

Association between Bronchial asthma and Allergic Rhinitis: A Cross-sectional Study

Dr. Shekhar Sharma¹, Dr. Rambabu Shrama², Dr. Meenakshi Sharma³,
Dr. Mahesh Verma^{4§}

¹Senior Resident, Department of Pediatrics, Medical College, Muzaffarnagar (UP) India

²Professor, Department of Pediatrics, SMS Medical College, Jaipur (Rajasthan) India

³Professor, Department of Physiology, SMS Medical College, Jaipur (Rajasthan) India

⁴Associate Professor, Department of Community Medicine, SMS Medical College, Jaipur (Rajasthan) India

[§]Email of Corresponding Author: verma.drmaresh5@gmail.com

Abstract— *Bronchial Asthma is a public health problem in childhood. Allergic Rhinitis (AR) is a very common co-morbidity with Bronchial Asthma. So this study was conducted on 250 Primary School Children to find prevalence of Bronchial asthma and Allergic Rhinitis and their association. It was observed from this study that 17.2% of children were having Bronchial asthma and 20.4% were found to have allergic Rhinitis. Co morbidity of Bronchial Asthma with Allergic Rhinitis was observed in 11.6 % of these cases. It was also observed that Bronchial Asthma was observed significantly more in males than females and children of walled city than outer city. So it was concluded form this study that chances of occurring Allergic Rhinitis is significantly more with Bronchial Asthma than the chances of Bronchial Asthma with Allergic Rhinitis*

Keywords— *Bronchial Asthma, Allergic Rhinitis, School Children*

I. INTRODUCTION

Asthma is a common long term inflammatory disease of the airways of the lungs.¹ It is characterized by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm.² Symptoms include episodes of wheezing, coughing, chest tightness, and shortness of breath.³ These episodes may occur a few times a day or a few times per week. Depending on the person they may become worse at night or with exercise.¹

Asthma is thought to be caused by a combination of genetic and environmental factors.⁴ Environmental factors include exposure to air pollution and allergens.¹ Other potential triggers include medications such as aspirin and beta blockers.¹ Diagnosis is usually based on the pattern of symptoms, response to therapy over time, and spirometry.⁵ Asthma is classified according to the frequency of symptoms, forced expiratory volume in one second (FEV1), and peak expiratory flow rate.⁶ It may also be classified as atopic or non-atopic where atopy refers to a predisposition toward developing a type 1 hypersensitivity reaction.^{7,8}

Childhood Bronchial Asthma varies widely from country to country. At the age of six to seven years, the prevalence ranges from 4 to 32%. The same range holds good for ages 13 and 14. UK has the highest prevalence of severe Bronchial Asthma in the world.⁹ It has also increased the number of preventable hospital emergency visits and admissions. Apart from being the leading cause of hospitalization for children, it is one of the most important chronic conditions causing elementary school absenteeism.^{10,11} Childhood Bronchial Asthma has multifactor causation. Geographical location,

environmental, racial, as well as factors related to behaviors and life-styles are associated with the disease.^{12,13}

Asthma and allergic rhinitis (AR) co-morbidity refers to the association between asthma and allergic rhinitis. This is due to their physiopathological, epidemiological, and clinical similarities. It is well known that patients with AR have changes in the bronchial mucosa despite the absence of asthma symptoms. Alternatively, patients with asthma have eosinophilic infiltrates in nasal mucosa despite the absence of AR symptoms. The Fact that, asthma and AR are manifestations of the same inflammatory disease affecting the entire airway are further suggested by the clinical improvement of asthma when AR is treated

Epidemiologically, there have been reports – mostly in ambulatory-based studies – showing high prevalence rates of AR in asthmatic patients¹⁴, with rates varying between 30-90%. However, population-based studies on the prevalence rates of asthma/AR co-morbidity are still scarce.

So this study was conducted to in Primary School Children in Dausa City to find out association between Bronchial asthma and Allergic Rhinitis.

II. METHODOLOGY

This cross-sectional study was conducted on Primary School Children to find out association between Bronchial asthma and Allergic Rhinitis in Dausa City (Rajasthan) India.

2.1 Sample Size

Sample size was calculated 233 subject at 95% confidence limit and 20% relative allowable error assuming 30% prevalence of Bronchial asthma in children. So for study purpose 250 Primary School Children were included in this study.

2.2 Study Population

Five schools were selected randomly among Primary Schools having strength more than >50 students. From each of identified school, 10 students were chosen from each of I to V class. These 10 students were also chosen randomly through their roll numbers. Thus from every school 50 children were selected, so total 250 children were included in this survey.

2.3 Study Tools

A predesigned proforma is being used for the study. This **proforma (Annexure 1)** is divided into two parts:

Part I – This part is having introductory data of the children.

