Prevalence of Asthma among School Children Belonging to High and Low Socio Economic Status

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Abstract
Background & Objectives: *Asthma is a common chronic respiratory condition mostly starting at childhood. There are studies showing an increase in prevalence of asthma in high socioeconomic group and an increase in asthma severity among low socioeconomic group. As there are very little data on the observed association between asthma and socioeconomic status this study was aimed to find out prevalence of asthma in school children belong to high and low socioeconomic families in Thrissur district.*
Materials & Methods: *This cross sectional observational study was conducted among school children of age 12-15 years in a private and a Government high school in Thrissur district, Kerala, using a semi structured validated ISAAC questionnaire1. With the help of school teachers, the questionnaires were distributed to children and filled up forms were collected and analyzed for respiratory symptoms like wheezing, its severity, and socio economic status. Those with a positive history for asthma were examined and data rechecked. Pulmonary function test was done in those with clinical diagnosis of asthma.*
Results: *Of the 1050 distributed questionnaires 95 were excluded, rest 955 were analyzed. Boys to Girls ratio was 1.01:1. Children belong to each socioeconomic group (according to Modified Kuppuswami Scale) were as follows. Upper class I- 13(1.4%), Middle upper II- 157(16.4%), Middle lower III- 296(31%), Lower upper IV-486(50.8%), Lower class V- 3(0.3%). Prevalence of asthma was 10.4 %. There was 2.1 times of increased risk for asthma among children belong to upper classes I,II compared to lower classes III,IV,V as per this present study (95% CI=1.31-3.35,χ²=9.96,p=0.001). Asthma severity (assessed by nocturnal symptoms, difficulty in speech, sleep disturbing episodes, affecting daily life and school absence) between groups showed a higher trend in lower classes even though it was not found to be statistically significant. Majority (73.9%) had normal pulmonary function. Children from low economic classes, children with more frequent wheezing episodes in last year showed low FEV1. School absenteeism was high (39.3%) in this study and low FEV1 was found to be a risk factor for absenteeism.*
Conclusion: *The overall prevalence of asthma in school children of age group 12-15 years was 10.4%. Prevalence of asthma was higher in the upper socioeconomic class. There was no significant difference in the severity of asthma between upper and lower socioeconomic group. The use of school-based asthma education and disease management to decrease school absenteeism due to asthma should be explored.*
Keywords: *Asthma; School children; Socio economic status; Prevalence; Pulmonary function test.*

Background

Asthma is a common, chronic respiratory disease affecting all age groups but often starts in childhood, characterized by recurrent attacks of shortness of breath, cough, and chest tightness and wheezing. The severity and frequency of

symptoms vary from person to person. The estimates are suggesting that asthma prevalence increases globally by 50% in every decade and currently 300 million people worldwide have asthma[2]. There is limited data on epidemiology from the developing world, including India. Among school children there is a wide variation (4 -19%) in prevalence of asthma from different geographical areas of India and also from time to time[3]. Diagnosing and managing asthma early in children is important because asthma will impair the child's social interaction and academic achievements.

There might be a complex interaction of both hereditary and environmental factors which finally determines the risk for developing asthma in an individual. Genetic predisposition is indicated by family history of atopy or asthma. Urbanization, air pollution and environmental tobacco smoke exposure are also contributing factors in children as in adults[4.] Low birth weight, prematurity, respiratory infections, especially those caused by respiratory syncytial virus, diet and obesity are other risk factors which showed varying influence on asthma[5]. It is important to establish in a predisposed individual, which environmental factors might influence the development of asthma.

