

## PASSIVE SMOKING EFFECTS ON WHEEZY BRONCHITIS

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Previous epidemiological studies have associated parental smoking with an increased incidence of lower respiratory illness and bronchial asthma. The aim of the present study was to investigate the association between parental smoking habits and diagnosed wheezy bronchitis in schoolchildren in Saudi Arabia. In a cross-sectional study 3,041 schoolchildren ages seven to 12 years were randomly selected in Dammam, Jeddah, and Riyadh; representing three different geoclimatic regions of Saudi Arabia. Standardized questionnaires were used in our study. The results showed that paternal smoking had a significant effect on the frequency of wheezing when paternal and maternal smoking were considered separately. There was no considerable variation in the parental smoking habits in three areas. The association between passive smoking and diagnosed wheezy bronchitis and frequency of wheezing attacks was highly significant ( $P < 0.0001$ ). Overall, the results tend to confirm that there is a real effect of passive smoking on the respiratory health of children and that parental smoking is a risk factor for wheezy bronchitis in children. *Ann Saudi Med* 1993;13(3):222-225.

Epidemiological research evidence from different parts of the world has stressed the hazards of cigarette smoking as an important factor in the cause of respiratory symptoms in children and adults [1-4]. Passive smoking is associated with increased prevalence and severity of asthma and wheezy bronchitis in children [2-8] and increased respiratory illness and incidence of bronchitis in infants [9,10].

Among the harmful effects postulated for passive smoking is an association between parental smoking and bronchial asthma, wheezing, dry cough, and other respiratory symptoms in children [11-16]. Effects of parental smoking have also been detected in schoolchildren. The most important risk factor for the development of chronic respiratory symptoms, childhood asthma, chronic cough, and wheezing is cigarette smoking [17,18]. Studies in schoolchildren have shown a significant association

between parental smoking and the risk of childhood asthma, chronic cough, occurrence of wheeze and respiratory conditions [11-23]. Evidence is accumulating of a relationship between parents smoking and respiratory symptoms in children [24].

The aim of the present investigation was to study the association between passive smoking and diagnosed wheezy bronchitis in Saudi schoolchildren; in addition, to confirm the harmful effects of parental smoking habits on respiratory symptoms in children.

### Material and Methods

The schoolchildren studied were the subjects of a cross-sectional population study conducted in three different regions: Riyadh, Dammam, and Jeddah, cities of the Kingdom of Saudi Arabia, between January 1987 and February 1989. Three regions were chosen because they represented three various geoclimatic regions of Saudi Arabia: Riyadh, which has a dry climate, is the capital of Saudi Arabia and has a population of 2.5 million; Jeddah, which has a humid climate, is a city of 1.5 million people on the Western coastal region of Saudi Arabia; then Dammam, which has a less humid climate than Jeddah City and has a population of 1 million people on the Eastern coastal region of Saudi Arabia.

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Approval for the study was obtained from the Director of General Education of the Ministry of Education and Medical Ethics Committee of the Faculty of Medicine at the King Saud University in Riyadh. Consent was also obtained from the Regional Director of Education and from individual school principals at selected schools. A signed consent was obtained from a parent of each child prior to this study.

We adopted standardized questionnaires to determine the effects of passive smoking on the prevalence and severity of wheezy bronchitis in Saudi Arabia [25,26]. A cluster sampling technique was performed in this study. A stratification allowed each region and school to be proportionally represented. A standardized questionnaire along with a letter of explanation was distributed among randomly selected students in which each student had the same chance of being selected in three cities. The study was carried out during the spring season. The questionnaire was completed by the students' parents with the help of senior medical students under the supervision of co-investigators and one clinician. The questionnaires and administrative team were the same in all three areas. A total of 3,300 Saudi schoolchildren between the ages of seven and 12 years were recruited in this study to submit details on 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, etc), parental smoking habits (separately and overall) and cigarette consumption at home by parents per day.

Children with a positive response to any of the three questions of wheeze, exercise wheeze, or dry night cough were classified as having "respiratory symptoms." In addition to the question concerning diagnosed asthma, other questions referred to age of

onset at which asthma was first diagnosed, the period since the last attack and the number of asthmatic attacks or wheezing during the previous 12 months. Also, at the time of the study, a questionnaire and consent forms were checked for thoroughness and the children were asked whether they had used any medication for asthma during the last 24 hours or whether they had a cold during the past week; replies were recorded on the questionnaire.

Data were analyzed on the IBM computer of the College of Medicine at the King Saud University. The statistical package program SAS was used to calculate chi-square values to assess statistical significance from contingency tables [27,28].

