

Research Article

A study on prevalence of bronchial asthma among school children in field practice area of medical college in Central Karnataka

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ABSTRACT

Background: Asthma in childhood is a chronic disease and, when unadorned, often results in augmented morbidity for the enduring and indirect economic fatalities for the community. The predominance of childhood bronchial asthma being amplified in developing countries like India due to rapid urbanization is imposing a challenge to health sector. This study aims to determine the prevalence of bronchial asthma and socio-demographic factors influencing the bronchial asthma among the school children in the field practice area.

Methods: A cross-sectional study was conducted in secondary schools in Davangere district, by utilizing International Study of Asthma and Allergies in Children (ISAAC) questionnaire tool for period of two months. Total of 550 school students were examined from the four schools of Davangere, two belonging to rural field practice area and two belonging to urban field practice area of J.J.M medical college, Davangere by using simple random selection.

Results: On the basis of ISAAC scoring, 25 (4.5%) were found to be the cases of asthma. Boys had a higher prevalence (5.14%) than girls (3.77%). Maximum numbers of positive cases were found at the age of 15 years, 10 (5.37 %) cases. Out of the 25 positive cases, 8 (32%) had wheezing or whistling in the chest in the past 12 months. Among 25 positive cases, from last 12 months, 6 children (24%) had attack of wheezing, maximum number of children had 4-12 times (67%) attack of wheezing.

Conclusions: Our data suggest that the actual prevalence of asthma and other 'wheezy' illnesses may be higher than that previously documented. Further studies are needed to confirm the difference in prevalence between urban and rural children and also to identify possible causes that could account for the higher urban prevalence in Davangere

Keywords: Bronchial asthma, Children, Prevalence, ISAAC, Davangere city

INTRODUCTION

Asthma in childhood is a chronic disease and, when unadorned, often results in augmented morbidity for the enduring and indirect economic fatalities for the community. Geographical location, environmental, ethnicity, as well as dynamics related to behaviours and life-styles are allied with the disease.¹ Asthma is a syndrome characterized by airflow obstruction that

differs strikingly, both instinctively and with treatment. Asthmatics anchorages a distinct type of inflammation in the airways that makes them more receptive than non-asthmatics to a wide assortment of triggers, leading to excessive narrowing with consequent reduced airflow and symptomatic wheezing and dyspnea.³⁻⁶

Narrowing of the airways is usually reversible, but in some patients with chronic asthma there may be an

element of irreversible airflow obstruction. The prevalence of Bronchial Asthma distresses an estimated 4 to 7% of the people worldwide. Childhood bronchial asthma diverges widely from country to country.^{7,8} The predominance of childhood bronchial asthma being amplified in developing countries like India due to rapid urbanization is imposing a challenge to health sector. At the age of six to seven years, the prevalence ranges from 4 to 32%. Same range holds good for ages 13 and 14.^{4,9-12}

It has also amplified 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 imperative chronic conditions instigating rudimentary school absenteeism.¹³⁻¹⁵ Childhood Bronchial Asthma partakes with multifactor causation. Still, there is paucity of epidemiological studies in different parts of India. The purpose of this study to determine prevalence of bronchial asthma and socio demographic factors influencing among school going children aged between 12 to 15 years in Davangere, Karnataka and compare it with that of India and world.

METHODS

A cross-sectional study was conducted in secondary (high) schools in the Davangere district utilizing the International Study of Asthma and Allergies in Children (ISAAC)^{2,3} questionnaire tool for period of two months. A total of 550 high school students were examined from the four schools of Davangere, two belonging to rural field practice area and two belonging to urban field practice area of J.J.M medical college, Davangere by using simple random selection. The high schools studied were Millet high school, Bashanagar and Government high school Bethur road belonging to urban field practice area and Kondovi high school, Kondovi and Government high school, Anaji belonging to rural field practice area. The study criteria includes following consent school going children aged 12 to 15 years and excluded criteria were, those not willing for study, children with pre-

existing congenital heart disease, lung disease and with thoracic cage abnormality. Informed consent was taken from the parents. The chosen subjects were given a (ISSAC) questionnaire to collect data and questionnaires were explained to children before collecting data to reduce the bias of understanding the knowledge of questions. All collected data were tabulated and statistically analysed, descriptive statistics such as mean, SD and percentage were used to present the data. Association between prevalence of asthma and risk factors was analyzed by chi-square test. A p-value less than 0.05 were considered statistically significant. Data was analysed by using software Epi info version 7.0.

