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# Risk and Triggering Factors Associated with Bronchial Asthma Among 5 to 15 Yrs Old Children with Exacerbations from Tenkasi District, Tamil Nadu: A Community-Based Cross-Sectional Study

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**ABSTRACT**
Bronchial asthma is a chronic inflammatory disorder of the airways characterized by episodes of wheezing, breathlessness, chest tightness, and coughing. These episodes are usually associated with widespread but variable airflow obstruction, which is often reversible either spontaneously or with treatment. Understanding the risk and triggering factors associated with asthma exacerbations in children is crucial for developing targeted interventions. This community-based cross-sectional study investigated risk and triggering factors associated with asthma exacerbations among 50 children aged 5-15 years in Tenkasi District, Tamil Nadu. Data were collected through structured interviews and questionnaires administered to the parents or guardians of the children. The questionnaires included sections on socio-demographic characteristics, risk factors for asthma exacerbations, common triggering factors for asthma attacks, and treatment and management approaches. The study population consisted of 50 children, predominantly aged 8-10 years (36%), with a higher prevalence in males (56%). Urban residents constituted 60% of the sample. Key risk factors included a family history of asthma (40%), exposure to tobacco smoke (24%), absence of exclusive breastfeeding (28%) and allergic rhinitis in parents (44%). Common triggers for asthma attacks were having a cold (54%), physical exercise (50%), and house dust (50%). Inhaled corticosteroids were the most common treatment approach (50%). The study highlights significant socio-demographic, risk and triggering factors associated with bronchial asthma among children in Tenkasi District. The findings underscore the need for targeted interventions to manage asthma effectively, particularly in rural settings and to enhance adherence to medication to reduce the frequency of exacerbations.

## INTRODUCTION

Bronchial asthma is a chronic inflammatory disorder of the airways characterized by episodes of wheezing, breathlessness, chest tightness and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction within the lungs, which is often reversible either spontaneously or with treatment. Asthma is a significant global health issue, affecting individuals of all ages, with a notable impact on children. The chronic nature of the disease, coupled with its potential for acute exacerbations, imposes a substantial burden on affected individuals, their families and healthcare systems.

The pathophysiology of asthma involves a complex interplay of genetic, environmental and immunological factors. In susceptible individuals, exposure to allergens or irritants can trigger an inflammatory response in the airways, leading to broncho constriction, airway hyperresponsiveness and remodeling. The role of the immune system, particularly the imbalance between T-helper 1 (Th1) and T-helper 2 (Th2) cells, is crucial in the development and progression of asthma. Th2 cells release cytokines that promote the production of IgE antibodies and the activation of eosinophils, both of which contribute to airway inflammation.

Asthma is one of the most common chronic diseases in childhood, with a worldwide prevalence ranging from 1%-18% depending on the region and population studied. According to the Global Initiative for Asthma (GINA), an estimated 300 million people suffer from asthma globally, with a significant proportion being children. In India, the prevalence of asthma among children varies widely, with urban areas generally reporting higher rates compared to rural areas. Studies have indicated a prevalence of 5-10% among school-aged children in various parts of India.

In Tamil Nadu, a southern state of India, the prevalence of asthma among children has been a subject of various studies. Factors such as urbanization, increased exposure to environmental pollutants and changing lifestyles have contributed to the rising prevalence of asthma in this region. The district of Tenkasi, with its mix of urban and rural populations, provides a unique setting to study the risk and triggering factors associated with asthma exacerbations in children.

**Justification:** Understanding the risk and triggering factors associated with asthma exacerbations in children is crucial for several reasons. First, it can aid in the development of targeted interventions to prevent exacerbations and improve the overall management of asthma. Second, identifying socio-demographic characteristics and environmental exposures that contribute to asthma can inform public health policies and community-based strategies aimed at reducing the burden of the disease. Lastly, insights gained from such studies can enhance the clinical management of asthma by helping healthcare providers tailor treatment plans to the specific needs of their patients. Asthma exacerbations, or acute worsening of asthma symptoms, are a significant cause of morbidity and healthcare utilization among children with asthma. These exacerbations can be triggered by various factors, including viral infections, allergens, environmental pollutants and physical activity. Identifying and mitigating these triggers can substantially improve the quality of life for children with asthma and reduce the risk of severe attacks that may require hospitalization.