Part II –Questionnaire: Pre designed validated questionnaire¹⁵ containing various questions pertaining to asthma and allergic rhinitis were distributed. Students and parents were explained by researcher in detail regarding the questions and how to fill the questionnaire. Questionnaires were filled by parents in case of 6-10 years and by students themselves in children above 10 years. We had different questionnaires for parents and students. The student questionnaire contained 9 questions while the parent questionnaire contained 10 questions. Questions 1 to 7 were related to asthma; we assigned a “1” for each “sometimes” or “a lot” response and add the scores. The total score 3 or more for any student

was considered to have the asthma diagnosis. Questions 8 and 9 were related to allergic conjunctivitis and allergic rhinitis respectively and we assigned a “1” for each “sometimes” or “a lot” response and added the scores. A total score 1 or more was considered to have allergic rhinitis.

Data collected were summaries and analyzed in percentage and proportions on MS Excel.

III. RESULTS

Study population for this study was in the age group of 5year to 11 years with mean age 7.6 ± 2.06 years with slight male preponderance. Majority (66%) of children were from outer city. (Figure 1,2 & 3)

Out of total 250 children surveyed, 43 (17.2%) found to have Bronchial Asthma. (Figure 4).

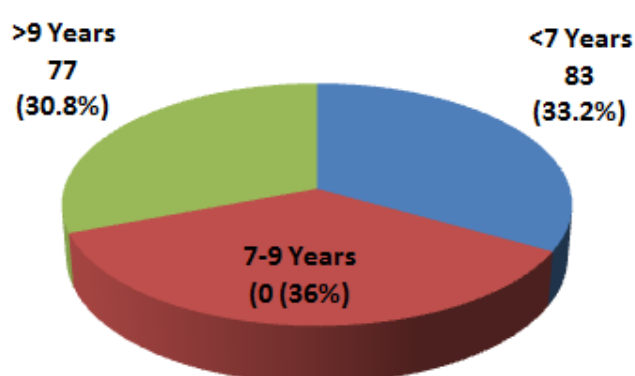


FIGURE 1: AGEWISE DISTRIBUTION OF CHILDREN

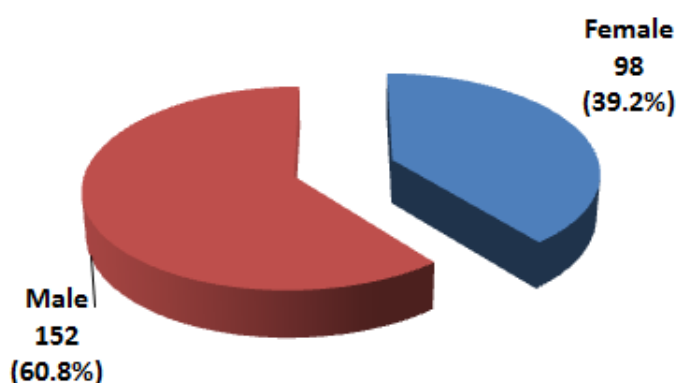


FIGURE 2: SEX WISE DISTRIBUTION OF CHILDREN

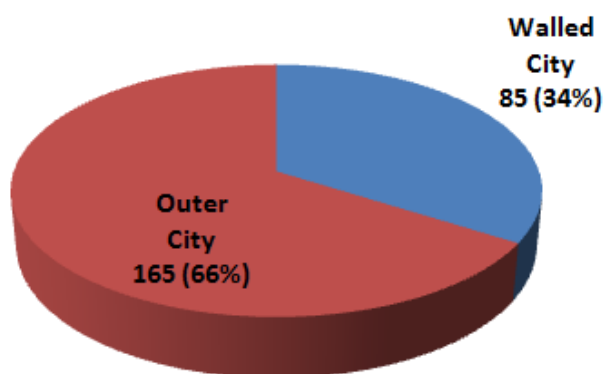


FIGURE 3: RESIDENCE WISE DISTRIBUTION OF CHILDREN

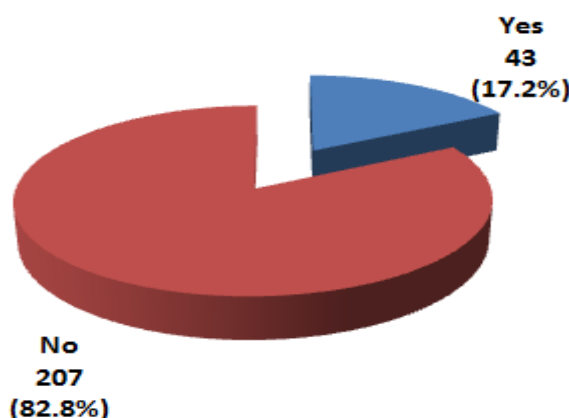


FIGURE 4: PREVELANCE OF BRONCHIL ASHMA IN CHILDREN

When distribution of Bronchial Asthma cases as per age of children was observed it was found that as the age increases proportion of children with Bronchial Asthma decreases but this variation was not found significant ($P > 0.05$). (Table 1)

When distribution of Bronchial Asthma cases was observed as per sex of children it was found that proportion of males with Bronchial Asthma were significantly ($P < 0.05$) more than females. (Table 1)

Likewise when distribution of Bronchial Asthma cases was observed as per residence of children it was found that proportion of children with Bronchial Asthma were significantly ($P < 0.05$) more in walled city than outer city (Table 1).