RESULTS

A total of 550 children were included in the study, out of which 311 (56.54%) were boys; 239 (43.46%) were girls.

Table 1: Prevalence of asthma according to age groups.

Age (years)	No. of children	No. with asthma	Prevalence	95% CI
12	112	4	3.57%	0.13 - 7.01
13	100	5	5.0%	0.73 - 9.27
14	152	6	3.95%	0.85 - 7.05
15	186	10	5.37%	2.31 - 8.61
Total	550	25	4.5%	

χ^2 for linear trend = 1.86, df = 1, p = 0.12, Mean (SD) age is 13.68 (1.20)

Table 2: Prevalence of asthma according to gender.

Gender	No. of children	No. with asthma	Prevalence	95 % CI
Boys	311	16	5.14%	2.69 - 7.59
Girls	239	9	3.77%	1.36 - 6.18
Total	550	25	4.5%	

Table 3: Risk factor for prevalence of bronchial asthma among high school children.

Risk factor	Category	Number	Positive cases (%)	95% CI	p value
Pet	Cat	63	4 (6.35)	0.33 - 12.37	p>0.05
	Dog	39	1 (2.56)	-2.4 - 7.52	
	Both	20	2 (10)	-3.15 - 23.15	
	No	428	18 (4.21)	2.31 - 6.11	
Exposure smoking	YES	57	3 (5.26)	-0.54 - 11.06	p>0.05
	No	493	22 (4.46)	2.64 - 6.28	
Type of fuel used	Electricity	2	0	-	p<0.001
	Gas & electricity	15	2 (13.33)	-3.87 - 30.53	
	Gas & other source	3	1 (33.3)	-20.03 - 86.63	
	Gas	522	20 (3.83)	2.18 - 5.48	
Mothers education	Open fire	8	2 (25)	-5.01 - 55.01	p>0.05
	Primary	77	4 (5.19)	0.24 - 10.14	
	Secondary	170	4 (2.35)	0.07 - 4.63	
	Others	303	17 (5.61)	3.02 - 8.2	

Overall prevalence of asthma was found to be 4.5%. The mean prevalence was $7.24 \pm \text{SD } 5.42$. The median prevalence was 4.75% (with IQR = 2.65-12.35%). The overall weighted mean prevalence was found to be 2.74. On the basis of ISAAC scoring, 25 (4.5%) were found to be the cases of asthma. Boys had a higher prevalence (5.14%) than girls (3.77%). Maximum numbers of positive cases were found at the age of 15 years, 10 (5.37%) cases. Out of the 25 positive cases, 8 (32%) had wheezing or whistling in the chest in the past 12 months. Among 25 positive cases, from last 12 months, 6 children (24%) had attack of wheezing, maximum number of children had 4-12 times (67%) attack of wheezing. 11 (2%) ever had asthma. In the past 12 months, chest sounded wheezy during or after exercise were 7 (1.27%). 31 (5.64%) had a dry cough at night.

DISCUSSION

In recent years, a preponderance of the researchers are either using a questionnaire suggested by the 50-nation International Study of Bronchial Asthma and Allergy in Children (ISSAC) or the definition of bronchial asthma as modified by the United Kingdom Medical Research Council (MRC). The predictable global prevalence of asthma is 200 million with a mortality of around 0.2 million per year. Although the prevalence is more in developed countries, the developing countries have a higher total burden of the disease due to differences in population. In India, the estimated burden of asthma is believed to be more than 15 million.

The diagnosis of asthma is dependent on the clinical presentation of bronchospasm, fickle airway narrowing, bronchial hyper-responsiveness, airway inflammation, and response to inhaled bronchodilators or corticosteroids. Additionally, spirometry results are often normal, and reversibility to bronchodilators is not unswervingly present. The airway mucosa is infiltrated with activated eosinophils and T lymphocytes, and there is activation of mucosal mast cells. The degree of inflammation is poorly related to disease severity and may be found in atopic patients without asthma symptoms. A characteristic finding is thickening of the basement membrane owed to sub-epithelial collagen deposition. This feature is also found in patients with eosinophilic bronchitis presenting as cough who do not have asthma; it is therefore likely to be a marker of eosinophilic inflammation in the airway, as eosinophils release fibrogenic factors. There is inadequate data on Asthma epidemiology from the developing world, including India.¹⁶ Even though some attempts have been made, studies suffer from several scientific snags including privation of uniformity of methodology and analysis of data (Subbarao et al. 2009).¹⁶ Asthma rates are legitimately low in India, although there is some contemporary evidence that the factual prevalence is higher than previously thought.¹⁷ The total appraised burden of Asthma is an overall prevalence of 3% (30

