

Prevalence of Bronchial Asthma and Allergic Rhinitis in School Girls in Delhi

Raj Kumar, Pankaj Singhal, Ankit Jain, Neelima Raj

Department of Respiratory Medicine, Vallabhbhai Patel Chest Institute, University of Delhi, Delhi – 110007, INDIA

Abstract

The present study was aimed to determine the prevalence of childhood asthma and rhinitis in girl's school children in Delhi and to establish the relationship between various factors associated with the disease. It was a questionnaire based study where 2300 validated questionnaires were distributed among the students of a girls school in Delhi, and collected duly completed by their parents at home for 2139 (93%) children aged 4-17 years. Overall 25.38% (543) children were found to have some form of respiratory allergy, either bronchial asthma or allergic rhinitis. On the total, 14.72% children gave history of wheezing at one or the other time in their life. The prevalence of bronchial asthma and allergic rhinitis was found to be 8.78% and 21.27%, respectively. The patients of allergic rhinitis (21.97%) had co-existent bronchial asthma and 53.19% of bronchial asthma patients have co-existent allergic rhinitis. The prevalence of allergic rhinitis increased with increasing age. Birth order and family income did not have any significant impact except that bronchial asthma was more common in very poor socioeconomic group of the patients. The students with family history of allergic rhinitis or bronchial asthma had significantly higher ($p < 0.05$) incidence of respiratory allergic disease. In conclusion, the prevalence of bronchial asthma and allergic rhinitis was found to be 8.78% and 21.27%, respectively in girls during childhood.

Keywords: Prevalence, Bronchial asthma, Allergic rhinitis, Wheezing.

INTRODUCTION

There have been a growing number of reports that the prevalence of asthma and allergic rhinitis has increased over the last 3 decades¹⁻³. Prevalence rates particularly for asthma may be influenced by variability in the questionnaires used for diagnostic purpose in

various studies. Despite the difficulties, the weight of evidence support that the frequency of allergic conditions is increasing worldwide⁴⁻⁵. Respiratory allergic diseases like allergic rhinitis and bronchial asthma are the most common chronic illnesses of childhood. There have been few epidemiologic studies in India on children^{6,7,8} but this is the first survey conducted exclusively in schoolgirls in Delhi. Numerous epidemiologic studies have been conducted in various countries and there is a large body of literature on the subject^{9,10,11}. However, it is very difficult to compare the results of the studies done at

Address for correspondence: Dr. Raj Kumar, Q-7, Type-IV, Patel Chest Flats, Maurice Nagar, Delhi University Campus, Delhi-110007, India

E-mail: rajkumar27563@yahoo.co.in

IJAAI, 2008, XXII (2) p 99-104.

different times or in different places due to absence of a standard questionnaire in various studies.

The present study has been aimed to determine the prevalence of childhood asthma and rhinitis in schoolgirls in Delhi and to establish the relationship between various factors associated with the disease.

MATERIALS AND METHODS

In order to determine the prevalence of respiratory allergy in 4-17 years old schoolgirls, we distributed 2300 questionnaire to be completed by their parents at home. Prior to this a preliminary study was done in the same school, where 100 questionnaires were distributed to the students. The purpose of the study was to determine the sensitivity and the specificity of the questions used in the study and to ensure that the language of questions was understandable. The final form of the questionnaire was pre-tested for its validity and reproducibility. The sensitivity of the questionnaire was 92% (true positive rate) and specificity was 94.4%. The false negative rate was 8% while the false positive rate was 5.6%. The response to the key questions on receiving had very good reproducibility which was measured by Kappa. Questions that were included in the study for diagnosis of bronchial asthma and allergic rhinitis were derived from the ATS, BMRC and ISSAC questionnaire^{12,13,14}.

The present study was carried out in a girl school located in Delhi. A questionnaire was developed in English on the lines of ATS 6, BMRC 7 and ISSAC 8 questionnaires to detect the presence of symptoms suggestive of asthma. The questionnaire was bilingual i.e. English and Hindi. It has 3 parts, where Part A

recorded information regarding educational studies, family size, parent's income and other. Part B contains symptoms suggestive of asthma and Part C contained questions related to family history of asthma, fuel used in house, smoking history in family and the criteria 9 was followed for classifying the subjects into different groups e.g. current asthma, probable asthma, past asthmatic and non asthmatic.

The questionnaire was distributed to all the children in every class of the schoolboy class teacher in presence of health professional. In all 2300 children received the questionnaire. The questionnaire was taken to home by the children for answering by parents and were returned within 2 days. Of the total, 2139 questionnaire were received duly completed with a overall response of 93%. Effort was made to assess the risk factors like socio-economic status, birth order, age, exposure to environment tobacco smoke, family history of bronchial asthma and allergic rhinitis. Statistical analysis was performed with the SPSS for windows statistics programme.

