

## ASSESSMENT OF RISK FACTORS FOR ACUTE SEVERE ASTHMA IN CHILDREN

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### ABSTRACT

**Background:** The present study was planned and conducted to assess the risk factors responsible for acute severe asthma in children. **Material & Methods:** The present study was an observational cross-sectional study. A total of two hundred children of the age group of 5 to 18 years were included in the study after undertaking written informed consent. Children presenting with signs and symptoms of acute severe asthma as per Global Initiative for Asthma guidelines (GINA) were included in the study. **Results:** In the present study, a total of 200 children with presenting signs and symptoms of acute severe asthma were included. Majority of the children were among the age group of 5-10 years (n = 124; 62%), males were affected more than females in the ratio of 1.44: 1. Poor drug Compliance seen in (n = 134; 67%; p <0.001) and risk factor named exposure to house dust found among (n = 128; 64%; p <0.001) and risk associated with smoke exposure was demonstrated among (n = 91; 45.5%; p <0.001). The family history of asthma was positive in 64%, raised absolute eosinophil counts (>400 cells/ $\mu$ L) was observed in 68% of children. **Conclusion:** Acute severe asthma is a manageable and preventable emergency. The present study results had shown that poor drug compliance, acute reactions to house dust exposure and smoke exposure were found as the significant risk factors for acute severe asthma.

**Keywords:** Acute severe asthma, Children, Risk factors.

### INTRODUCTION:

Asthma is among one of the most widespread diseases around the globe with an approximate of 300 million children lives affected by it (1). Acute severe asthma is also one of the most common emergency results in hospital admissions among children (2). In childhood asthma is one of the commonest chronic respiratory diseases; in its etiopathogenesis, it is a chronic inflammatory disease of the lower respiratory airways of the lungs which results in episodic airflow obstruction and along with that asthma is also one of the main causes of morbidity among children(3).

The worldwide magnitude of asthma varies in different geographical regions which range from 1% to 18% of the inhabitant population in various countries (4). The severity level of acute asthmatic attack can be subdivided as mild, moderate and severe. In the current scenario, Acute severe asthma is the most common medical emergency among children which is leading for nearly five lakh admissions to PICU per year(5).

As per reports of National Center for Health Statistics in 2005, the estimated burden of asthma was around

22.5 million and exacerbations rates included near about 2 million emergency admissions and 500,000 hospitalizations in ICU over the period of 1 year in the United States of America(6). A study was done in Bangalore city, Karnataka conducted among less than 18 years of age reported that prevalence of asthma is raised from the year 1979 (9%) to 1999 (29.5%) (7). There is not much research data available regarding the acute severe asthma risk factors responsible for children of India. Therefore, the present study was planned and conducted to assess the risk factors responsible for acute severe asthma in children.

## MATERIALS & METHODS

The present study was an observational cross-sectional study conducted at S.K. Hospital, Sikar, Rajasthan, during the period of August 2016 to July 2017. Ethical clearance from hospital ethical committee was taken. A total of two hundred children of the age group of 5 to 18 years were included in the study after undertaking written informed consent. Children presenting with signs and symptoms of acute severe asthma as per Global Initiative for Asthma guidelines (GINA) were included in the study (8). The study participants were selected and included in the study from the outdoor and indoor departments and formed the study group. A detailed history with general physical examination and clinical examination were taken. A predesigned and pretested Performa used for risk factors evaluation responsible for severe attacks or acute exacerbation of asthma such as exposure to house dust, exposure to smoke, treatment history and drug compliance and all data were recorded systematically. Chest X-ray and blood investigation including complete blood count, absolute eosinophil count, arterial blood gas analysis and electrolytes were done as per the standard protocol for acute severe asthma. All the findings were entered into an Excel spreadsheet on Microsoft Excel 2010. The statistical analysis was done using the Statistical software package SPSS v22 and Epi Info v7. A p-value <0.05 with 95% confidence intervals were considered statistically significant.

## RESULTS

In the present study, a total of 200 children with presenting signs and symptoms of acute severe asthma were included. Majority of the children were among the age group of 5-10 years (n = 124; 62%) as shown in Table 1.

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

Age group	Number of subjects	Percentage
5-10 years	124	62
11-15 years	50	25
15-18 years	26	13
<b>Total</b>	<b>200</b>	<b>100</b>

In the present study, among study subjects males were affected more than females in the ratio of 1.44: 1 as per shown in Table 2. The family history of asthma was positive in 64%.