million patients), and among adults over the age of 15, a median prevalence of 2.4%.¹⁷ In a study from Mumbai, Asthma prevalence in adults aged 20-44 years was reported to be 3.5% using 'clinician diagnosis' and 17% using a very broad definition (which included prior physician diagnosis and/or a positive broncho-provocation test).¹⁸ According to the recently conducted cross sectional nationally representative National Family Health Survey (NFHS)-3, the overall prevalence of asthma among adult men and women in India is similar with 1696 and 1627 per 100000 respectively (IIPS and Macro International 2007).¹⁹ The number of men and women with asthma increases steadily with age. Prevalence of asthma is higher in rural areas (1719 per 100000 for women and 1799 per 100000 for men) than for urban areas and that it is more common among women than men.¹⁷ Asthma among men is more prevalent in the lower wealth quintiles than among the higher wealth quintiles. Moreover, prevalence is highest among those with less than five years of schooling (2283 per 100000 among women and 2640 among men per 100000), & among those with no education (1914 among women per 100000 and 2440 among men per 100000).¹⁸

ISAAC phase one demonstrated for the first time that asthma is by its scale and frequency a global public health problem that includes sub-Saharan Africa where the average prevalence of Asthma in 1995-1996 had already reached 10% of children between 13 and 14 years old living in big cities. ISAAC phase two involved more intensive studies in a smaller number of selected centres. It began in 1998 and has enabled internationally standardised comparisons of disease and relevant risk factors.^{2,3} ISAAC phase three focused on estimations of the trend in the prevalence of asthma, rhino-conjunctivitis and eczema and has highlighted a continuous increase of asthma in almost all of the centres in low- and middle-income countries included in this study.^{2,3}

In a contemporary breakthrough Indian study, the researchers found an unailing association between being exposed to, and having proficient domestic violence, and childhood asthma prevalence in India. In an age-stratified analysis, a strong association was observed in age groups of under-five, 5-14, 15-24, & 25-44 years. Stress induced mechanisms, partially captured through violence and social circumstances may be a missing link in furthering our understanding of the social disparities in asthma.

Our study showed that prevalence of asthma is higher in boys when compared to girls which is similar to the study conducted by Behl RK et al.²⁰ In a study conducted by Shally Awasthi et al.,²³ they found that tertiary education of mother being a risk factor for developing asthma in their children but our study did not find significant association for the same and also significant association between smoking by family members and asthma was not established in our study contrary to the finding by study conducted by Hasnain SM et al.²⁴

Table 4: Prevalence of asthma and demographic factors among school children in different geographical region based on ISAAC questionnaire.

Region	Age & setting	Method	Prevalence	Salient features
Shimla (Behl RK) ²⁰	6-13 years school based	ISAAC Questionnaire	2.30%	Boys had higher prevalence. Association between asthma and family history
Dakshina Kannada district of Karnataka (Narayana PP 2010) ²¹	10-18 years school based	ISAAC Questionnaire	Ever wheezers-8.4% present wheezers-5.2%	Association between hay fever and wheezing
Mangalore (Amimesh 2009) ²²	6-15 years household interview	ISAAC Questionnaire	10.30%	Association with increasing age and family history
Lucknow (Shallyawasthi 2004) ²³	6-7 years and 13-14 years school based	ISAAC Questionnaire	2.3% and 3.3 %	Risk factor-tertiary education of mother, antibiotic use in the first year, eating pasta or meat, exercise once/more per week
Karachi, Pakistan (Hasnain SM 2009) ²⁴	3-16 years school based	Questionnaire used in Saudi Arabia	Diagnosed by physician-15.8%, wheezing-11.7%	Association with smoking by family members and family atopy

CONCLUSION

Due to rapid industrialisation and development in agriculture, exposure to dust and pollens have increased since last one decade in Davangere. Our data suggest that the actual prevalence of asthma and other 'wheezy' illnesses may be higher than that previously documented. Further studies are needed to confirm the difference in prevalence between urban and rural children and also to identify possible causes that could account for the higher urban prevalence in Davangere.

Limitations of the study

Wide differences in samples, primary outcome variables, lack of consistency in age category, rural-urban variation, criteria for positive diagnosis, and study instruments confounded the outcome variables in our study.

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