RESULTS

Out of 2300 questionnaires distributed among school children, 2139 were completed and returned with overall response of 93%. Sensitivity of the questionnaire was 92% (true positive rate) and the specificity (true negative rate) was 94.4%. The false negative rate was 8% while false positive rate was 5.6% The response to the key questions on wheezing had very good reproducibility.

Presentation of various symptoms is summarized in Table 1. Overall 25.38% (543) children were found

Table 1. Presentation of Various Symptoms in school children

Symptoms	N	%
Wheeze Ever	315	14.72
Wheeze in last year	108	5.05
Wheeze after exercise	154	7.19
Wheeze complicating cold	118	5.51
Recurrent colds (Allergic rhinitis)	455	21.27
Bronchial asthma	188	8.78
Bronchial asthma and allergic rhinitis	100	4.67
Respiratory Allergy (B.asthma or A.rhinitis)	543	25.38

to have some form of respiratory allergy, either bronchial asthma or allergic rhinitis. Of the total, 14.72% children gave history of wheezing at one or the other time in their life. The prevalence of bronchial asthma and allergic rhinitis was found to be 8.78% and 21.27%, respectively.

Prevalence of asthma and allergic rhinitis in relation to birth order and family income is presented in Table 2. Prevalence of allergic rhinitis increased significantly ($P<0.05$) in children with more than 10 years of age, whereas prevalence of bronchial asthma is almost similar across different age groups. Birth order has no significant impact on the prevalence of two illnesses. Family income has no significant impact on the prevalence of allergic rhinitis but the prevalence of bronchial asthma was significantly higher in people with poor socio-economic status (monthly income less than Rs.1,000).

The prevalence of asthma was highest in children who were eldest in their family. However, the incidence of asthma was marginally lower in children of higher birth order. Family income did not have any

significant impact on allergic rhinitis. Although, the prevalence of bronchial asthma was significantly higher in students with low socio-economic status (monthly income less than Rs.1,000), but nothing significant can be interpreted, as the number of such students was very low (7 students). Of the total, 21.97% patients of allergic rhinitis had co-existent bronchial asthma whereas 53.19% bronchial asthma patients had co-existent allergic rhinitis and 37.26% of such patients had their disease exacerbated by an attack of common cold.

Effect of family history of smoking on bronchial asthma rhinitis, hypertension in the two groups as compared to control is presented in Table 3. Both groups have almost similar number of positive family history with regard to asthma, allergic rhinitis and environmental tobacco smoke exposure. Presence of a smoker in the family is more common in the students suffering from allergic rhinitis or bronchial asthma as compared to controls but the difference was not statistically significant. However, the students with history of allergic rhinitis or bronchial asthma had

Table 2. Prevalence of Allergic rhinitis and Bronchial asthma in school children

Age groups	Controls		Allergic rhinitis		Bronchial asthma	
	N	%	N	%	N	%
4-9(857)	661	77.12	135	15.75	78	9.10
10-14(899)	649	72.19	221	24.58*	78	8.67
15-17(312)	212	67.94	89	28.52*	26	8.33
Birth order						
1(1002)	727	72.55	224	22.35	97	9.68
2(666)	500	75.05	139	20.87	49	7.35
3(667)	125	74.85	34	20.35	14	8.38
4(41)	31	75.60	7	17.07	3	7.31
5(11)	6	54.54	3	27.27	1	9.09
Family income (Rs.)						
>5000(1442)	1083	75.10	289	20.04	116	8.04
3-5000(427)	302	70.72	109	25.52	41	9.60
1-3000(49)	65	65.65	22	22.22	16	9.58
<1000(50)	35	70.00	11	22.00	7	17.07*

* Statistically significant ($p<0.05$)

Controls = Children without Asthma or Rhinitis

Table 3. Family History of atopic disease(s) in school children

Family history of–	Controls		Allergic rhinitis(455)		Bronchial asthma(188)	
	N	%	N	%	N	%
Smoking	236	15.75	90	19.98	38	20.21
Asthma	127	8.06	73	16.04*	37	19.68*
Allergic rhinitis	189	12.00	138	30.32*	60	31.91*
Hypertension	418	26.53	167	36.70	65	34.57

* Statistically significant ($p < 0.05$)

significantly higher incidence of ($P < 0.05$) respiratory allergic diseases.

