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Research Article

Early childhood determinants of bronchial asthma: a cross-sectional study from western Uttar Pradesh

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ABSTRACT

Background: In India, an estimated 57,000 deaths were attributed to Asthma in 2004, and it was seen as one of the leading causes of morbidity and mortality. The range of prevalence of bronchial asthma in children in India varied from 2% to 20%. There has been a constant increase in asthma prevalence worldwide in the last two decades, and the same is being observed in India. The objective was to determine the prevalence of bronchial asthma among children of 5-15 years and its early childhood risk factors in a slum of Meerut.
Methods: A cross-sectional community-based study was conducted by interviewing parents of randomly selected children using the International Study on Allergy and Asthma in Childhood Questionnaire. Assuming the prevalence of bronchial asthma to be 10% at 95% confidence interval and allowing a relative precision of 20% for the estimate, the sample size was calculated as 864. The observations thus obtained were analyzed using relevant statistical methods.
Results: A total of 880 children of 5-15 years participated in the study showing a response rate of 97.02%. The prevalence of asthma was found to be 9.3%. Non breast fed children and more than 3 episodes of lower respiratory tract infections in infancy were found to be associated with bronchial asthma.
Conclusion: The high prevalence of bronchial asthma warrants a national program to reduce the morbidity in children.

Keywords: Bronchial asthma, Children, International Study on Allergy and Asthma in Childhood, Questionnaire

INTRODUCTION

According to World Health Organization (WHO) estimates 300 million people suffer from asthma, 255,000 people died of asthma in 2005 and over 80% of asthma deaths are reported from low and lower-middle income countries.[1] Asthma creates a substantial burden on individuals and families as it is more often under-diagnosed and under-treated.[2]

Pediatric asthma is a serious global health problem. Asthma can considerably impair the child's social interaction and academic achievement. An estimated 1.9 disability-adjusted life year (DALYs) are lost every year due to asthma per thousand children under 15 years of age in India.[3] The increase in the prevalence of asthma in children may have serious implications for adults as 40% of children with infrequent trivial wheeze and 70-90% of those with more troublesome asthma continue to have symptoms in mid-adult life.[4]

The prevalence of asthma varies in different parts of India. The southern states show a higher prevalence (5-10.3%)[5-8] compared with northern states (0.2-4%)[3,9,10] and an overall of 0.89% reported by NFHS 3 data.[11] However Singh et al. (2004)[12] conducted a study in Punjab among children of 5-17 years old, which reported an urban prevalence of 11.92% and a rural prevalence of 13.72 with a weighted average of 12.76%.

Asthma comprises a range of heterogeneous phenotypes that differ in presentation, etiology and pathophysiology. The risk factors for each recognized phenotype of asthma include genetic, environmental and host factors which had played an important role in early childhood.

Asthma is one of the most important chronic diseases of childhood, causing substantial morbidity. Increase in the rates of hospital admission and primary care contacts for asthma in childhood has led to concern regarding prevalence or severity of increasing wheezing illness in children. There is a paucity of studies in India regarding asthma in children; moreover, there are no studies in Uttar Pradesh regarding the treatment modalities adopted by the community. Keeping all the above facts in view, a need was felt to assess the prevalence of bronchial asthma in children with the following objective:

1. To study the prevalence of bronchial asthma among children of 5-15 years, and it's an early childhood risk factors.

METHODS

The present cross-sectional community-based study was conducted in the population registered at the Urban Health Centre Suraj Kund, which is the field practice area of Department of Community Medicine. Assuming the prevalence of bronchial asthma to be 10% at 95% confidence interval (CI) and allowing a relative precision of 20% for the estimate, the sample size was calculated as 864. The final sample size of 907 was arrived by expecting a nonresponse rate of 5%.

The study was conducted in a period of 9 months from December 2010 to September 2011. Every second child was selected using systematic random sampling method. Information was collected by interviewing parents along with their child using International Study on Allergy and Asthma in Childhood Questionnaire.[13]

The data thus collected, was first coded and then transferred to a master chart on Microsoft Excel, from which distribution, as well as co-relation tables, were prepared, analyzed and statistically evaluated by SPSS version 16.0.

Descriptive analysis was performed for all variables. Frequencies and percentages were calculated for categorical variables. The findings were described in terms of proportions and their 95% CI. The early childhood factors associated with bronchial asthma were analyzed by Chi-square and univariate analysis. All the variables with $p < 0.25$ (age of mother at pregnancy, birth weight, breastfeeding and episodes of lower respiratory tract infections [LRTI] in infancy) in Chi-square analysis were included in the multi-nominal logistic model.

RESULTS

During this study, all the required information could be collected for 880 children yielding a response rate of 97%. The baseline characteristics were as follows: Most of the children were in the 5-9 year age group (48.2%) with birth order one (35.3%). The proportion of boys was slightly higher than girls (53.6% vs. 46.4%). Majority were Hindus (99.3%) and most belonged to families with low socio-economic class (50.1%) with a high literacy rate among parents (father 77.1%, mother 74.9%).

