Prevalence of Bronchial Asthma in Rural Indian Children: A Cross Sectional Study From EASTERN INDIA, BIHAR

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ABSTRACT
Objective: To determine the prevalence and to study the socio-demographic correlates of bronchial asthma among children aged 6-15 yr in the rural field practice area of the department of Pediatrics, JLNMC, BHAGALPUR.

Methods. This is a cross sectional community based study conducted by interviewing the parents of randomly selected 559 children in the age group of 6 – 15 yr using an International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire.

Results. The prevalence of bronchial asthma was found to be 10.3%. The prevalence of asthma was higher among boys (12.1%). There was a significant inverse linear trend with increasing age. A statistically significant association of bronchial asthma with family history of asthma was also observed. There was no association of bronchial asthma with socio-economic status or parents’ literacy level.

Conclusion. There is a high prevalence of bronchial asthma among children with a higher prevalence among boys. There were significant inverse linear association with increasing age and also with family history of asthma.

KEYWORDS: bronchial asthma, prevalence

Pediatric asthma is a serious global health problem. It accounts for a large number of lost school days. Furthermore, asthma can considerably impair the child's social interaction and academic achievement. It can affect child's ability to enjoy and partake in activities such as playing a musical instrument and sporting events, and even affect sleep patterns and their academic and career success because of poor school attendance associated with asthma attacks. Childhood asthma can even lead to severe psychosocial disturbances in the family and also places strain on healthcare resources as a result of doctor and hospital visits and the cost of treatment.

There are very few community-based studies on the prevalence of asthma in Indian children particularly more so in rural areas. As there is paucity of data on asthma among children in India, we conducted a community based cross sectional study in rural India to determine the prevalence of asthma symptoms and its socio-demographic correlates among children of school going age (6-15 yr).

MATERIAL AND METHODS
Subjects and Sampling
This study was carried out in the rural field practice area of the Department of Pediatrics, S.Jawaharlal Nehru Medical College, College, BGP department runs seven Rural Child health services to the population. There were 1384 children in the 6-15 yr age group in the study area. Assuming the prevalence of bronchial asthma to be 10% at 95% confidence interval (C.I.) and allowing a relative precision of 20% for the estimate, the sample size was calculated for the finite population size of 1384. This meant that we needed a minimum of 532 children. Expecting a non-response rate of 5%, the sample size was 555 children yielding a response rate of 99.3%. The data about the non-respondents were included only for the baseline characteristics and not during the final analysis. The baseline characteristics were as follows: most of the children were in the 6-9 yr age group (39.5%) with birth order 1 (44.5%). The sex distribution was almost equal (50.5% boys and 49.5% girls). Majority were Hindus (87.1%) and most belonged to families with low socio-economic class (63.3%) with a high literacy rate among parents (father 90.9%, mother 86.6%). The overall prevalence of bronchial asthma was found to be 10.3% (95% C.I. 7.8 - 12.8) among children aged 6-15 yr.

Questionnaire and Interview
A pre tested and validated questionnaire was designed on the lines of International study on Allergy and Asthma in childhood (ISAAC) questionnaire. This was translated into the local language hindi and translated back into English to ensure reliability and validity. A semi-structured proforma containing information regarding the demographics and socio-economic status (SES) of the individual (that was later estimated by the modified Udai-Pareek Scale) was used to collect the data. After obtaining the informed consent, the designated respondent(s) (either of the parents/caretakers) of a child in the particular household was interviewed as per the questionnaire by the investigator (first author) himself. The investigator was guided in locating the respondents by the field Auxiliary Nurse Midwife (ANM) who was familiar with the area and population.

Data Analysis
The collected data were tabulated and analyzed by using the statistical package SPSS (Statistical Package for Social Sciences) version 10.0 for Windows. The findings were described in terms of proportions and their 95% confidence intervals. Univariate analysis was carried out separately for each factor (question). Chi square tests of significance were carried out to test the differences between proportions. To determine the independent effect of various factors on bronchial asthma, Multiple Logistic Regression analysis was performed and their significance was estimated in terms of adjusted Odds Ratio and its 95% confidence interval. Significance was reported at 5% level.

The study was approved by the Institutional Ethics Committee of college.

RESULTS
During this study, all the required information could be collected for 555 children yielding a response rate of 99.3%. The data about the non-respondents were included only for the baseline characteristics and not during the final analysis. The baseline characteristics were as follows: most of the children were in the 6-9 yr age group (39.5%) with birth order 1 (44.5%). The sex distribution was almost equal (50.5% boys and 49.5% girls). Majority were Hindus (87.1%) and most belonged to families with low socio-economic class (63.3%) with a high literacy rate among parents (father 90.9%, mother 86.6%). The overall prevalence of bronchial asthma was found to be 10.3% (95% C.I. 7.8 - 12.8) among children aged 6-15 yr.