DISCUSSION

The recognition of asthma is based on the symptoms which are often regarded as essential objective evidence. Reversibility of obstruction may not always be demonstrable and the poor predictive value of airway hyper-responsiveness due to its presence in persons without asthma coupled with lack of standardization and a lack of consensus on what constituents normally make tool impractical for use in epidemiological studies. The most widely used and reliable method of measuring prevalence of asthma in a population remains properly validated questionnaire. The present study reveals prevalence of asthma in schoolgirls aged 7-14 years to be 8.78%, wheezing in 14.72%, allergic rhinitis in 21.27% whereas 4.67% of schoolgirls had concurrent asthma and rhinitis.

The prevalence of asthma is reported to be in the range of 1-20% in various studies. Vishwanthan et al (1966) reported a current asthma prevalence of 0.2% in children upto 9 years of age from Patna, eastern part of India⁶. A study by Chhabra⁷ shows 11.9% children aged 5-16 years in d Delhi school are current asthmatics whereas past asthmatics were 3.4%. The cumulative prevalence of asthma was 15.3% in these children. Further, studies carried out in many centers suggest that the prevalence of asthma is on rise^{15,16,17}. In another study in children⁸ aged 5-18 yrs, the prevalence of bronchial asthma and allergic rhinitis was found to be 8% and 7.3%, respectively.

In Europe, asthma seems to be most prevalent in Britain¹⁵, where prevalence is reported to be 10%.

The prevalence of rhinitis^{15,16} closely follows asthma but may be higher up to three times. In Melbourne⁹ reported asthma prevalence rate in 7 years old was 24% and the prevalence of wheezing was 26%. The similarity in incidences of these two reported conditions exemplifies the problem poised by different methods of classifying disease. A study at La Serena recorded the prevalence of wheezing in 7 years old to be 26% whereas only 9% was reported to have asthma. The prevalence rate for asthma in 12 years old was reported to be 23% in Melbourne, 6% in St. Gallen and 8% in La Sarena, respectively, whereas the reported¹⁵ prevalence in 15 years old in the three states was 22%, 4% and 7%, respectively.

Asthma and rhinitis are considered having different presentations of same pathology. It has been shown that 25% of patients with allergic rhinitis have co-existent asthma and 66% of bronchial asthma has co-existent rhinitis^{10,11}. In the present study, 22% patients of allergic rhinitis had asthma and 53.19% patients of bronchial asthma had associated rhinitis. A strict comparison of prevalence rate found in present study with those reported from several other countries is difficult because of different methodology used, population difference and different definition of asthma followed to classify the subjects.

The present study reveals that prevalence of asthma is maximum (9.10%) in girls aged 4 9 years. It is marginally lower in girls aged 10-14 (8.67%) and 15-17 (8.33%) years. A study¹⁸ at Turkey reported incidence of asthma to be 10.7% in 5 7 years old, 8.9% in 9 years old, 11.5% in 10 years old and 7.9% in 12 years old. Further, a study¹⁹ at Chicago public school reported asthma prevalence in 6 years old to be 10.8%. On the other hand, the prevalence of

allergic rhinitis shows significant increase as the age increased from 15.75% in 4-9 years age group to 24.58% in 10-14 years age group and 28.5% in 15-17 years age group. This possibly reflects the increased exposure to numerous outdoor allergens with increase in outdoor activity.

Asthma and rhinitis are considered to have multifactorial aetiology. However, family history of atopic disease(s) is recognized as the major risk factor for both asthma and rhinitis^{14,20,21}. It has been reported that the person with a family history of asthma has 3-4 times higher risk of developing asthma²². In the present study, the students with family history of asthma and allergic rhinitis had significantly more prevalence of either bronchial asthma or allergic rhinitis.

Exposure to environmental tobacco smoke has been reported to be a major risk factor for the development of asthma and atopy²³, but few studies have found a link between tobacco smoke and asthma²⁴. The present study reveals that history of exposure to environmental tobacco smoke was significantly more in patients of allergic rhinitis and asthma than controls. Other risk factors that are considered important for development of bronchial asthma or allergic rhinitis are indoor air quality, house dampness, outdoor air pollution, and lifestyle.

CONCLUSION

The prevalence of bronchial asthma and allergic rhinitis in schoolgirls aged 4-17 yrs was found to be 8.78% and 21.27%, respectively, while 14.27% students had a history of wheezing. Also 21.97% patients of allergic rhinitis have co-existent bronchial asthma whereas 53.19% of bronchial asthma patients have co-existent allergic rhinitis.