TABLE NO. 1
SOCIO-DEMOGRAPHIC VARIABLES WISE BRONCHIAL ASTHMA IN STUDY POPULATION (N = 250)

Socio-demographic Variable	Cases		Total Children
	No.	Percentage	
Age Chi-square = 3.018 with 2 degrees of freedom; P = 0.221			
<7 Years	19	22.89	83
7-9 Years	14	15.56	90
>9 Years	10	12.99	77
Sex Chi-square = 6.377 with 1 degree of freedom; P = 0.012			
Female	9	9.18	98
Male	34	22.37	152
Residence Chi-square = 5.925 with 1 degree of freedom; P = 0.015			
Walled City	22	25.88	85
Outer City	21	12.73	165

Age range=5 years to 11 years with mean age 7.6 years

When association between Bronchial Asthma and co morbidity with Allergic Rhinitis was evaluated it was found that it was associated with Rhinitis but when association between Allergic Rhinitis and co morbidity with Bronchial Asthma was evaluated it was found that it was associated with Bronchial Asthma i.e. co morbidity of Allergic Rhinitis is more common with Bronchial Asthma than that of co morbidity of Bronchial Asthma with Allergic Rhinitis. So chances of occurring Allergic Rhinitis is significantly more with Bronchial Asthma than the chances of Bronchial Asthma with Allergic Rhinitis. (Table 2)

TABLE NO. 2
COMPARISON OF DISEASE STATUS AMONG CHILDREN

Diseases	No.	%
Only Allergic Rhinitis	22	8.8
Only Bronchial Asthma	14	5.6
Both above Co-morbidity	29	11.6

Chi-square between Only Bronchial Asthma and Co morbidity with Allergic Rhinitis
= 9.116 with DF 1, P=0.003, LS=**S**

Chi-square between Only Allergic Rhinitis and Co morbidity with Bronchial Asthma
= 1.412 with DF 1, P=0.235, LS=**NS**

IV. DISCUSSION

In the present study, it was found that 17.2% of children were having Bronchial asthma. Out of these 17.2% Bronchial asthma, 11.6% were with Allergic Rhinitis. Other authors had varied experience with prevalence of Bronchial Asthma like B.S. Sharma et al¹⁶ in a cross sectional survey of 3321 school going children (5-15 years) using modified ISAAC questionnaire in Jaipur city showed 7.59% children to have Asthma (2008-2009) but S.N. Gaur et al (2006)¹⁷ in a study of adults showed the prevalence of asthma among rural, urban city and urban slum population of Delhi to be 13.34%, 7.9% and 11.92%, respectively

In this surveyed population of children 20.4% were found to have allergic Rhinitis. Although Sandeep Salvi et al¹⁸ in a study of Prevalence of asthma and allergic diseases in 15,500 school children from Pune and Nagpur showed the prevalence of allergic rhinitis 9.51% in age group of 6-7 years and 12.72% in age group of 13-14 years in Nagpur and S.N. Gaur et al (2006)¹⁷ showed the prevalence of allergic

rhinitis among adult population of Delhi as 11.69% but well comparable observations were made by Abhishek Saini et al (2012)¹⁹ showed the prevalence of Allergic Rhinitis (AR) in school going children 4-18 years (n-1572) in urban area of Jaipur City, Rajasthan to be 33.52%. This may be due to climate of Rajasthan.

In present study Bronchial Asthma cases was observed as per residence of children it was found that proportion of children with Bronchial Asthma were significantly ($P < 0.05$) more in walled city than outer city. Well comparable observations were made by Sandeep Salvi et al¹⁸ in their study showed the prevalence of bronchial asthma 5.7% in age group of 6-7 years and 4.26% in age group of 13-14 years in Nagpur.

Out of these Allergic Rhinitis cases, 56.86% were with Bronchial asthma. So chances of occurring Allergic Rhinitis is significantly more with Bronchial Asthma than the chances of Bronchial Asthma with Allergic Rhinitis (67.44% v/s 56.86%). Abhishek Saini et al (2012)¹⁹ showed the prevalence of Asthma as co-morbidity in children with allergic rhinitis to be 19.16% in Jaipur City and Sibbald B, Rink E et al (1991)²⁰ found asthma 23.0% in adult Rhinitis cases. Present study showed more proportion of co morbidity of Bronchial Asthma with Allergic Rhinitis, that may be either because of difference in social and geographical characteristics or rising prevalence in last few years.

