that these two allergic disorders share a common genetic defect in the Saudi population. However, the exact mode of inheritance has yet to be determined.

ACKNOWLEDGEMENTS

We would like to thank King Abdulaziz City for Science and Technology for their financial assistance. This research was supported by funds provided by the KACST (project AR-7-45).

REFERENCES

- Williams HE, McNicol KN. Prevalence, natural history and relationship of wheezy bronchitis and asthma in children. An epidemiological study. *Br Med J* 1969; 4 : 321-325.
- Foucard T. The wheezy child. *Acta Paediatr Scand* 1985; 74 : 172-178.
- Sibbald B, Horn MEC, Gregg I. A family study of genetics of asthma and wheezy bronchitis. *Arch Dis Child* 1980; 55 : 354-357.
- Sibbald B, Horn MEC, Brain EA et al. Genetic factors in childhood asthma. *Thorax* 1980; 35 : 671-674.
- Aberg N, Engstrom I, Lindberg U. Allergic diseases in Swedish school children. *Acta Paediatr Scand* 1989; 78 : 246-252.
- Aberg N, Engstrom I. Natural history of allergic diseases in children. *Acta Paediatr Scand* 1990; 79 : 206-211.
- Emanuel MB. Hay fever, a post industrial revolution epidemic. *Clinic Allergy* 1988; 18 : 295-304.
- Perkin JN. Allergy in general practice. *Practitioner* 1972; 208 : 776-783.
- Blair H. Incidence of asthma, hay fever and eczema in an East London group practice. *Allergy* 1974; 4 : 389-399.
- Pederson PA, Weeke ER. Asthma and allergic rhinitis in the same patients. *Allergy* 1983; 38 : 25-29.
- Bener A, Al-Jawadi TQ, Simsek M et al. Heredity of asthma in Saudi population. *Eur J Epidemiology* 1992; 8 : 733-736.
- Leigh D, Marley E. *Bronchial Asthma. A Genetic Population and Psychiatric Study.* Oxford : Pergamon Press. 1967.
- Edfors-Lubs ML. Allergy in 7000 twin pairs. *Acta Allergol* 1971; 26 : 249-285.
- Lopes da Mata P, Charpin D, Vervoyet D. Allergy to pets. *Aerobiologia* 1990; 6 : 87-92.
- Brunekreef B, Groot B, Hoek G. Pets, allergy and respiratory symptoms in children. *Int J Epidemiol* 1992; 21 : 338-342.
- Peat JK, Woolcock AJ, Leeder SR et al. Asthma and bronchitis in Sydney school children. *Am J Epidemiol* 1980; 111 : 721-727.
- SAS Users Guide. SAS Institute : Statistics SAS Institute, Cary, NC. 1985.
- Matthews DE, Farewell VT. *Using and understanding Medical Statistics*, Second Revised ed. Karger, Basel, 1988.
- Lebowitz MD, Holberg CJ, Martinez FD. A longitudinal study of risk factors in asthma and chronic bronchitis in childhood. *Eur J Epidemiol* 1990; 6 : 341-347.
- Taussig LM, Smith SM, Blumenfeld R. Chronic bronchitis in childhood : What is it? *Pediatrics* 1981; 67 : 1-5.
- Leeder SR, Corkhill RT, Irwing LM. Influence of family factors on asthma

and wheezing during the first five years of life. *Br J Prev Soc Med* 1976; 30 : 213-218.

22. Taussing L, Lebowitz M. Cough and wheeze syndromes in children (Abstract). *Am Rev Respir Dis* 1976; 45 : 113-114.

CHILD MORTALITY RATES* : 1985 TO 1989 SRS ESTIMATES

States	1985	1986	1987	1988	1989
Andhra Pradesh	29.0	29.1	27.0	27.0	21.8
Assam	43.1	40.4	36.2	37.2	29.6
Bihar	48.5	43.3	40.0	38.0	32.8
Gujarat	37.3	37.4	33.3	30.9	29.2
Haryana	29.8	29.1	28.1	29.4	24.1
Himachal Pradesh	26.5	27.1	22.3	23.7	19.3
Jammu & Kashmir	30.4	29.0	20.1	25.0	19.6
Karnataka	24.7	24.5	25.1	24.1	25.7
Kerala	10.2	8.1	7.6	7.7	6.1
Madhya Pradesh	53.3	50.0	49.5	51.0	43.0
Maharashtra	23.3	20.6	21.1	22.3	18.0
Orissa	46.2	43.9	47.6	37.2	39.7
Punjab	26.3	24.1	20.4	21.4	21.9
Rajasthan	45.5	41.4	40.5	51.8	35.6
Tamil Nadu	25.6	25.1	23.2	21.4	20.6
Uttar Pradesh	54.0	54.3	52.0	46.7	41.3
West Bengal	27.3	25.6	24.3	22.4	21.9
India	38.4	36.6	35.2	33.3	29.9

* No of deaths of children in the 0-4 age group per one thousand population in the same age group

Modified from:

CSSM Review June 1993; 6 : 6.