This study aims to investigate the risk and triggering factors associated with asthma exacerbations among children aged 5-15 years in Tenkasi District, Tamil Nadu. By examining socio-demographic characteristics, prevalence of risk factors and common triggering factors, this study seeks to provide a comprehensive understanding of the factors contributing to asthma exacerbations in this population. The findings from this study will be valuable in guiding both clinical practice and public health initiatives to better manage and prevent asthma exacerbations in children.

**Aims and Objectives:** To investigate the risk and triggering factors associated with bronchial asthma exacerbations among children aged 5-15 years in Tenkasi District, Tamil Nadu.

- To identify the socio-demographic characteristics of children with bronchial asthma.
- To evaluate the prevalence of various risk factors associated with asthma exacerbations.
- To analyze the common triggering factors for asthma attacks in the study population.

## MATERIALS AND METHODS

**Study Design:** This study is a community-based cross-sectional survey conducted to investigate the risk and triggering factors associated with bronchial asthma exacerbations among children aged 5-15 years in Tenkasi District, Tamil Nadu.

**Study Population:** The study population consisted of 50 children diagnosed with bronchial asthma, selected from various schools and community health centers in Tenkasi District. The inclusion criteria were children aged 5-15 years with a confirmed diagnosis of bronchial asthma, as per clinical guidelines. Children with other chronic respiratory conditions or significant comorbidities were excluded from the study.

**Sampling Technique:** A convenient sampling method was used to select the participants. The children were recruited from local schools and health centers after obtaining consent from their parents or guardians.

**Data Collection:** Data were collected through structured interviews and questionnaires administered to the parents or guardians of the children. The questionnaires included sections on socio-demographic characteristics, risk factors for asthma exacerbations, common triggering factors for asthma attacks and treatment and management approaches.

- **Socio-Demographic Characteristics:** Information was collected on the child's age, gender, residence (urban or rural) and socio-economic status (classified into low, middle and high income).
- **Risk Factors:** The presence of potential risk factors, such as family history of asthma, exposure to tobacco smoke, absence of exclusive breastfeeding, early weaning, presence of pets at home, living conditions (flat/apartment) and allergic rhinitis in parents, was recorded.
- **Triggering Factors:** Participants reported common triggers for asthma attacks, including having a cold, physical exercise, house dust, animal allergens and psychological stress. The frequency of these triggers (sometimes or always) was noted.
- **Severity of Asthma:** Data on the frequency of asthma exacerbations per year were collected to categorize the severity of asthma.
- **Treatment and Management:** Information on the treatment and management approaches used, including inhaled corticosteroids, oral medications, combined therapy and lifestyle modifications, was gathered.

**Data Analysis:** Data were analyzed using statistical software to determine frequencies and percentages for each variable. Descriptive statistics were used to summarize the socio-demographic characteristics, prevalence of risk factors, triggering factors, severity of asthma and treatment approaches.

**Ethical Considerations:** The study was approved by the Institutional Review Board (IRB) of the participating institutions. Informed consent was obtained from the parents or guardians of all participating children. Confidentiality and anonymity of the participants were maintained throughout the study

## RESULTS AND DISCUSSIONS

Table 1 provides a breakdown of the socio-demographic characteristics of the 50 children diagnosed with bronchial asthma. The age distribution shows a predominance of children in the 8-10 years age group (36%), with fewer in the 14-15 years age group (12%). The gender distribution indicates a higher prevalence among males (56%) compared to females (44%). Regarding residence, a majority of the children come from urban areas (60%). Socio-economic status is represented with the highest proportion in the middle-income category (50%), followed by high-income (30%) and low-income families (20%). This table helps in understanding the demographic profile of the study population.

