IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 6 Ver. V (June. 2016), PP 12-19
www.iosrjournals.org

Asthma: Environmental Factors are Major Triggers in Children- A Teaching Hospital Experience

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Abstract: *Bronchial asthma is one of the common chronic childhood illnesses. An increasing prevalence and severity of asthma has been reported worldwide. Indian studies are limited regarding asthma in children. Recent reports show wide variation 4-19% in the prevalence of asthma in India.*
Objective: *To study the risk factors and triggering factors for bronchial asthma in children.*
Materials: *This study has been conducted upon 92 children (n=92) suffering from bronchial asthma in a teaching hospital, Nizamabad, Telangana State, from 2013 to 2015, to find out the risk factors and triggering factors for bronchial asthma.*
Results: *Among 92 children (n=92) under study, risk factors for bronchial asthma are identified in 86 (93.4%) cases. They include environmental factors 41 (44.5%), dietary factors 21 (22.8%), physical factors 17 (18.5%), family history 7 (7.6%). In 6 cases the exact triggering factor is not found but occasionally emotional factors seems to be underlying cause like exam stress , after laughing, after crying, after hearing bad news.*
Conclusion: *Environmental factors including increasing exposure to pollution, allergens, environmental tobacco smoke and sedentary lifestyle have been identified as risk factors for asthma.*
Keywords: *Bronchial Asthma, Risk Factors, Triggering Factors, Environmental Factors, Allergens, Physical Factors, Dietary Factors, Atopy, Emotional Factors, Stress, PEFR (Peak Expiratory Flow Recording), Ig-E antibodies.*

I. Introduction

Bronchial asthma is a chronic inflammatory disease of the airways. This is characterized by bronchial hyper- responsiveness and manifests with episodic wheezing and breathlessness, which is often reversible either spontaneously or with treatment. Most children with asthma are atopic as they are susceptible for bronchoconstriction when exposed to triggers (5).

Lawrence E et al. enrolled 114 patients and 114 control subjects over a 1-yr period in Wilmington, Delaware in 1992. Sera were assayed for total IgE, and for IgE antibodies to dust mites, cat dander, cockroach, grass pollen, and ragweed pollen. Dust was obtained from 186 homes and assayed for dust mite, cat, and cockroach allergens. IgE antibodies to mite, cat, and cockroach were each significantly associated with asthma (28). MD Robert S et al. From 1985 to 1990 in the United States. Eighty children in this study were enrolled in the emergency department and 64 in hospital clinics. Dust from 57 homes, assayed for three indoor allergens (dust mite, cat, and cockroach), revealed similar exposure for asthma and control groups. Sixty-nine percent of the children with asthma had IgE antibodies to dust mite, cockroach, or cat. The combination of sensitization and exposure is a major risk factor for asthma in this population (29).

A.N. Aggarwal et al. For Asthma Epidemiology Study Group, 2006; A field study was conducted at Chandigarh, Delhi, Kanpur and Bangalore. Information on smoking habits, domestic cooking fuel used, atopic symptoms, and family history suggestive of asthma was also collected. Female sex, advancing age, usual residence in urban area, lower socio-economic status, history suggestive of atopy, history of asthma in a first degree relative, and all forms of tobacco smoking were associated with significantly higher odds of having asthma (30). In this study our primary aim is to study the triggering factors and risk factors for bronchial asthma in children coming to pediatric department.

II. Materials and Methods

The present study is a descriptive study conducted upon 92 children (n=92) suffering from bronchial asthma in a teaching hospital, Nizamabad, Telangana State, from 2013 to 2015. The children are presented with various symptoms like episodic wheezing or breathlessness, cough (constant or intermittent), shortness of breath or rapid breathing, chest pain or chest tightness, fatigue, nocturnal cough or wheezing, wheezing on exertion. Age group taken for study is from 1 to 16yr. Infants below 1yr and asthma mimics are excluded from study. Before commencing the study the institutional Ethics Committee clearance is taken. Informed consent from the parent or guardian of each and every child enrolled in this study is obtained.

