Study of Prevalence of Asthma in School Children in Pune and Its Relation with Family History of Asthma and Allergic Disorders

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Abstract

Objective: To determine prevalence of asthma in Pune and its relation to family history of allergic disease. **Study Design:** Cross-sectional study in two schools of Pune. **Method:** International Study of Asthma and Allergy in Childhood (ISAAC) based questionnaire was administered to 815 parents of students of 2 selected schools between ages of 5-15 years. Responses were analyzed and children with history suggestive of asthma were examined, investigated at a tertiary teaching hospital. **Results:** prevalence of asthma was 6.13%. Prevalence in males was 6.36% and in females was 8.05% (p= 0.639). Prevalence in English medium school was 7.36% as compared to Marathi medium school of 3.8%. Family history of asthma and allergic disease had strong association with asthma. PEFR at time of enrolment was decreased in many children irrespective of symptoms. **Conclusion:** Prevalence of asthma was 6.13%. Family history is strong determinant of asthma. **Keywords:** Asthma Prevalence, Family History, PEFR Correlation.

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INTRODUCTION

The most common chronic respiratory disorder of childhood is Asthma . It is characterized by airway hyper responsiveness with airway inflammation. Asthma is more common in children (8.6 %) than adults (7.4 %). (1) . Allergic rhinitis, Atopic dermatitis , food or inhalant allergy ,family history of asthma, is common risk factors for persistent asthma. (1). Atopy is the alone largest risk factor for development of asthma. Nearly 80% of atopic individuals develop asthma, allergic rhinitis, eczema or urticarial. (2). Atopy has been associated with increased risk of persistent and severe asthma as shown in several studies. Allergen provocation can induce bronchial inflammation. Children who developed early sensitization to food or aero antigen and had eczema are at high risk for developing persistent asthma. (3)Asthma is a global health care problem, with increasing prevalence being observed over last few decades. (1). Prevalence of asthma in developing countries is significantly different from developed countries. In India, prevalence varies widely due to the vast size of the country, variable population density, variable climate, variable pollution levels and variable life style. (4)ISAAC, largest study determining prevalence of asthma had showed prevalence

of asthma in Pune of 2.9% in 2003 (5). In recent study of 2012, study conducted in Pune suggested an increase in prevalence of asthma from 2.9% to 6.7%. (4.) This study defined asthma from history provided in questionnaire and no clinical examination was done to confirm the diagnosis. To substantiate this observation after confirming the diagnosis with examination, this study was planned. PEFR was performed as a marker of lung function.

METHODOLOGY

It was a cross sectional study done in 815 children (5-15 yrs.), from two urban schools (English medium and Marathi medium each). Questionnaire - adopted from International Study of Asthma and Allergy in Childhood (ISAAC). It contains 11 questions pertaining to the diagnosis and risk factors of asthma. This questionnaire was adapted from ISAAC phase 1 and phase 2 with slight modification (questions indicating severity of asthma were excluded) and were printed in both English and Marathi. The Marathi questionnaire was a pre validated translation. Questions were answered as either Yes or No. After permission from school authority, and clearance from local ethics committee, questionnaires were distributed to 1718 children. Explanation of each question was provided in the form. Questionnaire was to be answered by parents. After 2 reminders, 815 children returned the form (47.43%). Questionnaires were analysed and 62 out of 815 who answered yes for any question in section B were shortlisted as probable asthmatic and were evaluated at a tertiary teaching hospital in Pune. Detailed history and examination, PEFR was done. Out of these 62 children, 50 children were found to be asthmatic and they were included in the study and analysed. Asthma in this population was defined as per the ISAAC study criteria . Data was collected ,compiled which then evaluated using Statistical Package for Social Sciences (SPSS) software. Chi square, p test were used for determining statistical significance.