## Results

In the population study, questionnaires with a letter of explanation were distributed to the parents of 3,300 children. Parents of 3,041 children (93.3%) gave consent for study. There was no difference in the consent rate in the three cities (Dammam, Jeddah, and Riyadh). The age and sex distribution were identical and the distribution of social status was not significantly different in the three cities. The age range of the children studied was seven to 12 years with a mean of 9.32 years; 56% males and 44% females in Dammam; 47% males and 53% females in Riyadh, and 47% males and 53% females in Jeddah. Also, there were no significant differences in area of residence.

Table 1 shows the prevalence of children's wheeze related to parental smoking. As can be noted from this table, parental smoking had a significant effect on the frequency of children's wheeze when maternal and paternal smoking were considered separately and where both parents were smokers or neither parent smoked.

TABLE 1. Percentage of children reporting frequent wheeze related to parental smoking.

Parental smoking habits	Dammam Sample=918		Jeddah Sample=1035		Riyadh Sample=1088	
	Number	(%)	Number	(%)	Number	(%)
Father only	75	( 8)	144	(14)	103	( 9)
Mother only	21	( 2)	45	( 4)	39	( 4)
Both parents	14	( 2)	28	( 3)	21	( 2)
Neither parents	808	(88)	818	(79)	922	(85)

TABLE 2. Prevalence of wheezing among children who never smoked reporting frequent wheezing attacks (>1/month) and infrequent attacks (<4/year) related to parental smoking.\*

Parental habit (either or both)	Frequent wheeze attacks		Infrequent wheeze or no attacks	
	n	(%)	n	(%)
Yes	303	( 82)	187	( 7)
No	67	( 18)	2484	( 93)
Total	370	(100)	2671	(100)

\*Significant differences determined by the chi-square method; chi-square=1342.9; df=1;  $P<0.0001$ .

TABLE 3. Number of cigarettes smoked by both parents at home/day.

No. cigarettes smoked/day	Father		Mother	
	No.	(%)	No.	(%)
<5 cigarettes/day	759	( 25)	430	( 14)
10 cigarettes/day	250	( 8)	170	( 6)
About 20 or more cigarettes/day	54	( 2)	63	( 2)
Non-smoker	1978	( 65)	2378	( 78)
Total	3041	(100)	3041	(100)

Chi-square=143.69; df=3df;  $P<0.0001$ .

Table 2 denotes the prevalence of wheeze among children who have never smoked reporting frequent wheeze attacks related to parental smoking when compared with wheezy children with infrequent or no attacks. Those with infrequent wheeze attacks or no attacks were considered to be asymptomatic. The expected relationship between wheezy attacks in children and parental smoking habits appeared to be very significant. The effect of smoking on wheezing was highly significant ( $P<0.0001$ ). An overall incidence of positive respiratory symptomatic groups was about 15.5% and its incidence among both parents smoking or either of them against symptomatic subjects among non-smoking parents.

Table 3 shows the distribution of cigarettes smoked per day by both parents, (fathers and mothers) at home in Saudi Arabia. As can be seen from Table 3, there is considerable variation in parental smoking habits. We found considerable statistically significant differences between father and mother smoking habits and the consumption of cigarettes smoked at home ( $P<0.0001$ ).

## Discussion

The present study revealed that there was no significant variation in parental smoking habits between the three regions. The study showed that paternal smoking had more influence on children's wheeze than maternal smoking. A higher proportion of non-smoking mothers is perhaps related to culture since religion does not consider it less distasteful or unlawful for men to smoke.

However, a few studies have included all four symptoms of wheeze, cough, asthma and bronchitis [18,24]. In this study we have included all four symptoms of wheeze, cough, asthma, and bronchitis. Apart from the prime question of whether passive smoking causes any harmful effects to children of primary school age, the nature of the effects being a secondary consideration, the symptoms are not a manifestation of distinct disease. Analysis of single symptoms may fail to detect a real increase in the prevalence of respiratory ailments. In particular, an effect of passive smoking on asthma may be missed if only a question about asthma is included due to underdiagnosis in many children with wheezes [29].

No data were available on active smoking by the children as the questionnaire was completed by a parent. However, even in the oldest age group, and on the assumption that smoking by the child is strongly associated with parental smoking, the prevalence of active smoking would be too small to account for the differences in the prevalence of respiratory symptoms.

In this study, a statistical analysis showed a number of statistically significant associations between respiratory conditions in children and parental smoking. Other studies have also found significant associations between persistent cough and parental smoking [2,13,22] between bronchial asthma and parental smoking [6,8, 11,12,14,15,17,23,24]. Our demonstration that passive smoking significantly affects wheezy bronchitis is consistent with results obtained in a representative survey of schoolchildren in different parts of the world [1,6,11,17,18,25]. Overall, the present investigation reconfirms a potential relationship between passive cigarette smoking and wheezy bronchitis in Saudi schoolchildren.

