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Original Research Article

A clinical study of risk factors for acute severe asthma in children

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ABSTRACT

Background: Asthma is one of the most prevalent diseases worldwide with an estimated 300 million affected children. Acute severe asthma in children is one of the common causes of emergency admissions. There is no much study regarding the risk factors for acute severe asthma in children in India. Hence the present study was conducted to know the risk factors for acute severe asthma in children.
Methods: A prospective observational study of 100 children between the age group of 5 and 18 years who presented with symptoms and signs of acute severe asthma admitted to the pediatric intensive care unit (PICU) of Indira Gandhi Institute of Child Health (IGICH) for a period of 12 months between January 2015 to December 2015 formed the study group. These children were evaluated for the risk factors responsible for acute severe asthma.
Results: A total of 100 children with acute severe asthma were enrolled in the study. The predominant age group was between 5-10 years (68%), the risk factors responsible for acute severe asthma were poor drug compliance (68%), which was statistically significant (p-value <0.0001), exposure to house dust (61%) and smoke (42%) (p <0.0001). There was also marked rise in absolute eosinophil count (62%).
Conclusions: Acute severe asthma in children is one of the common causes of emergency admissions. The present study has shown that poor drug compliance, exposure to house dust and smoke were significant risk factors for acute severe asthma.

Keywords: Acute severe asthma, Children, Risk factors

INTRODUCTION

Asthma is one of the most common chronic respiratory diseases in childhood; it is a chronic inflammatory condition of the lungs and lower airways resulting in episodic airflow obstruction and also one of the leading causes of morbidity in children.

Global prevalence of asthma ranges from 1% to 18% of the population in different countries. The severity of acute attack of asthma can be mild, moderate and severe. Acute severe asthma is currently the most common medical emergency in children and is responsible for nearly half a million admissions to PICU.[1] In the United States, as per 2005 National Center for Health Statistics estimates asthma prevalence of 22.5 million and exacerbations included approximately 2 million emergency room visits and 500,000 hospitalizations over 1 year.[2] A study conducted in Bangalore city among less than 18 years of age showed that Asthma prevalence is increased from the year 1979 (9%) to 1999 (29.5%).[3]

There is no much study regarding the risk factors responsible for acute severe asthma in children in India. Hence, the present study was conducted to know the risk factors for acute severe asthma in children.

METHODS

A prospective observational study was carried out for a period of 12 months from January 2015 to December 2015. The study protocol was approved by the Institutional ethical committee. One hundred children between the age group of 5 to 18 years presenting with symptoms and signs of acute severe asthma as per Global Initiative for Asthma (GINA) guidelines.[4] Children were admitted to PICU of Indira Gandhi Institute of Child Health, Bangalore, formed the study group. Detailed history with regard to risk factors responsible for acute exacerbation and severe attacks of asthma such as treatment history, drug compliance, and exposure to house dust and smoke were recorded in a systematically designed proforma. These children were subjected to routine investigations including absolute eosinophil count, chest X ray, arterial blood gas analysis and electrolytes and were managed as per the standard protocol for acute severe asthma.

Inclusion criteria

All patients in the age group of 5 to 18 years with signs and symptoms of acute severe asthma as per GINA guidelines.

Exclusion criteria

Children less than 5 years of age

Statistical analysis

All data were analyzed with 95% confidence interval. Continuous variables were expressed in terms of mean with standard deviation. Categorical variables were expressed in terms of frequencies and percentages. Associations were calculated between relevant parameters using chi square test for categorical variables and student t test for continuous variables. A probability value of less than 0.05 was considered significant. The data was entered into MS-Excel and analyzed using SPSS software version 20.

RESULTS

A total of 100 children with signs and symptoms of acute severe asthma were enrolled in the study. Majority of the children were between the age group of 5-10 years (n = 68; 68%) as shown in Table 1.

Table 1: Distribution of study subjects according to the age.

Age group	Number of subjects	Percentage
5-10 years	68	68
11-15 years	32	32
15-18 years	10	10
Total	100	100

Males were affected more than females in the ratio of 1.2: 1 as shown in Table 2. Family history of asthma was positive in 60%.

Table 2: Distribution of study subjects according to gender.

Gender	Frequency	Percentage
Female	45	45.0
Male	55	55.0
Total	100	100.0

Poor drug Compliance (n = 68; 68%; p <0.0001) and exposure to house dust (n = 61; 61%; p <0.0001) and smoke (n = 42; 42%; p <0.0001) were found to be significant risk factors for acute severe asthma as shown in Table 3. Raised absolute eosinophil counts (>400 cells/µL) was seen in 62% of children.

Table 3: Distribution of subjects according to Risk factors.

Risk factors	Present	Absent	P Value
Poor drug compliance	68	32	<0.0001
House dust	61	39	<0.0001
Smoke	42	58	<0.0001

DISCUSSION

Across various studies available worldwide, acute severe asthma is currently the most common medical emergency in children and is responsible for nearly half a million admissions to PICU. Current treatments, although helpful, are still unable to prevent childhood asthma exacerbations completely. Table 4 shows the comparison of total number of cases studied with distribution of age and gender.

Table 4: Comparison of cases studied with distribution of age and sex.

Studies	Celedon JC et al	Bijanzadeh et al	Present study
Place	Costa Rica	Mysore	Bangalore
Year	2008-2012	2009-2010	2015
No. of subjects	324	78	100
Age group (years)	5-15	5-18	5-18
Males	193	42	55
Females	131	36	45

In most of the studies, the most common age group of children with acute severe asthma was between 5-15 years and male children were more commonly affected than female children, similar observation noted by Celedón JC et al and Bijanzadeh Mahdi et al.[5,6] This could be due to the fact that children belonging to this

age group are probably more exposed to environmental pollution. Table 5 and Table 6 shows major risk factors for acute severe asthma, acute sudden exposure to house dust (61%) and smoke (42%) were found to be statistically significant (p <0.0001) risk factors for acute severe asthma, similar observation was noticed by Stephen J et al.[7]

Table 5: Risk factors for acute severe asthma.

Studies	Stephen J et al	Present study
House dust	79.1%	61%
Smoke	36%	42%

Table 6: Drug compliance and acute severe asthma.

Studies	Mitchell et al	Present study
Drug Compliance	58%	68%

Poor drug compliance (68%) in the form of sudden stoppage of drugs, improper technique and inadequate dosage was also a significant risk factor (p <0.0001) for acute severe exacerbations, similar observation was made by Mitchell et al.[8]

Incidentally it has been observed that absolute eosinophil counts was raised in 62% of the children with Acute severe asthma which is a significant factor comparable with study by Tran TN et al (54%) which indicates asthma is an allergic disorder, eosinophils contain inflammatory enzymes, generate leukotrienes and express a wide variety of pro inflammatory cytokines.[9] Increase in eosinophils correlates with severity of asthma.

Limitation of the study of this study were: Serum IgE and skin prick test were not done due to logistic reason. The study population is too small to conclude, and the results cannot be extrapolated to the entire population.

CONCLUSION

Acute severe asthma is a preventable medical emergency. The present study has shown that poor drug compliance, acute exposure to house dust and smoke were found to be the significant risk factors for acute severe asthma. Education of parents and children about the importance of ensuring regular treatment and avoidance of exposure to dust and smoke go a long way in prevention of acute severe asthma, avoids visit to emergency care and ensures good control of asthma.

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