REFERENCES

- Magnus P, Jaakkola JJK. Secular trend in the occurrence of asthma among children and young adults: critical appraisal of repeated cross sectional surveys. *Br Med J* 1997; **314**: 1975-79.
- Burney PGJ, Chinn S, Rona RJ. Has the prevalence of asthma increased in children? Evidence from the national study of health and growth 1973-86. *Br Med J* 1990; **300**: 1306-10.
- Peat JK, Van den Berg RH, Greer WF, Mellis CM, Leeder SR, Woolcock AJ. Changing prevalence of asthma in Australian children. *Br Med J* 1994; **308**: 1591-96.
- Ninan TK, Russel G. Respiratory symptoms and atopy in Aberdeen schoolchildren evidence from two surveys 25 years apart. *Br Med J* 1992; **304**: 873-75.
- Abeg N. Asthma and allergic rhinitis in Swedish conscripts. *Clin Exp Allergy* 1989; **19**: 50-63.
- Vishwanathan R, Prasad M, Thakur AK, Sinha S P, Prakash N, Mody RK, Singh TRBPN, Prashad S N. Epidemiology of asthma in urban population. A random morbidity survey. *J Indian Med Assoc.* 1966; **46**: 480-483.
- Chhabra SK. Prevalence of Bronchial asthma in schoolchildren in Delhi. *J Asthma* 1998; **35**(3): 291-96.
- Gaur S.N., Sanjay R, Rohtagi A. Prevalence of bronchial asthma and allergic rhinitis among school children in Delhi. *Intern Med J Thai.* 2004; **20**: 8-13.
- Robertson CF, Bishop J, Sennhauser FH et al. International comparison of asthma prevalence in children – Australia, Switzerland, Chile, *Pediatr Pulmonol* 1993; **16**: 219-25.
- Lundback B. Asthma, chronic bronchitis and respiratory symptoms; prevalence and important determinants. The Obstructive Lung Disease in Northern Sweden study I. Umea Univ. Med Dis. 1993.
- Sibbald B, Strachan DP. Epidemiology of rhinitis In: Busse WW, Holgate ST, eds Asthma and rhinitis. Oxford : Blackwell Scientific, 1995; 32-43.
- Ferris BG. Epidemiology standardization project. *Am Rev Respir Dis* 1978; **118**: 1-53.
- Medical Research council – standardized questionnaires on respiratory symptoms. *Br Med J* 1960; **2**: 1665.
- Keil U, Weiland SK, Dubme H, Chambless L. The International study of Asthma and Allergies in childhood (ISAAC): objectives and methods; results from German ISAAC centers concerning traffic density and wheezing and allergic rhinitis. *Toxicol Lett* 1996; **86**: 99-03.
- Burney P, Chinn S, Jarvis D et al. Variations in the prevalence of respiratory symptoms, self-reported asthma attacks, and use of asthma medication in the European Community Respiratory Health Survey (ECRHS). *Eur Respir J* 1996; **9**: 687-95.
- Smith J. Epidemiology. In : Mygind N, Naclerio RM, eds Allergic and non-allergic rhinitis : clinical aspects, 11th ed. Copenhagen: Munksgaard, 1993: 15-21.
- Sibbald B. Epidemiology of allergic rhinitis, In: Burr M. ed. Monograph on epidemiology of allergic disease. Basel: S Karger, 1993; 61-79.
- Ones U, Sapan N, Somer A, Disci R, Salman N, Guler N, Yalem I. Prevalence of childhood asthma in Istanbul., Turkey. *Allergy* 1997; **52**: 570-575.
- Grant N, Daugharty S R, Moy JN, Nelson SG, Provkowsky M, Weiss KB. Prevalence and burden of illness for asthma and related symptoms among kindergartners in Chicago Public Schools. *Ann Allergy Asthma Immunol* 1999; **83**: 113-20.

20. Aberg N, Sundell J, Eriksson B, Heselmar B, Aberg B. Prevalence of allergic diseases in school children in relation to family history, upper respiratory infections and residential characteristics. *Allergy* 1996; **51**: 232-37.
21. Aberg N. Familial occurrence of atopic disease genetic vs. environmental factors. *Clin Exp Allergy* 1993; **23**: 829-34.
22. Ronmark E, Lundback B, Jonson EA, Jonsson AC, Liandstrom M, Sandstrom T. Incidence of asthma in adults – report from the Obstructive Lung Disease in Northern Sweden study, *Allergy* 1997; **52**: 1071-81.
23. Bjorksten B. Risk factors in early childhood for the development of atopic disease. *Allergy* 1994; **49**: 100-07.
24. Kaplan BA, Mascie-Taylor CGN. Biosocial factors in the epidemiology of childhood asthma in a British national sample. *J Epidemiol Community Health* 1985; **39**: 152-6.