Information on the observed association between Asthma and socioeconomic status is still on debate. Earlier studies showed that children belonged to lower economic status have greater morbidity due to asthma, but findings with respect to the prevalence of asthma are mixed. Such results may vary depending upon both how socio economic status and the specific outcome are measured. Poor economic class children are at increased risk for other problems like parental separation, violence, insecurity and instability[6]. All these have been linked to asthma. Not only has the stress of children, stress of parents also been prospectively linked with wheezing in infancy[7].But recent studies are showing increase in prevalence of asthma in high economic groups. The hygiene hypothesis says that exposure of an infant to recurrent infections by many types of

bacteria stimulates the developing immune system towards a non-asthmatic phenotypes. Several studies from Europe supporting hygiene hypothesis reported a lower prevalence of asthma and allergic rhinitis among rural children than in urban[8]. Whether socioeconomic status is not only influencing the prevalence of asthma but also to the expression and severity remains unclear. If hygiene hypothesis holds well, the Asthma prevalence in India may increase further as the economic status of families/society/country improves. More awareness and screening programs to be done among the population who is at risk of developing asthma. So In this background present study in school children about difference in prevalence of asthma in different economic classes in our locality will be much enlightening.

Materials and Methods

After getting approval from the Institutional Ethical Committee a cross sectional observational study was conducted over a period of one year from August 2015 to July 2016. Two schools were randomly selected from a total of 262 high schools in Thrissur district, Kerala. One was an unaided school named J.M.J. English Medium School Athani located in a semi urban area and second was Erumappetty Government Higher Secondary School located in a rural area. This ensured inclusion of children representing all economic classes. A written permission was obtained from principal of each school. All children of age group 12-15years who were present on the appointed day of school visit were enrolled in the study. A Performa containing information regarding the demography and socioeconomic status of the individual and a pre tested, validated ISAAC questionnaire translated to the local language Malayalam were used to collect the data. After proper explanation about the study, with the help of school teachers, the questionnaires were distributed. The students were asked to fill up the questionnaire with the help of parents. Questionnaires which are partially filled up, without consent or not returned with in the

proposed time period were excluded. Filled up questionnaires were collected and analyzed for respiratory symptoms like wheezing, its severity and socio economic status. Modified Kuppu swami scale was used to assess the SES. Children with a positive history of asthma were subjected to verification of data by personal interview in repeated school visits. Clinical examination was done mainly to exclude other possible causes for similar symptoms like major cardiac illness. For consented students spirometry was done.

Ethics

Ethical clearance was obtained from Institutional Ethical Committee Government Medical College, Thrissur, Kerala.

Results

Total number of participants of the study was 955 with a response rate of 90.9%. Majority of them belonged to 13-14 years (60.5%) and almost equal distribution of boys and girls was there (50.3% & 49.7%). Most of the mothers were unemployed (72.3%), or unskilled workers (9.6%). But most of mothers (45.2%) had higher education status than fathers. The distribution of children belonging to each economic class is shown in the table 1. Those belonged to extremes of economic strata both upper and lower were very few (1.45% and 0.3% respectively. >50% of the children belonged to upper lower economic class.

Table 1. Distribution of children in different socio economic class

Socio economic class	No (%)
Upper I	13 (1.4%)
Upper middle II	157 (16.4%)
Lower middle III	296 (31.0%)
Upper lower IV	486 (50.8%)
Lower V	3 (0.4%)
total	955 (100%)

Prevalence of asthma was found to be 10.4% (n=99) (95% CI=8.54%-12.52%). Among them current wheezers were 78 (8.3%). Severity of asthma was also assessed in this study. 17.1% of asthmatics had >4 episodes of wheezing in last year, 15.1% of children with asthma had sleep disturbing attacks >1/week, 15.1% had experie-nced unable to speak due to wheezing. 8% of children were severely affected in their daily activities due to asthma. School absenteeism due to asthma was also found to be higher in the present study (39.3%). 174 (18.2%) had Allergic Rhinitis. Asthma equaling symptoms like exerc-ised intolerance was 49 (5.1%), and nocturnal cough was 81(8.5%) in this whole sample. Among asthmatics 38.3% experienced exercise intolerance and 41.4% had nocturnal cough

Even though >50% of the total study sample were belonged to lower classes IV,V asthma pre valence was found to be higher in upper classes I,II,III(figure 1)