Funding: None.

III. Study Procedures

Children presenting with the above symptoms suggestive of bronchial asthma are examined thoroughly with detailed history including exposure to allergens, surroundings of house etc. Suspected case of bronchial asthma is advised to undergo peak flow recording using a hand held peak flow meter. Reduced peak flow recording and a reversibility of more than 12% or 200ml after inhaling a short acting β2- agonist is taken as diagnostic. Other investigations like complete blood picture, absolute eosinophil count, serum Ig-E levels, chest-x-ray are done to support and establish the allergic cause of asthma, especially in children who are too young to perform peak flowmetry. Triggering factors for asthma are identified in most of the cases after regular follow up.

IV. Results

Among 92 children of bronchial asthma 57 (62%) are boys and 35 (38%) are girls. The age of children ranges from 1yr to 16 yr. The risk factors for bronchial asthma are identified in 86 (93.4%) cases. They include environmental factors 41 (44.5%), dietary factors 21 (22.8%), physical factors 17 (18.5%), family history 7 (7.6%). In 6 cases the exact triggering factor is not found but occasionally emotional factors seems to be underlying cause like exam stress , after laughing, after crying, after hearing bad news etc. (Fig.1)

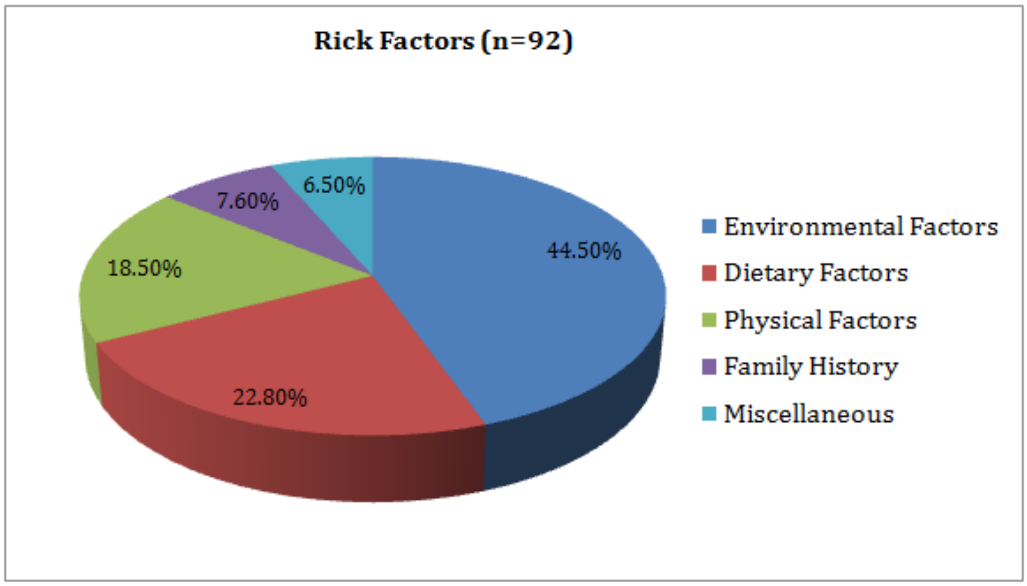

Fig.1

Table.1. Percentage of Risk Factors (n=92)

Risk Factors	Number of Cases	Percentage of Cases
Environmental Factors	41	44.5%
Dietary Factors	21	22.8%
Physical Factors	17	18.5%
Family History	7	7.6%
Miscellaneous	6	6.5%

In ***environmental factors*** major triggering factors are exposure to cold, pollution and allergens and seasonal variation is observed. Others include family members of habitual smokers, asthma triggered by using repellents, sprays, mosquito coils. Low socio economic condition and unhygienic surroundings are also risk factors for asthma. ***Dietary factors*** include taking junk food, chocolates, cool drinks, fruits. ***Physical factors*** are preterm, low birth weight, top feeding, bronchial asthma followed by atopy, URTI, obesity and sedentary life, asthma after exertion (playing). ***Family history*** of asthma, atopy, and sinusitis is seen in some cases. ***Miscellaneous*** include emotional factors (hearing to bad news), stress (exam stress), after laughing, crying. In a few cases exact triggering factor is not identified. (Table .2)