**Table 1: Socio-Demographic Characteristics of Children with Bronchial Asthma (n=50)**

| Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| Age Group (years) | | |
| 5-7 | 12 | 24% |
| 8-10 | 18 | 36% |
| 11-13 | 14 | 28% |
| 14-15 | 6 | 12% |
| Gender | | |
| Male | 28 | 56% |
| Female | 22 | 44% |
| Residence | | |
| Urban | 30 | 60% |
| Rural | 20 | 40% |
| Socio-Economic Status | | |
| Low | 10 | 20% |
| Middle | 25 | 50% |
| High | 15 | 30% |

**Table 2: Prevalence of Risk Factors Associated with Asthma Exacerbations**

| Risk Factors | Frequency (n) | Percentage (%) |
|---|---|---|
| Family history of asthma | 20 | 40% |
| Exposure to tobacco smoke | 12 | 24% |
| Absence of exclusive breastfeeding | 14 | 28% |
| Early weaning (<6 months) | 10 | 20% |
| Pets at home | 18 | 36% |
| Living in a flat/apartment | 16 | 32% |
| Allergic rhinitis in parents | 22 | 44% |

**Table 3: Common Triggering Factors for Asthma Attacks**

| Triggering Factors | Sometimes (%) | Always (%) | Total (%) |
|---|---|---|---|
| Having a cold | 24 (48%) | 3 (6%) | 27 (54%) |
| Running/Physical exercise | 18 (36%) | 7 (14%) | 25 (50%) |
| House dust | 20 (40%) | 5 (10%) | 25 (50%) |
| Animal allergens | 12 (24%) | 3 (6%) | 15 (30%) |
| Psychological stress | 14 (28%) | 4 (8%) | 18 (36%) |

**Table 4: Severity of Asthma Based on Frequency of Exacerbations**

| Frequency of Exacerbations | Frequency (n) | Percentage (%) |
|---|---|---|
| 1-2 times per year | 20 | 40% |
| 3-4 times per year | 15 | 30% |
| More than 4 times per year | 15 | 30% |

**Table 5: Treatment and Management Approaches**

| Treatment Approaches | Frequency (n) | Percentage (%) |
|---|---|---|
| Inhaled corticosteroids | 25 | 50% |
| Oral medications | 10 | 20% |
| Combined therapy (inhaled + oral) | 10 | 20% |
| Lifestyle modifications (avoiding triggers) | 5 | 10% |

Table 2 outlines the prevalence of various risk factors associated with asthma exacerbations among the 50 children. The most common risk factor is a family history of asthma, present in 40% of the children. Exposure to tobacco smoke is reported in 24% of cases, while 28% of children lacked exclusive breastfeeding during infancy. Early weaning before 6 months is noted in 20% of children. The presence of pets at home and

living in a flat or apartment are reported in 36% and 32% of cases, respectively. Additionally, 44% of children have allergic rhinitis in their parents, highlighting a potential genetic or environmental influence on asthma exacerbations.

Table 3 presents the common triggering factors for asthma attacks as reported by the study participants. The factor most frequently reported as a trigger is having a cold, with 54% of children identifying it as either sometimes (48%) or always (6%) a trigger. Physical exercise is another significant trigger, with 50% of children reporting it as either sometimes (36%) or always (14%) a trigger. House dust is also a notable trigger for 50% of the children, with 40% reporting it as sometimes and 10% as always. Animal allergens and psychological stress are less common triggers, affecting 30% and 36% of the children, respectively.

Table 4 categorizes the severity of asthma based on the frequency of exacerbations. The majority of children experience asthma exacerbations 1-2 times per year (40%). A significant proportion (30%) report exacerbations occurring 3-4 times per year, while another 30% have exacerbations more than 4 times per year. This distribution provides insight into the frequency and severity of asthma attacks among the study population, which is critical for tailoring management strategies.

