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Prevalence of childhood asthma in rural school children of Chandrapur, Maharashtra

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Abstract

Background and Objectives: Childhood asthma is a major clinical concern worldwide and represents a huge burden on families and societies. According to WHO, asthma is the most common chronic disease in children and is recognized as a disease of major public health importance. The prevalence of asthma symptoms varies from 1.6% to 36.8%. Asthma remains under-diagnosed in general practice and hence a more active approach to the detection and assessment of asthma is called for. With this background the present study was conducted to estimate the prevalence of childhood asthma in rural school children of Chandrapur district in Maharashtra.

Methods: The sample comprised of 905 school children. Information was collected by interview technique, using predesigned and pretested proforma based on ISAAC questionnaire from children in class V-X and from parents of children in class I-IV after obtaining informed consent. Asthma was diagnosed on the basis of scores obtained in ISSAC questionnaire. Score ≥ 5 was diagnostic for students < 10 years and score ≥ 6 was diagnostic for students ≥ 10 years.

Results: Out of 905 school children, 539 (59.6%) were boys and 366 (40.4%) were girls. Mean age of school children was 11.06 ± 3.08 yrs (5 yrs -19 yrs). Prevalence of childhood asthma based on ISAAC Questionnaire was 9.94%. It was 11.31% in males while 7.92% in females. ($P= 0.09$).

Conclusion: The prevalence of childhood asthma among rural school children is quite high.

Keywords: asthma, children, ISAAC, questionnaire, rural, school, score

Introduction

"When I have an asthma attack I feel like a fish taken out of water."

As expressed by a six year old child suffering from childhood asthma.

Childhood asthma is a major clinical concern worldwide and represents a huge burden on families and societies^[1]. Until recently, there was scarce epidemiological data available on asthma, which made it difficult to evaluate the impact of this disease, as well as to establish strategies to control it. This scenario has changed after the International Study of Asthma and Allergies in Childhood (ISAAC), a landmark study in the epidemiology of asthma worldwide^[2]. The results of this study have shown the prevalence of asthma symptoms to vary from 1.6% to 36.8%^[3].

Asthma remains under-diagnosed in general practice. Many children do not have their symptoms reported to a doctor and others have significant delays in diagnosis. A more active approach to the detection and assessment of asthma is called for that is able to mesh easily into busy general practices. Standardized written questionnaires of ISAAC, used in epidemiological studies are considered valid methods for understanding the prevalence variations^[4].

There are very few studies on the prevalence of asthma in Indian children particularly in central India and more so in rural areas. Hence, this cross sectional study was conducted on school children in one rural private school situated 30 km from Chandrapur city. The objective of the study was to determine the prevalence of childhood asthma in school children.

Methodology

Approval from the Institutional Ethics Committee was obtained. A private school was selected purposively for feasibility reasons. The necessary permission for carrying out the

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study was obtained from the Principal of the school after apprising her about the nature and the purpose of the study.

Sampling

The school had 1630 students on roll of which 964(59.1%) were boys and 666 (40.9%) were girls, the ratio of boys: girls being 6:4. As required sample size for this study was 864, in phase 1 by systematic random sampling method out of 1630 every alternate student was selected. The 815 students thus selected were categorized as n1. Rest of the 49 study subjects (864-815=49) were to be selected from the remaining students. In order to maintain proportionate representation from each class (30 classes in all, 3 section of each standard I to X) 3 students (2 boys & 1 girl) from each class were drawn by simple random sampling (lottery method). So in this phase 2 the number of subjects selected were 90 which constituted n2. In this way final sample size was $n=n_1+n_2=815+90=905$ of which 539 were boys and 366 were girls representing the 6:4 ratio of boys and girls as that present in the school.

The data of was collected in two parts.

- From students of V-X Std.
- From parents of students in I-IV Std.

Information was collected by interview technique, using predesigned and pretested proforma based on ISAAC questionnaire. Video of wheezing (ISAAC) was played for the students and parents to enhance their understanding of the questionnaire and prevent false interpretations.

Asthma was diagnosed on the basis of scores obtained in ISSAC questionnaire (which was included in the proforma).

Score ≥ 5 was diagnostic for students <10 years and score ≥ 6 was diagnostic for students ≥ 10 years.

Students V-X STD

Verbal consent was obtained after explaining the nature and the purpose of the study. In order to seek their maximum co-operation, the data was collected during school hours, in a separate room, at suitable timings convenient to both students as well as the teachers. Help of the class teachers was taken to extract information from the students. Every student was enquired about presenting complaints in detail. After interview they were subjected to thorough clinical examination which was carried out in separate classroom provided by school authorities. Female students were examined in the presence of a lady teacher. The school record was used to crosscheck some of the information provided by the students. (eg date of birth, religion, home address etc.) Students who were unable to answer some questions or were doubtful about something were asked to verify and get the corrected information from their parents on the subsequent day. Each student required 15-20 min.

About 15-20 students were interviewed in a day.

Parents of students in I-IV Std.

The complete address and phone number of the students was taken from school records. Each student's house was visited to gather information from the parents by interview technique. After explaining the nature and purpose of the study, verbal consent from the parents was taken and their co-operation was sought. Clinical examination with special reference to respiratory system was done in front of parents. Each student required 20-30 min. About 15-20 students were interviewed in a day.