The individual risk factors are illustrated below. (Fig.2)

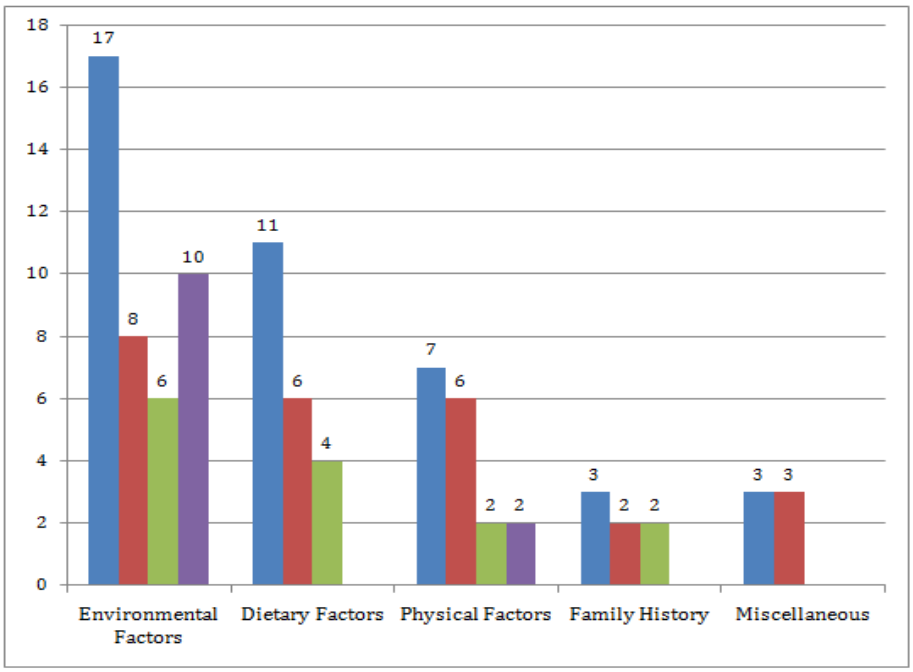

Fig.2

Table .2 The details of individual risk factors. (n=92)

Risk Factors	**No. of cases**
Environmental Factors	
Exposure to allergens, pollution, seasonal variation, cold air	17
Family members of habitual smokers	8
Repellents, sprays, mosquito coils	6
Low socioeconomic status, unhygienic surroundings	10
Total	**41**
Dietary Factors	
Junk food, chocolates, sweets	11
Cool drinks, ice creams	6
Fruits	4
Total	**21**
Physical Factors	
Preterm, low birth weight, top feeding	7
History of Atopy, URTI	6
Obesity, sedentary life style	2
Exertion (after playing)	2
Total	**17**
Family History	
Asthma	3
Atopy	2
Sinusitis	2
Total	**7**
Miscellaneous	
Emotional, stress, after crying, after laughing	3
Others/unknown	3
Total	**6**

V. Discussion

The study is taken place in a teaching hospital, Nizamabad, Telangana State. 92 children of bronchial asthma are kept under study (n=92) after excluding other children. In this group the triggering factors for asthma are identified by taking detailed history, clinical examination, investigations treatment and regular follow up. Environmental factors play a major role in triggering asthma in children followed by dietary factors, physical factors family history of bronchial asthma , atopy are also risk factors. Emotion, stress may trigger asthma to some extent.

Our study shows similar results when compared to other studies. MD Robert S et al. from 1985 to 1990 in the United States; 69% of the children with asthma had Ig-E antibodies to dust mite, cockroach, or cat (29).