The overall prevalence of bronchial asthma was found to be 9.3% (95% CI: 7.4-11.2) among children aged 5-15 year. Boys had a higher prevalence of asthma (12.5%) compared to girls (5.6%) and the male to female ratio for the prevalence was found to be 2.6:1. ($\chi^2 = 12.2$, df = 1, $p < 0.001$). Boys had a higher risk of developing asthma than girls in younger age group.

Young age at conception, absence of breastfeeding, low birth weight and LRTI episodes in Infancy were associated with bronchial asthma. Birth order and type of family were not associated with the occurrence of Bronchial asthma. Multivariate logistic regression showed that the occurrence of LRTI in infancy (odds ratio [OR] = 14.11) and not being breast fed (OR = 59) were independent risk factors for bronchial asthma.

DISCUSSION

In the present study, the overall prevalence of bronchial asthma among children of school going age group was found to be 9.3%. The findings of the study were consistent with Chhabra et al. (1999), Paramesh (2002), Singh et al. (2004), Mistry et al. (2004), Narayana et al. (2010) and Jain et al. (2010) who reported a prevalence of 11.9%, 11.2%, 11.9%, 12.5%, 8.4% and 10.3% respectively.[14] The current study reported a high prevalence of bronchial asthma in males compared to females that is concurring with the existing literature.[15,16]

The association between low birth weight, low maternal age and asthma in the current study was supported by the studies conducted by Svanes et al. (1998).[17] The protective effect of breastfeeding against asthma was also reported by the studies conducted by Kull et al. (2004).[18] A meta-analysis by Gdadevich et al. 2001[19] showed that exclusive breastfeeding for at least 3 months was associated with lower rates of asthma between 2 and 5 years of age. The occurrence of asthma is considerably reduced in breastfed children because the immunological complexity of the breast milk itself is protective against the development of allergies and in sensitizing via different causal pathways. The current study also found that the presence as well as the number of episodes of LRTI in infancy was associated with an increased prevalence of asthma in children. This was supported by the studies conducted by Martinez et al. (1995) [20] and Paramesh (2002).[21]

No association was found between type of family and birth order in the present study which was consistent with the findings of Jain et al. (2010).[3]

Table 1: Early childhood risk factors of bronchial asthma.

Parameter	Total number of children N (%)	Children with asthma N (%)	95% CI	χ^2	*p* value
Age of mother during pregnancy					
>21 years	822 (93.4)	71 (8.6)	6.7-10.6	6.84	<0.01
≤21 years	58 (6.6)	11 (19.0)	8.9-29.1		
Absent	745 (84.7)	60 (8.1)	6.1-10		
Type of family					
Nuclear	552 (62.7)	52 (9.4)	7.0-11.9	0.018	>0.8
Joint or extended	328 (37.3)	30 (9.2)	6.0-12.3		
Exposure to tobacco smoke during pregnancy					
Present	135 (15.3)	22 (16.3)	10.1-22.5	9.19	0.6
Absent	745 (84.7)	60 (8.1)	6.1-10		
Birth order					
1	310 (35.3)	29 (9.4)	6.1-12.6	9.19	0.6
2	287 (32.8)	26 (9.1)	5.7-12.4		
≥3	283 (31.9)	27 (9.5)	6.1-13		
Birth weight					
Normal	714 (81.1)	55 (7.7)	5.7-9.7	11.685	<0.001
Low birth weight	166 (18.9)	27 (16.3)	10.7-21.9		
Breast feeding					
Not breastfed	245 (27.8)	64 (26.1)	20.6-31.6	131.0	<0.001
Breastfed<4 months	86 (9.8)	13 (15.1)	7.5-22.7		
Breastfed≥4 months	549 (62.4)	5 (0.9)	0.1-1.7		
LRTI in infancy					
Absent	781 (88.8)	64 (8.2)	6.3-10.1	16.536	<0.001
<3 episodes	63 (7.1)	8 (12.7)	4.5-20.9		
≥3 episodes	36 (4.1)	10 (27.8)	13.1-42.4		

CI: Confidence interval

Table 2: Early childhood risk factors of bronchial asthma - multiple logistic regression analysis.

Parameter	Wald statistics	OR	OR adjusted	95% CI		p value
Age of mother during pregnancy						
>21 years[R]		0[b]				
≤21 years	3.794	0.986	2.680	0.994	7.226	0.051
Birth weight						
Normal[R]		0[b]				
Low birth weight	1.205	0.320	1.376	0.778	2.435	0.272
Breast feeding						
Not breastfed	57.534	4.081	59.184	20.619	169.878	0.000*
Breastfed<4 months	29.360	3.219	24.993	7.802	80.061	0.000*
Breastfed≥4 months[R]		0[b]				
LRTI in infancy						
Absent[R]		0[b]				
<3 episodes	0.725	0.428	0.652	0.243	1.746	0.394
≥3 episodes	17.953	2.647	14.113	4.148	48.018	0.000*

[R]Reference category, *Statistically significant. CI: Confidence interval, OR: Odds ratio, LRTI: Lower respiratory tract infections

CONCLUSION

The present findings highlight that there is a high prevalence of bronchial asthma among children. The findings of this study suggest that the risk for asthma is partly established early in life. Absence of breast feeding and viral lower respiratory infections may all be involved in the etiology of childhood asthma. Efforts should be taken to alter the modifiable early childhood risk factors to reduce the airway morbidity in children.