Descriptive statistics (percentage, mean, standard deviation, range) were used to summarize baseline characteristics age and gender of the study subjects. Data was analyzed using STATA- 8 statistical software.

Results

Mean age of school children was 11.06 ± 3.08 yrs (5 yrs -19 yrs).

Table 1: Responses to ISSAC core questionnaire

Sr. no	Variable	School children	
		Number (n=905)	Percentage
1	Wheeze ever	84	9.3
2	Wheeze in the past 12 months	49	5.4
3	1-3 attacks of wheeze in the past 12 months	19	2.1
4	Sleep disturbance from wheeze 1 or more nights a week in the past 12months	6	0.7
5	Speech limited by wheeze in the past 12 months	27	3.0
6	Asthma ever	40	4.4
7	Wheeze during or after exercise in the past 12 months	53	5.9
8	Night cough in the past 12 months	110	12.2

Responses to ISSAC core questionnaire are seen in table 1.

Prevalence of wheeze ever was 9.3% and that of wheeze in the past 12 months was 5.4%. 1-3 attacks of wheeze; sleep disturbance from wheeze for 1 or more nights a week and speech limited by wheeze in the past 12 months were reported by 2.1%, 0.7% and 3% of school children respectively.

Table 2: Shows Age and gender wise prevalence of asthma. Prevalence of childhood asthma based on ISAAC Questionnaire was 9. 94% (95% CI: 9.92-9.96). In males it was 11.31% while in females it was 7.92%. This difference was not statistically significant ($P= 0.09$). There were total 40 known cases of childhood asthma of which 7 were asymptomatic at the time of survey. In this study 57 school children were newly diagnosed to have childhood asthma.

Table 2: Age and gender wise prevalence of asthma*

Age group in years	School children							
	Male			Female			Total	
	Number	Questionnaire diagnosed asthma	Percentage	Number	Questionnaire diagnosed asthma	Percentage	Number	Questionnaire diagnosed asthma
<7	56	9	16.07	41	5	12.19	97	14
7-10	154	21	13.63	111	7	6.30	265	30
10-13	159	16	10.06	112	8	7.14	271	24
13-16	139	10	7.19	91	5	5.49	230	15
>16	31	5	16.12	11	2	18.18	42	7
Total	539	61	11.31	366	29	7.92	905	90
								9.94

*As diagnosed by ISSAC questionnaire

Male: Chi square =5.40 df =4 P=0.24; Female: Chi square =3.94 df=4 P=0.41 Total: Chi square =8.23 df=4 P=0.09

Discussion

Asthma is one of the principle chronic childhood diseases presenting increasing mortality rates responsible for a great number of hospitalizations and resulting in high social costs [2].

Since pathologic conformation of asthma had a high cost and wasn't available for epidemiological studies, the clinical definition of asthma was used for such studies. In order to make definitions as uniform as possible the ISAAC questionnaire was introduced [5]. ISAAC standardized a questionnaire written specifically for allergic diseases in children and adolescents, which permits both prevalence evaluation and epidemiological data comparison over time in a single location and among different populations [4]. Even the World Allergy Organization has reported that "use of ISAAC questionnaire is a major step toward overcoming barriers to the world wide diagnosis and treatment of asthma [6].

In response to ISAAC questionnaire (table1), the results were comparable with the findings of ISAAC phase III data from Nagpur Centre of ISAAC in Central India under Dr. Sundeep Salvi as the principle investigator [7].

Prevalence of asthma in school children in this study was found to be 9.94% (95% CI: 9.92-9.96). Epidemiological studies have shown that the prevalence of bronchial asthma varies from country to country and region to region within the country. The present study showed that almost 1 out of every 10 school children living in study area had ever had asthma. Similar results were obtained in study conducted by Animesh Jain *et al.* [8] in a cross sectional community based study in rural children in south India (10.3%). This prevalence was also consistent with the findings of Smita Pakhale *et al.* [9] on school children in a rural region in Malegaon (10.7%). Evidence from the ISAAC study also showed that the distribution of childhood asthma varies between global populations from less than 2% to approximately 33% of the populations [10]. The proportion of Indian school children suffering from bronchial asthma has increased to more than a double in the last 10 years and reached the highest level ever [10]. There was low prevalence of bronchial asthma (1-3.3%) in the children surveyed in Akola, Pune, and Mumbai¹¹, while in Delhi the prevalence of bronchial asthma was 11.6% [10]. The variability in the prevalence may be related to differences in environmental factors, climate, racial composition, health facilities. Global warming has also got important role to play in the upsurge of allergic disorder worldwide over the last three decades. Increased temperature and carbon dioxide increases the production of pollens and fungal spores that could exacerbate symptoms of allergic diseases. There is also some evidence of significantly stronger allergenicity in pollen at increased temperature [12].

Chandrapur is a forested district and is known for rising pollution and extreme temperatures in recent years. This may be reason for increased prevalence of asthma in this area. Out of 539 males 61(11.31%) and out of 366 females 29(7.92%) had childhood asthma. There was no statistically significant difference in prevalence of childhood asthma in males and females. The prevalence of childhood asthma was more in boys than girls in studies by A. P. Uyan *et al.* [13], D. Al-Ghamdi *et al.* [14], Ms. Maria Cheraghi *et al.* [15], Lau YL *et al.* [16] and Leung R *et al.* [17].

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