Fig. 1. Overall Prevalence of Symptoms and Severity of Asthma in all Children (n=555)

Boys had a higher prevalence of asthma (12.1%) compared to girls (8.4%) and the male to female ratio for prevalence was found to be 1.5:1. This difference though was not statistically significant (z = 2.067, df = 1, p = 0.151). Majority of children surveyed had 1-3 attacks (63.2%) of asthma whereas 36.8% children had 4-12 attacks in the last 12 mo. Among males, 55.9% had 1-3 attacks and 44.1% had 4-12 attacks whereas among females, though the total frequency of attacks was less, 73.9% had only 1-3 attacks and 26.1% had 4-12 attacks of wheezing in the last one year.
The prevalence of asthma was significantly higher among younger age group (14.9% among 6-9 yr) and decreased with increasing age. It was 8.7% among 10-12 year age group and 5.5% among 13-15 yr age group. (-2 for linear trend=9.254, df=2, p=0.00235) (Table 1). Family history of asthma among parents had a strong association with development of asthma in children. The prevalence of asthma was almost thrice (18.8%) among children with a family history of asthma/ allergy compared to that of those without a family history. 

**TABLE 1. Prevalence of Asthma According to Age Groups**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of children surveyed</th>
<th>Number of children with asthma</th>
<th>Prevalence率 of asthma (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td>221</td>
<td>33</td>
<td>14.9 10.2–19.6</td>
</tr>
<tr>
<td>10-12</td>
<td>172</td>
<td>15</td>
<td>8.7 4.5–12.9</td>
</tr>
<tr>
<td>13-15</td>
<td>162</td>
<td>9</td>
<td>5.6 2.0–9.0</td>
</tr>
<tr>
<td>Total</td>
<td>555</td>
<td>57</td>
<td>10.3 7.8–12.8</td>
</tr>
</tbody>
</table>

X2 for linear trend = 9.254 df=2 p=0.00235

The prevalence of current asthma, defined as wheezing within the last 12 mo, 2.6% sleep disturbance and 24.4% prevalence of night cough respectively has been reported in two studies in north India.1,2-3 The prevalence of frequency of more than four episodes in the past 12 mo (3.8%) in our study is similar to that in the study from Chennai. 11 However, the prevalence of wheezing in past 12 mo (10.3%), speech disturbance (2.5%), nocturnal dry cough (4.1%) is less in our study population compared to the figures of 17.7%, 6.8%, 20.7% respectively at Chennai. Nevertheless the prevalence of sleep disturbance (5%) and reduced physical activity (8.3%) is higher in our study compared to that reported by Chakravartiy et all.14 A Turkish study had reported 4.7% wheezing in past 12 mo, 2.6% sleep disturbance and 24.4% prevalence of night cough.15

The gender distribution in our study is consistent with findings by other investigators.11,11,15 Some studies have noted a higher male: female ratio of 1.8:1.15 Though there was no gender difference observed in two earlier studies,1,14 these studies followed a different methodology and the former was carried out a long time ago. The male predominance may be related to a greater degree of bronchial lability in males. More recently, a female preponderance was found, which was attributed to the fact that living in ill-ventilated houses, use of cow-dung cakes and agriculture waste as fuel for cooking and girls always helping the mothers to cook in the kitchen lead to airway inflammation and asthma.15 The inverse linear relationship between bronchial asthma and age that we report is a known phenomenon.1-3. Several studies have reported a strong association between family history of atopic disorders and the prevalence of current asthma as well as total wheezing.1,10,20,24 Though there is a report of no significant association between family history of asthma and asthma in children.15 However, findings of our study are concurrent with the well documented strong association of family history with prevalence of asthma in children. Regarding the association of asthma with socio-economic status of the family, several earlier studies have also shown that family income (SES) was not a significant determinant of asthma; a similar finding was observed by us. There was no significant association between literacy level of parents and prevalence of asthma in children in our study. Similarly no association between father’s literacy status and asthma symptoms in children was seen in a study in Saudi Arabia.20,21

The present study had certain limitations. Though the ISAAC questionnaire9 was developed for 6-7 yr and 13-14 yr old children, we administered it to collect data about children in 6 – 15 yr age group. There may have been respondent or reporting biases due to incorrectly reported symptoms. Last but not least, spirometry or lung function tests could not be performed due to feasibility.

**CONCLUSION:**

The present findings highlight that there is a high prevalence of bronchial asthma among school going children in rural India leading to considerable morbidity. The prevalence of asthma was higher among boys. There were significant inverse linear association with increasing age and also with family history of asthma.

**REFERENCES**


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