Keeping in mind the increasing prevalence, there is also a need to sensitize the planners and the politicians to develop policies and programs for the prevention and management of asthma.

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REFERENCES

1. Braman SS. The global burden of asthma. Chest. 2006;130 1 Suppl:4S-12.
2. Rabe KF, Vermeire PA, Soriano JB, Maier WC. Clinical management of asthma in 1999: the Asthma Insights and Reality in Europe (AIRE) study. Eur Respir J. 2000;16(5):802-7.
3. Jain A, Vinod Bhat H, Acharya D. Prevalence of bronchial asthma in rural Indian children: a cross sectional study from South India. Indian J Pediatr. 2010;77(1):31-5.
4. Juniper EF, Wisniewski ME, Cox FM, Emmett AH, Nielsen KE, O'Byrne PM. Relationship between quality of life and clinical status in asthma: a factor analysis. Eur Respir J. 2004;23(2):287-91.
5. Viswanathan R, Prasad M, Thakur AK, Sinha SP, Prakash N, Mody RK, et al. Epidemiology of asthma in an urban population. A random morbidity survey. J Indian Med Assoc. 1966;46(9):480-3.
6. Gupta D, Aggarwal AN, Kumar R, Jindal SK. Prevalence of bronchial asthma and association with environmental tobacco smoke exposure in adolescent school children in Chandigarh, north India. J Asthma. 2001;38(6):501-7.
7. Awasthi S, Kalra E, Roy S, Awasthi S. Prevalence and risk factors of asthma and wheeze in school-going children in Lucknow, North India. Indian Pediatr. 2004;41(12):1205-10.
8. Singh D, Sobti PC, Arora V, Soni RK. Epidemiologicalal study of asthma in rural children. Indian J Community Med. 2002;27:167-70.
9. Chakravarthy S, Singh RB, Swaminathan S, Venkatesan P. Prevalence of asthma in urban and rural children in Tamil Nadu. Natl Med J India. 2002;15(5):260-3.
10. Narayana PP, Prasanna MP, Narahari SR, Guruprasad AM. Prevalence of asthma in school children in rural India. Ann Thorac Med. 2010;5(2):118-9.
11. Morbidity and Health Care International Institute for Population Sciences (IIPS) and Macro International; National Family Health Survey (NFHS-3), 2005-06: India. Volume. 1. Mumbai: IIPS; 2007: 423.
12. Singh M, Singh SP, Singh K, Bhatia AS, Kajal NC, Aggarwal D, et al. Prevalence of Bronchial Asthma among school children in urban and rural areas. Chest. 2004;126:762S.
13. Worldwide variations in the prevalence of asthma symptoms: the International Study of Asthma and Allergies in Childhood (ISAAC). Eur Respir J. 1998;12:315-35.
14. Agrawal S. Asthma in India. Available at http://www.sancd.org/uploads/pdf/Asthma_factsheet.pdf. Accessed 11-01-2012.
15. de Marco R, Locatelli F, Sunyer J, Burney P. Differences in incidence of reported asthma related to age in men and women. A retrospective analysis of the data of the European Respiratory Health Survey. Am J Respir Crit Care Med. 2000;162(1):68-74.
16. Nicolai T, Illi S, Tenbörg J, Kiess W, Mutius E. Puberty and prognosis of asthma and bronchial hyper-reactivity. Pediatr Allergy Immunol. 2001;12(3):142-8.
17. Svanes C, Omenaas E, Heuch JM, Irgens LM, Gulsvik A. Birth characteristics and asthma symptoms in young adults: results from a population-based cohort study in Norway. Eur Respir J. 1998;12(6):1366-70.
18. Kull I, Almqvist C, Lilja G, Pershagen G, Wickman M. Breast-feeding reduces the risk of asthma during the first 4 years of life. J Allergy Clin Immunol. 2004;114(4):755-60.
19. Gdalevich M, Mimouni D, Mimouni M. Breast-feeding and the risk of bronchial asthma in childhood: a systematic review with meta-analysis of prospective studies. J Pediatr. 2001;139(2):261-6.
20. Martinez FD, Wright AL, Taussig LM, Holberg CJ, Halonen M, Morgan WJ. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. N Engl J Med. 1995;332(3):133-8.
21. Paramesh H. Epidemiology of asthma in India. Indian J Pediatr. 2002;69(4):309-12.

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