V. CONCLUSION

It was concluded from this study that 17.2% of children were having Bronchial asthma and 20.4% were found to have allergic Rhinitis. Co morbidity of Bronchial Asthma with Allergic Rhinitis was observed in 11.6 % of these cases. It was also concluded that Bronchial Asthma was observed significantly more in males than females and children of walled city than outer city. It was also concluded from this study that chances of occurring Allergic Rhinitis is significantly more with Bronchial Asthma than the chances of Bronchial Asthma with Allergic Rhinitis.

CONFLICT

None declared till date.

REFERENCES

- [1] Asthma Fact sheet N°307". WHO. November 2013. Archived from the original on June 29, 2011. Retrieved 3 March 2016.
- [2] NHLBI Guideline 2007, pp. 11–12
- [3] British Guideline 2009, p. 4
- [4] Martinez FD (2007). "Genes, environments, development and asthma: a reappraisal". *European Respiratory Journal*. **29** (1): 179–84. doi:10.1183/09031936.00087906. PMID 17197483.
- [5] Lemanske, R.F.; Busse, W.W. (February 2010). "Asthma: clinical expression and molecular mechanisms". *J. Allergy Clin. Immunol.* **125** (2 Suppl 2): S95–102. doi:10.1016/j.jaci.2009.10.047. PMC 2853245. PMID 20176271.
- [6] Yawn BP (September 2008). "Factors accounting for asthma variability: achieving optimal symptom control for individual patients". *Primary Care Respiratory Journal*. **17** (3): 138–147. doi:10.3132/pcrj.2008.00004. PMID 18264646. Archived from the original (PDF) on 2010-03-04.
- [7] Kumar, Vinay; Abbas, Abul K; Fausto, Nelson; Aster, Jon, eds. (2010). *Robbins and Cotran pathologic basis of disease* (8th ed.). Saunders. p. 688. ISBN 978-1-4160-3121-5. OCLC 643462931.
- [8] *Stedman's Medical Dictionary* (28 ed.). Lippincott Williams and Wilkins. 2005. ISBN 0-7817-3390-1.
- [9] International study of Bronchial Asthma and allergies in childhood (ISAAC). Worldwide variations in the prevalence of Bronchial Asthma symptoms. *Euro Respir J* 1998;12:315-35
- [10] Reid J, Marciniuk DD, Cockcroft DW. Bronchial Asthma management in the emergency department. *Can Respir J* 2000;7:255-60

- [11] Górkán F, Ece A, Haspolat K, Derman O, Bosnak M. Predictors for multiple hospital admissions in children with Bronchial Asthma. *Can Respir J* 2000;7:163-6
- [12] World Health Organization. Bronchial Asthma: scope of the problem. Available from: <http://www.who.int>. [last cited on 2005 Aug 23].
- [13] Ahmad OB, Lopez AD, Inoue M. The decline in child mortality: a reappraisal. *Bull World Health Organ* 2000;78:1175-91
- [14] Claudia Ribeiro de Andradea, Cássio da Cunha Ibiapinab (2008) Asthma and allergic rhinitis co-morbidity: a cross-sectional questionnaire study on adolescents aged 13-14 years, *Primary Care Respiratory Journal*; 17(4)225-226
- [15] "International pattern of the prevalence of pediatric asthma : The ISAAC program : The pediatric clinics of North America, 50 (2003), 539-553
- [16] B.S. Sharma. Prevalence of Asthma in Urban School Children in Jaipur, Rajasthan *INDIAN PEDIATRICS VOLUME 49*__OCTOBER 16, 2012: 835-36.
- [17] S.N. Gaur et al Prevalence of bronchial asthma and allergic rhinitis among urban and rural adult population of Delhi *Indian J Allergy Asthma Immunol* 2006; 20(2) : 90 - 97
- [18] Sandeep Salvi et al: Prevalence of asthma and allergic diseases in 15,500 school children from Pune and Nagpur **(ISAAC study)**
Presented at National Pulmonary Congress, 2003, Coimbatore.<http://www.crfindia.com/index.php?q=node/19>
- [19] Abhishek Saini et al (2012): Prevalence of Allergic Rhinitis (AR) and its associated co-morbidity in school going children in urban area of Jaipur City Rajasthan.<https://wao.confex.com/wao/wisc12/webprogram/Paper4761.html>
- [20] Sibbald B, Rink E. Epidemiology of seasonal and perennial rhinitis: clinical presentation and medical history. *Thorax* 1991; 46:895-901.