RESULTS

In this study 815 children were studied. Male to female ratio was 1.38 (male-57.9%, female -42.1%). Age wise distribution showed that 28.22% of children were in 5-8yrs age group, 33.12 % children in 9-11yrs age group and 38.65% children in 12-15 yrs. age group. 368 children were from Marathi medium (45.15 %) and 447 were from English medium schools (54.85 %).(Table-1).Overall Prevalence of asthma in our study was 6.13 %. Prevalence of asthma in age group of 5-8yrs (6.96%) was more than that in age group 9-11 yrs. (6.29%) and in age group 12-15 yrs. (5.39%). This difference was not statistically significant. In this study, overall male predominance was observed in the children with asthma. Prevalence of asthma in male children was 6.36%. Prevalence of asthma in female children was 5.83 %. In age group 5-8 yrs. 7.6% female had asthma as compared to 6.52% males. In age group 9-11 yrs. and 12-15 yrs. male predominance was observed (6.53% vs 5.83% and 6.0% vs 5.83%) respectively .(table-2). Out of 62 children labelled as probable asthmatics, 50 children were diagnosed as asthmatic after clinical evaluation. Out of 50 children, 30 were male and20 were female. Family history of asthma and allergic diseases was present in 30 (60%), either asthma or allergic diseases in 17 (34%), and no family history of either in 3 (6%). Family history of asthma is an important predisposing factor in asthmatic children. In our study, 11.05% (90 out of 815) of cohort had family history of asthma, while 62% (31 out of 50) of asthmatic children had positive family history. This difference was statistically highly significant ($X\hat{}2 = 175.9$, $p < 0.0001$) (Table-3). More number of children with decrease PEFR had family history of asthma. 58.06% (18/31) of children with family history of asthma had decreased PEFR as compared to 52.6 % (10/19) children without family history of asthma. This difference was statistically not significant (p: 0.70).(Table-4).In children with decreased PEFR it was found that 64.3% had positive family history of Asthma, 35.7% had no such history. Family history of other allergic diseases besides asthma also has significant association with prevalence of asthma. In this study 7.36% (60/815) of children had positive family history of allergic diseases. 56 % (28/50) of asthmatics had history of allergic disease in their family except asthma. This was highly significant ($p < 0.005$). (table-3)In children who do not have family history of allergic diseases 57.1% (16/28) had decreased PEFR. While in children who do not have family history of allergic disease 54.5 % (12/22) had decreased PEFR. (P: 0.85).Of asthmatic children 58% had history of atopic diseases. 56% of these had decrease in PEFR. In this study 8.05% (36 out of 447) of English medium students suffered from asthma as compared to 3.8% (14 out of368)

of students studying in Marathi medium. This was significant($p<0.05$) (table-1). Decrease in PEFR was seen in 58.3% of English medium students as compared to 50% in Marathi medium students($p> 0.05$).

DISCUSSION

Asthma is chronic childhood disease with increasing prevalence over past decades. Environmental factors and genetic factors are contributing for the same. Pune is one of the most rapidly growing cities of India. In Pune, prevalence reported in 2004 by ISAAC phase 3 was 2.9%. While a study by Maria Cheraghi et. al. in 2009 and 2012 showed a prevalence of 5.4% and 6.7% respectively. (4).There was an increase in the prevalence of asthma by 130%in a decade. These were questionnaire based studies, where diagnosis of probable asthma was done by analysis of response sent by parents. The diagnosis was not confirmed by clinical examination. Prevalence of Asthma in present study was 6.13% .In our study, prevalence of asthma in age group 5-8 yrs. was 6.96%, in age group 9-11 yrs. was 6.29% and in age group 12-15 yrs. was 5.39%. A similar age wise prevalence of asthma of 7% among 6-7 yrs. old and 6.3 % amongst 13-14 yrs. olds was reported from Pune .(4).An Iranian study by HadiBazzazi et al found prevalence of 7% in children aged 12-13 yrs. (6).As compared to 2012 Pune study, there was no increase in prevalence of asthma in our study. Unlike previous study,we had taken a detailed history and done examination and investigations of 62 probable asthmatics diagnosed by the questionnaire. We excluded 12 probable asthmatics as on examination we could not confirm the diagnosis of asthma in them .In spite of excluding 12 probable asthmatics from 62 probable asthmatics the prevalence of asthma in this study was 6.13% .We found male predominance in asthmatics. Prevalence of asthma in males was 6.36% and females were 5.83%. Male to female ratio was 1:1.5 .Most of the studies have reported male predominance in prevalence of asthma. (7,8,9).Jain *et.al.* considered that to increase bronchial responsiveness in males. (10).S. K. Chhabra reported prevalence of 12% in males as compared to 11.2% in females. (8).Similarly Renata Gontijo et. al .reported prevalence of 8.1% and 6.1% respectively in males and females. (11).In our study 11.5% of children in cohort of 815 had family history of asthma. While in asthmatic group 62% children had family history of asthma. This correlation was highly significant ($p< 0.0001$). Similar strong relationship between family history of asthma and asthma has been reported previously. (8,10).First detailed study for asthma inheritance was conducted by Cook and Vander Veer in year 1916 . They came to conclusion that familial association was due to genetic component. (7,12). In this study we found strong association between family history of allergic diseases and asthma. 7.36 % of 815 children had family history of allergic disorder, while 56% of asthmatic had family history of allergic disorders. Anzhela V. Glushkovaet .al.found that family history of allergic disease had highly significant association with prevalence of asthma in children. (13). Hadi Bazzaziet. al. that 30.2% of asthmatic children had family history of allergic disorders with strong association between family history of allergic disorders and asthma. (6)PEFR was performed at the time of confirmation of diagnosis. This was a baseline PEFR irrespective of the clinical symptoms. Hence the difference in PEFR value was not significant in children with predisposing factor and children without them.Out of 28 children with family history of allergic disorders 57.1 % had decreased PEFR as compared to 42.9% of children with no family history of allergic disorders. 58.06% of children with family history of asthma had decrease in PEFR as compared to 41.9% of children In children who do not have family history of ashtma. We discovered that children who had both family history of asthma and family history of allergic disease had higher incidence of low PEFR as compared to those who had either or none. This may indicate higher chance of asthma being triggered by minor triggers in these children. Prevalence of asthma was 8.05% in students of English medium school, and was 3.8% in students of Marathi medium school. Children from