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### References

- Jarvis MJ, Russell MAH, Feyerabend C, et al. Passive exposure to tobacco smoke: Salvia Brit. nicotine concentrations in a representative population sample of non-smoking schoolchildren. *Br Med J* 1985;291:927-9.
- Lebowitz MD, Burows B. Respiratory symptoms related to smoking habits of family adults. *Chest* 1976;69:48-50.
- Bonham GS, Wilson RW. Children's health in families with cigarette smokers. *Am J Public Health* 1981;71:290-3.
- Harlap S, Davies AM. Infant admissions to hospital and maternal smoking. *Lancet* 1974;1:529-32.
- Ware JH, Dockery DW, Spiro A, et al. Passive smoking, gas cooking and respiratory health of children living in six cities. *Am Rev Respir Dis* 1984;129:366-74.
- Burchfiel CM, Higgins MW, Keller JB, et al. Passive smoking in childhood: respiratory conditions and pulmonary function in Tecumseh, Michigan, USA. *Am Rev Respir Dis* 1986;133:966-73.
- Vedal S, Schenker MB, Samet JM, et al. Risk factors for childhood respiratory disease: analysis of pulmonary function. *Am Rev Respir Dis* 1984;130:187-92.
- Tager IB, Weiss ST, Rosner B, Speizer FE. Effect of parental cigarette smoking on the pulmonary function of children. *Am J Epidemiol* 1979;110:15-26.
- Ferguson DM, Horwood LJ, Shannon FT. Parental smoking and respiratory illness in infancy. *Arch Dis Child* 1980;55:358-61.
- Liard R, Perdrizet S, Reinert P. Wheezing bronchitis in infants and parents' smoking habits. *Lancet* 1982;(2):334-5.
- O'Connor GT, Weiss TS, Tager IB, et al. The effect of passive smoking on pulmonary function and non-specific bronchial responsiveness in a population-based sample of children and young adults. *Am Rev Respir Dis* 1987;135:800-4.
- Bland M, Bewley BR, Pollard V, Banks MH. Effects of children's and parents' smoking on respiratory symptoms. *Arch Dis Childhood* 1978;53:100-5.
- Colley JRT, Holland WW, Corkhill RT. Influence of passive smoking and bronchitis in early childhood. *Lancet* 1974;2:1031-4.
- Wiedemann HP, Mahler DA, Loke J, et al. Acute effects of passive smoking on lung function and airway reactivity in asthmatic subjects. *Chest* 1986;89:180-5.
- Dahms TE, Bolin JF, Salvin RG. Passive smoking and the seasonal difference of severity of asthma in children. *Chest* 1981;80:530-4.
- Murray AB, Morrison BJ. Passive smoking and the seasonal difference of severity of asthma in children. *Chest* 1988;94:701-8.
- Gortmaker SL, Walker DK, Jacobs FH, Rugh-Ross H. Parental smoking and risk of childhood asthma. *Am J Public Health* 1982;72:574-9.
- Somerville SM, Rona RJ, Chin S. Passive smoking and respiratory conditions in primary schoolchildren. *J Epidemiol Community Health* 1988;42:105-10.
- Charlton A. Children's cough related to parental smoking. *Br Med J* 1984;288:1647-9.
- Weiss ST, Tager IB, Speizer FE, Rosner B. Persistent wheeze: its relation to respiratory illness, cigarette smoking and level of pulmonary function in a population sample of children. *Am Rev Respir Dis* 1980;122:697-707.
- Tager IB. "Passive Smoking" and respiratory health in children - sophistry of cause for concern. *Am Rev Respir Dis* 1986;133:959-61.
- Dodge R. The effects of indoor pollution on Arizona children. *Arch Environ Health* 1982;37:151-5.
- O'Connell EJ, Logan GB. Parental smoking in childhood asthma. *Ann Allergy* 1974;32:142-5.
- Bener A, Al-Frayh AR, Al-Jawadi TQ. Parental smoking and the risk of childhood asthma. *J Asthma* 1991;28:281-6.
- Peat JK, Woolcock AJ, Leeder SR, Blackburn CRB. Asthma and bronchitis in Sydney schoolchildren. *Am J Epidemiol* 1980;111:721-7.
- Salome CM, Peat JK, Britton WJ, Woolcock AJ. Bronchial hyperresponsiveness in two populations of Australian schoolchildren. *Clin Allergy* 1987;17:271-300.
- SAS Institute. SAS User's Guide. Statistics SAS Institute, Cary, NC, USA, 1985.
- Matthews DE, Farewell VT. Using and understanding medical statistics. 2nd ed. S. Karger, Basel: 1988.
- Anderson HR, Bailey PA, Cooper JS, et al. Medical care of asthma and wheezing illness in children: a community survey. *J Epidemiol Community Health* 1983;37:180-6.