Figure 1. Asthma prevalence in different economic classes
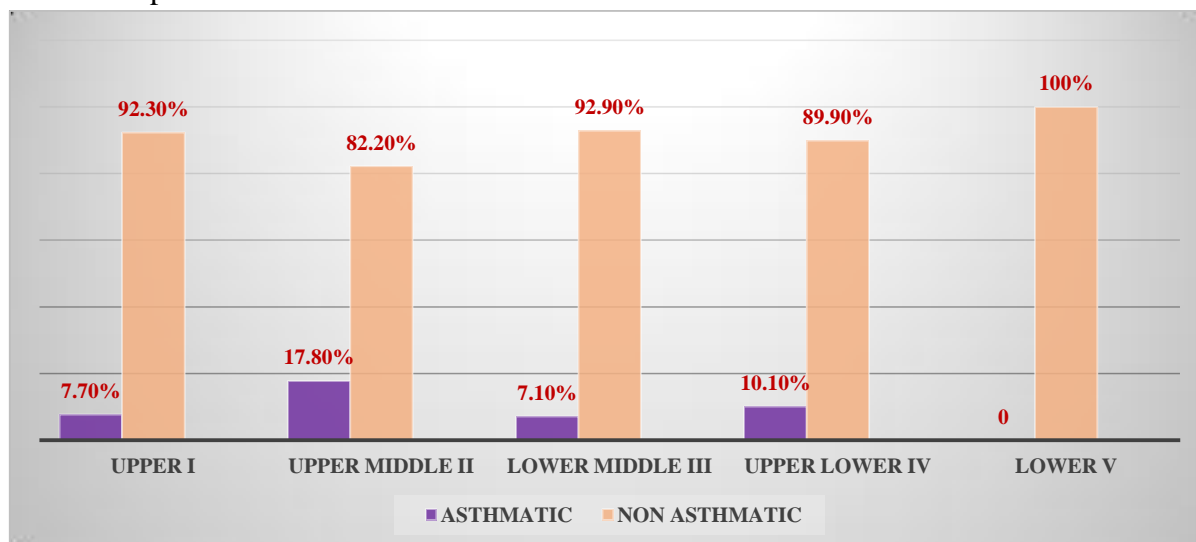
For statistical analysis Kuppu swami socio economic classes I, II were classified into higher economic group and III, IV, V were classified into lower economic group. It was found that socio economic classes I & II having 2.1 times increased risk for asthma prevalence than the lower classes III,IV & V (p=0.001, χ^2=9.96, ODD'S RATIO=2.1, 95% CI=1.31-3.35) (Table 2).

Table 2: Prevalence of Asthma in higher and lower economic groups

Economic Class	Total Frequency N (%)	Asthmatic N (%) (95% CI)	Non Asthmatic N (%) (95% CI)
Higher (I,II)	170 (17.8%)	29 (17.1%) (11.7%-23.6%)	141 (82.9%) (76.4%-88.2%)
Lower (III,IV,V)	785 (82.2%)	70 (8.9%) (7.1%-11.9%)	715 (91.1%) (88.8%-92.9%)

Even though there was high prevalence in high economic group, considering the influence of maternal education status, children whose mothers educated less than 10th standard showed high prevalence of asthma compared to children whose mothers educated more than 10th standard (14.8% Vs 9.58%, OR=1.6, p=0.05).

Severity of asthma in terms of sleep disturbing episodes (20% Vs 3.4%, OR=7,p=0.07); speech disturbance (15.7% Vs 13.7%, OR=1.1,p=0.8); exercise intolerance (44.3% Vs 24.1%, OR=2.4,p=0.06); nocturnal cough (45.7% Vs 31.03%, OR=1.8,p=0.1); affecting daily life (70% Vs 65.5%,OR=1.2,p=0.6); school absenteeism (42.9% Vs 31.03%, OR=1.6,p=0.2) between groups showed a higher trend in lower classes even though it was not found to be statistically significant .