Lawrence E et al. enrolled 114 patients and 114 control subjects over a 1-yr period in Wilmington, Delaware in 1992. Ig-E antibodies to mite, cat, and cockroach were each significantly associated with asthma (28).

A.N. Aggarwal et al. for Asthma Epidemiology Study Group, 2006; A field study was conducted at Chandigarh, Delhi, Kanpur and Bangalore. Female sex, advancing age, usual residence in urban area, lower socio-economic status, history suggestive of atopy, history of asthma in a first degree relative, and all forms of tobacco smoking were associated with significantly higher odds of having asthma (30). Our study is related to the common chronic childhood illness and the triggering factors for asthma in children and having regular follow-up. Children are examined in a separate room under good light in calm and quiet atmosphere. Anxiety and fear in children are removed by talking to them and making the child acquainted with the examiner. Peak expiratory flow is recorded 3 times and the maximum is taken. Our study is comparable to other studies mentioned above and shows similar findings.

However this study is conducted in children, who are coming to our hospital. Thus our findings may not represent the exact percentage of risk factors in the population. Peak flow recording is not possible in all children. Serum Ig-E levels are done but not specific for a particular allergen as noted in above studies.

VI. Recommendations

Goal of asthma care is to achieve and maintain control of clinical manifestation of disease for prolonged period. It is to be noted that cure is not always possible and hence treatment aims at control. This requires a long term management plan with controller medication, as and when required reliever medication and regular follow up.

Asthma education and counseling to the child and family members is an integral component of management. Environmental control and avoidance of exposure to allergens are also required (23). Recent advances include anti Ig-E antibody (Omalizumab) and immunotherapy (24, 25).

VII. Conclusion

Bronchial asthma is one of the common chronic childhood illnesses. Environmental factors including increasing exposure to pollution, allergens, environmental tobacco smoke and sedentary lifestyle have been identified as risk factors for asthma (5).

Components of asthma care include the following:

- Develop patient-doctor relationship.
- Identify and reduce exposure to risk factors.
- Assess, treat and monitor asthma.
- Manage asthma exacerbations.

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Annexure-I

Table 1. Classification of Asthma Based on Severity

Severity	Symptom frequency	Night- time symptoms	FEV1 Predicted (%)	FEV1Variability (%)
Intermittent	< 1 per week	≤ 2 per month	≥ 80%	< 20%
Mild persistent	>1 per week But < 1per day	≥2 per month	≥ 80%	20 -30%
Moderate persistent	Daily	>1 per week	60-80%	>30%
Severe persistent	Daily	Frequent	<60%	>30%

Table 2. Level of Asthma Control

Characteristics	Controlled	Partially controlled	Uncontrolled
Day time symptoms	None or < twice/week	> twice/week	Three or more features of partially controlled asthma present in any week
Limitation of activities	None	Any	
Nocturnal symptoms or awakening	None	Any	
Need for reliever /rescue treatment	None (twice or less per week)	More than twice per week	
Lung function (PEF or FEV1)	Normal	<80% predicted or personal best	

Table 3. Drugs Used In the Long Term Control of Asthma

Long acting β2-agonists	Salmeterol, Formoterol
Corticosteroids	Fluticasone
Leukotriene inhibitors	Montelukast, Zafirlukast
Oral Theophylline	----

Table 4. Drugs Used In Acute Exacerbations of Asthma

Short Acting B2-Agonist	Salbutamol
Systemic Corticosteroids	Methyl Prednisolone, Prednisolone
Anti Cholinergics	Ipratropium Bromide
Intra Venous Theophylline	----
Supplemental Oxygen	----

Table 5. Asthma Mimics in Children

- Aspiration Pneumonitis
- Pneumonia
- Bronchiolitis
- Tracheomalacia
- Cystic Fibrosis

Annexure-II
Spacers and Devices

Inhalation Therapy

Peak Flow Meter

Recording PEFR

Asthma – Literature

In English, Hindi & Local Language
(For Education & Counseling)

Airway Changes in Asthma

(For Education & Counseling)