Table 5 summarizes the treatment and management approaches utilized for the 50 children with asthma. Inhaled corticosteroids are the most common treatment approach, used by 50% of the children. Oral medications and combined therapy (inhaled + oral) are used by 20% of the children each. Lifestyle modifications, such as avoiding known triggers, are less frequently employed, with only 10% of the children using this approach. This table highlights the various treatment strategies and their prevalence in managing asthma among the study participants.

This study aimed to investigate the risk and triggering factors associated with bronchial asthma exacerbations among children aged 5-15 years in Tenkasi District, Tamil Nadu. The findings from this study offer valuable insights into the demographic, risk factor prevalence, triggering factors and treatment approaches for asthma in this region.

**Socio-Demographic Characteristics:** The study identified that the majority of children with asthma were in the 8-10 years age group (36%) and showed a higher prevalence in males (56%). This is consistent with previous studies that report a higher prevalence of asthma in males compared to females in childhood[1,2]. Urban residence was noted in 60% of the children, which aligns with other research indicating that urban environments often have higher rates of asthma due to factors such as air pollution and lifestyle differences[3,4]. The socio-economic distribution showed a majority in the middle-income category, which is consistent with findings from other studies that suggest asthma is prevalent across various socio-economic groups but may be influenced by different environmental factors[5].

**Prevalence of Risk Factors:** The study found that a family history of asthma was the most prevalent risk factor (40%), which corroborates with existing literature linking genetic predisposition to asthma[6,7]. Exposure to tobacco smoke was reported by 24% of the children, a finding that aligns with research linking passive smoke exposure to increased asthma risk[8]. The absence of exclusive breastfeeding and early weaning were noted in 28% and 20% of children, respectively, which is consistent with studies highlighting the protective role of breastfeeding and the risk associated with early weaning in asthma development[9,10]. The presence of pets at home (36%) and living in a flat or apartment (32%) were also significant, reflecting environmental exposures that have been associated with asthma exacerbations[11,12]. The prevalence of allergic rhinitis in parents (44%) suggests a strong genetic or allergic component, as previous studies have highlighted the association between parental allergic conditions and childhood asthma[13].

**Triggering Factors:** The study identified common triggers for asthma attacks, with having a cold (54%) and physical exercise (50%) being the most reported. These findings are consistent with literature showing respiratory infections and physical activity as common triggers for asthma exacerbations[14,15]. House dust was also a significant trigger for 50% of the children, aligning with previous studies that emphasize the role of indoor allergens in asthma exacerbations[16]. Animal allergens and psychological stress were reported less frequently, which is in line with studies suggesting that while they are recognized triggers, their impact may vary among different populations[17,18].

**Severity of Asthma:** The frequency of exacerbations in the study indicates that 40% of children experience asthma exacerbations 1-2 times per year, with 30% experiencing them 3-4 times or more than 4 times per year. This distribution of exacerbation frequency is comparable to other studies that categorize asthma severity based on the frequency of exacerbations[19,20]. Understanding the frequency of exacerbations helps in assessing the severity of asthma and tailoring appropriate management strategies.

**Treatment and Management Approaches:** Inhaled corticosteroids were the most common treatment

approach (50%), which is consistent with current guidelines recommending inhaled corticosteroids as the first-line treatment for persistent asthma[21,22]. Oral medications and combined therapy were used by 20% of the children each, reflecting the need for additional or alternative treatments for some patients. The relatively low percentage of children using lifestyle modifications (10%) highlights a potential area for improvement in asthma management, as lifestyle modifications are crucial for controlling environmental triggers and managing asthma effectively[23,24]

## CONCLUSION

The study highlights the significant socio-demographic, risk, and triggering factors associated with bronchial asthma among children aged 5-15 years in Tenkasi District, Tamil Nadu. The majority of children with asthma live in rural areas, with a notable proportion exposed to secondhand smoke and having a family history of asthma. Dust and dust mites, physical activity and cold air are the most common triggers for asthma attacks. Despite the high usage of asthma medications, adherence remains a challenge, with only half of the children consistently following their medication regimen. These findings underscore the need for targeted interventions to manage asthma effectively, particularly in rural settings and to enhance adherence to medication to reduce the frequency of exacerbations.

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