PFT was done in 96 asthmatic children who gave consent. In 73.9 %(n=71) of children with asthma PFT was normal. Only 21.8% of clinically diagnosed asthma had PFT showing obstructive pattern. Others were restrictive or mixed patterns. Lower economic classes showed poor lung function (FEV1 <80%) compared to higher classes (25.5% vs 13.8%). But it was also not found to be a risk factor with statistical significance. It was found that children who were frequent wheezers (>4episodes/last year) had lower lung function (FEV1 <80%) (25% Vs 21.3%, OR=1.2 p=0.7).But due to lesser sample in each group association was not statistically significant. Children with FEV1<80% were found to have more missed school days due to asthma (47.6% Vs 37.3%, OR=1.5). But lower lung function was not found to be risk factor for school absenteeism here (p=0.3)

Discussion

In this study conducted among 955 school children from two schools in Thrissur the prevalence of asthma was found to be 10.4%.This is lower than other studies[9] and higher than most of Indian studies like study by Amir et al[10], Prasad et al[11] etc. Prevalence of adult asthma in the study done in Kerala was 5.4%.Asthma prevalence among school children in the other studies were 8.4- 10.3%. prevalence of current wheezers were found to be higher in the present study 8.3% compared to 5.2-6.1% in previous study[12].

The present study group included two schools one private and one government, so that children from all economic classes could be included in the study. Majority of children belonged to lower middle class and upper lower classes (31%, 50.8% respectively). This is representative of the sociodemographic distribution of Kerala where major population is middle and lower class[13]. But prevalence of asthma was found to be higher among children who belong to Upper socio economic classes I,II than Lower classes III,IV,V (17.06% Vs 8.92%, OR=2.1, p=0.001). It is similar to another recent study by Amir et al were also the prevalence of asthma was highest in upper class (8.2%) and lowest in upper-lower class (5.6%)[(10)]. It is also supporting the hygiene hypothesis. Studies differ in their opinion regarding asthma prevalence in various economic classes.

Data from USA showed asthma prevalence is higher among persons with family income below the poverty level[14]. Poor QOL was also associated with socioeconomic status, with lower scores associated with lower socioeconomic class. Higher family income improves the affordability

of the required treatment, health care services and hence a better QOL[15]. Gupta D et al, in Chandigarh, studied the prevalence of asthma and its association with environmental factors, showed a high prevalence of asthma among the school children in a rural area[16].

Severity of asthma symptoms showed a higher trend in lower economic classes III, IV, V compared to higher economic class I, II even though it was not found to be statistically significant. It may be because of lesser number of children in extremes of economic classes I and V causing p value to be not significant. Study done in Chicago school children also showed severity of asthma symptoms and mortality found to be higher in low economic classes[17]. There is a significant negative correlation between lung function (primarily FEV1 and FVC) and SES shown in studies[18]. In present study also children from low economic classes showed lower FEV1 than upper classes (25.4% Vs 13.8%, OR=2.1, p=0.2). Compared with study done by Ying Ying Meng et al School absenteeism was higher among asthmatics in present study (40.3%) compared to 23% in their study[19]. Lower FEV1 was found to be a risk factor for absenteeism in the present study. Malnutrition was found to be confounding factor with lower FEV1 and absenteeism[(18)] which was not assessed in the present study.

Limitations of the Study

Firstly it was a questionnaire based cross sectional study. Asthma diagnosed was based on clinical assessment. Secondly even though this study tried to include children from all economic classes, numbers from different groups were in different proportions. The nutritional status, and psycho-social stresses in family were not assessed in this study which can act as confounding factors. Logistic regression analysis has not done due to lesser number of samples in each economic class.

Conclusion

The overall prevalence of asthma among school children of age group 12-15 years was 10.4%. Prevalence of asthma was higher in the upper socioeconomic class. There was no statistically significant difference in the severity of asthma between upper and lower socioeconomic group. Most of children with asthma had normal lung function at the time of examination. Asthma prevalence may increase further as the socioeconomic standards of India improves. So the use of school-based asthma education and disease management to decrease school absenteeism due to asthma should be explored.

Acknowledgments

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