**Table 2: Gender wise distribution of study subjects according**

Gender	Frequency	Percentage
Female	82	41%
Male	118	59%
<b>Total</b>	<b>200</b>	<b>100%</b>

**Table 3: Distribution of subjects according to Risk factors.**

Risk factors	Present	Absent	P Value
Poor drug compliance	134	66	<0.001
House dust	128	72	<0.001
Smoke	91	109	<0.001

In the present study among the study individuals poor drug Compliance seen in (n = 134; 67%; p <0.001) and risk factor named exposure to house dust found among (n = 128; 64%; p <0.001) and risk associated with smoke exposure was demonstrated among (n = 91; 45.5%; p <0.001). All the above-mentioned risk factors were found to be highly statistically significant risk factors for precipitating the acute severe asthma as per shown in Table 3.

In the present study among the study individuals, on the blood investigation, it was reported that raised

absolute eosinophil counts ( $>400$  cells/ $\mu\text{L}$ ) were observed in 68% of children.

## DISCUSSION

Asthma is among one of the most widespread diseases around the globe and various researches conducted all around the globe. In the current scenario, Acute severe asthma is the most common medical emergency among children which is leading for nearly five lakh admissions to PICU per year. Current treatments regimes, although successful but they are still not effective to prevent the exacerbations of childhood asthma completely. In the present study, a total of 200 children with presenting signs and symptoms of acute severe asthma were included. Majority of the children were among the age group of 5-10 years ( $n = 124$ ; 62%) and among study subjects males were affected more than females in the ratio of 1.44: 1 as per shown in Table 2. The family history of asthma was positive in 64%. A cross-sectional study conducted a by Celedón J et al. in 2001 on risk factors for childhood asthma among 214 schoolchildren of age 10 to 13 years participating in phase II of the International Study of Asthma and Allergies in Childhood. They reported sensitivity to house dust mites was linked with asthma with an odds ratio of 2.2 ( $p\text{-value} = 0.02$ ). On applying multivariate analysis, parental education equal or less than high school odds ratio of 3.0 ( $p\text{ value} < 0.01$ ) and history of parental asthma odds ratio of 2.6 ( $p\text{-value} < 0.01$ ) (9).

A study conducted on inheritance patterns, consanguinity & risk for asthma by Mahdi B et al. in 2010 among 100 children and 100 adults of diagnosed asthma, along with 400 normal children and adults taken as controls reported that history of asthma 89 cases and 5.3 percent of a normal individual ( $P < 0.001$ ). A differential risk of family history in developing asthma was observed in first and second degree relatives of cases (10). In a prospective study conducted by Pragalatha A et al. in 2015, they observed among 100 study individuals that majority of individuals were present in the age group between 5-10 years (68%), the main risk factors accounting for acute severe asthma was poor drug compliance (68%), which shows statistically

significant result ( $p\text{-value} < 0.0001$ ), than house dust exposure (61%) and smoke exposure (42%) ( $p < 0.0001$ ) (11).

In the present study among the study individuals poor drug Compliance seen in ( $n = 134$ ; 67%;  $p < 0.001$ ) and risk factor named exposure to house dust found among ( $n = 128$ ; 64%;  $p < 0.001$ ) and risk associated with smoke exposure was demonstrated among ( $n = 91$ ; 45.5%;  $p < 0.001$ ). A study conducted by Teach S et al. 2006 on indoor environmental risk factors among children with asthma reported that among 488 enrolled cases, 60.0% were of less than 6 years of age, 63.9% were male and 51.8% cases had more than 3 hospital visits in the last 12 months. Home exposure to house dust and potential risk factors was high. Exposure to cockroach allergen was also significantly associated (12). A study conducted by Mitchell E et al. on risk factors for admission to the hospital for asthma reported that female sex had higher relative risk of 1.23 with 95% of confidence interval (CI), similarly young age (age  $< 5$  years) had RR of 1.71 with 95% of CI, number of previous hospitalizations had RR of 1.32, and indoor intravenous treatment had RR of 1.29 at 95% of CI (13).

In the present study among the study individuals, on the blood investigation, it was reported that raised absolute eosinophil counts ( $>400$  cells/ $\mu\text{L}$ ) were observed in 68% of children. This was a significant factor and comparable with a study conducted by Tran TN et al. on blood eosinophil count is correlated with more frequent asthma episodes. They reported that among 3,162 cases with asthma 54% of children and 52% of adults had raised blood eosinophil counts and approximately half of them reported an asthma attack in the last year. Hence, in primary analysis higher eosinophil counts were associated with asthma attacks in children and as well as the increase in eosinophil's count associated with severity of asthma (14). The limitations of the present study were: Serum IgE levels and skin prick test were not undertaken due to lack of equipment and logistics. The study population size or our sample size was too small to generalize the study results to the entire population.

## CONCLUSION

We concluded from the present study that acute severe asthma is a manageable and preventable emergency. The present study results had shown that poor drug compliance, acute reactions to house dust exposure and smoke exposure were found as the significant risk factors for acute severe asthma. For prevention, education of parents and children both about the awareness of regular treatment and avoidance of dust exposure and smoke exposure to make a way for long prevention of acute severe asthma, decrease visits to hospitals and provides good control of asthma.

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