Marathi medium were from lower socioeconomic class as they were from government school and were from an area away from the city. Students from English medium were from a private school located in the crowded area of city. Dr Strachan's theory that children in larger families were exposed to more infection , resulting in healthier immune system that were less likely to mistake harmless substances for allergen . A similar difference of 7.3%and 5.8 % in private and public schools respectively was reported by Maria Cheraghi *et.al.* (4).They stated that this was because students of private schools were from higher socioeconomic class as compared to public schools catering to lower socioeconomic class.The strength of this study was that after screening using ISAAC, probable asthmatics were examined and investigated. Children not confirming to

diagnosis of asthma were not included. PEFR was performed in all asthmatic children, which was not the feature of other studies. Doing study in two schools was the limitation.

Conclusion :-

Prevalence of asthma was 6.13%. Family history is strong determinant of asthma. Socioeconomic difference can be contributory to the manifestation of asthma .We feel that more schools should be screened in this manner to get better representation of prevalence in the city. Such studies should be done at regular intervals so that trends in burden of disease can be determined and preventive methods be implemented. Future studies correlating air quality and life style with asthma is required for prevention planning.

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Table No.1- Demographic Data of Study Population

		Cohort	Asthma	p value
		N=815	N=50	
Age (years)	5-8	230 (28.22%)	16 (32%)	0.7483
	9-11	270 (33.12%)	17 (34%)	
	12-15	315 (38.65%)	17 (34%)	
Sex	Male	472 (57.91%)	30 (60%)	0.7578
	Female	343 (42.08%)	20 (40%)	
	Male : Female	1.38 :1	1.5 :1	
Medium of education	Marathi	368 (45.15%)	14 (28%)	0.01188
	English	447 (54.85%)	36 (72%)	

Table No.2 Prevalence of Asthma

Age (years)	Male	Male	Male	p value	Female	Female	Female	p value	Total	Total
	Total	Asthmatic	Prevalence		Total	Asthmatic	Prevalence		Total	Asthmatic
5-8	138	9	6.52%	0.9810	92	7	7.60%	0.6122	230	16
9-11	153	10	6.53%		117	7	5.98%		270	17
12-15	181	11	6.08%		134	6	4.48%		315	17
Total	472	30	6.36%		343	20	5.83%		815	50

Table No.3- Risk Factors for Asthma

	Cohort	Asthma	P value
	N=815	N=50	
Family history of asthma	90 (11.05%)	31 (62%)	P<0.0001
Family history of allergic disorder	60 (7.36%)	28 (56%)	P<0.0001

Table No.4 – Association of Risk Factors for Asthma& PEFR

	LOW PEFR	NORMAL PEFR	P value
	28	22	
Family history of asthma	18 (64.3%)	13 (59.1%)	0.7072

	LOW PEFR	NORMAL PEFR	P value
No Family history of asthma	10 (35.7%)	9 (40.9%)	
Family history of allergic disease	16 (57.1%)	12 (54.5%)	0.8543
No Family history of allergic disease	12 (42.9%)	10 (45.5%)	
Medium of Education: English	21 (75%)	15 (68.18%)	0.5940
Medium of Education: Marathi	7 (25%)	7 (31.81%)	

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