# Childhood Asthma: Emerging Patterns and Precipitating Factors

A W RATHORE P MIRAJ T M AHMED
*Department of Paediatrics, King Edward Medical College/Mayo Hospital, Lahore*
*Correspondence to Dr. Ahsan Waheed Rathore, Assistant Professor (e. mail rathore@brain.net.pk)*

**Bronchial asthma in children has a varied presentation and diverse precipitating factors. The pattern is likely lo be different in our part of the world where upper respiratory tract infections are very common. To document the common presenting symptoms and precipitating factors in confirmed patients with bronchial asthma in our set up. A tertiary referral center- Mayo Hospital Lahore. All patients reporting to the Emergency Department, OPD and the Respiratory & Asthma Clinic of Mayo Hospital, Lahore, with respiratory symptoms suggestive of Bronchial asthma were assessed during a one-year period, from January 1999 to December 1999. Peak expiratory flow rate was measured in each patient to confirm the diagnosis of bronchial asthma. Detailed history and examination on a Proforma was recorded by an asthma-trained nurse and verified by the clinician. A total of 536 patients with respiratory symptoms suggestive of asthma were included in the study. Amongst them 472(88.06%) were from Lahore while only 64(11.94%) were from outside Lahore. The patients were mostly in the age range of 1-5 years (43.84%) and 5-15 years (47.58%). The common presenting symptoms of bronchial asthma in these children which wheeze, daytime cough, night cough, and shortness of breath with 96.83%, 98.88%, 74.81% and 65.49% distribution respectively. Other presenting symptoms included, chest pain (51.87%), exertional breathlessness (43.84%), limitation of activity (42.91%) and fever (68.10%). In 43,7% children there was an effect on education, while 72.76% patients had sleep disturbances due to the illness. The common contributing precipitating factors included, upper respiratory tract Infections (53.17%), dust (41.60%). food (52.43%) and cigarette smoke (36.57%). Other factors were exercise (34.89%), pollen (22.39%), animals/pets (18.28%), emotional stress (I2.31%) and drugs (2.80%). Children with bronchial asthma present with varied symptoms most commonly wheeze, cough and shortness of breath. Upper respiratory tract infections are the commonest precipitating factor, making fever an important symptom. Food allergy and dust are other common precipitating factors. Insight into the spectrum of precipitating factors can help in better understanding of the diagnosis and treatment of the disease.**
**Key Words: Bronchial asthma. Childhood asthma, precipitating factors.**

Asthma is conceptually defined as variable airflow obstruction and is itself highly variable in clinical presentation and natural history. Prevalence of childhood asthma varies a great deal between countries and has been rising to a variable extent in many parts of the world over the past 20-30 years[1,2]. Concerns about under diagnosis and inadequate treatment of asthmatic symptoms have led to a clinical and epidemiological consensus that all wheezing should he considered as asthma[3]. Defining asthma in terms of symptoms has some advantages[1], but some investigators propose objective confirmation of bronchial hyper-responsiveness for the diagnosis of asthma[4,5]. The pathogenesis of allergy is multifactorial, and depends on the interaction between the time and amount of allergen exposure and the presence of certain nonspecific factors like air pollution in genetically susceptible individuals. Environmental factors that influence the development of allergic diseases like bronchial asthma may be specific or non-specific. In addition psychological factors may trigger or aggravate the condition[6]. Early contact with pollen, pets and house-dust mites and early feeding with foreign proteins seem to he associated with an increased risk of allergic diseases[7]. There has been an increase by about 50% in relative terms in the prevalence of wheezing among school children in Britain[8] and Australia[9] over the past 30 years and a six-ford increase in Taiwan[10]. Bronchial asthma in children displays a wide spectrum of severity. Ascertaining symptoms rather than diagnosis has the advantage that a full range of manifestations can be explored. Various dimensions of severity were recently included in a questionnaire developed for recent international comparisons of asthma prevalence[5]. The prevalence of asthma at population level is highly variable, both over time and between countries[1]. The exact prevalence of childhood asthma in Pakistan based on symptoms rather than diagnosis label is not known. Asthma prevalence worldwide has been on rise. Although worldwide comparisons have been made by the ISAAC (International study of asthma and allergies in childhood) but we arc still not clear about the exact prevalence of childhood asthma, especially in our country.

The present study was thus designed to assess a relatively larger group of children regarding variations in the presentation of childhood asthma in terms of symptoms or manifestation independent of the diagnostic label. Furthermore various precipitating factors were elucidated to improve our understanding regarding prevention and treatment of childhood asthma.

**Patients and methods**

All patients under the age of 15 years presenting to the emergency department, out patients department and (the respiratory & asthma clinic) of Mayo Hospital, Lahore

with respiratory symptoms suggestive of asthma were included in the study. The study period was from January 1999 lo December 1999. Peak expiratory flow rate (PEFR) of each patient was determined to confirm the diagnosis of bronchial asthma. Detailed history of each patient and clinical examination was recorded on a proforma especially developed for the study by a trained asthma nurse and an asthma specialist in the asthma clinic. Special investigations were carried out in selected patients when indicated.

**Results**

A total of 536 patients with respiratory symptoms suggestive of asthma were included in the study. The study population consisted of 329 males and 207 females with male to female ratio of 1 6:1. To assess the age distribution, the patients were placed into three groups. 0-1 year, I–5 years, and 5-15 years respectively. The minimum age of the patients was 1 month while the maximum age was 15 years. In the age range, 0-1 years there were total of 46(8.58%) patients, consisting of 34(73.9%) males and 12(26.1%) females. In the age group 1-5 years there were 235(43.84%) patients with 144(61.28%) males and 91(38.72%) females, while in the age group, 5-15 years there were a total of 255(47.58%) patients with 151(59.22%) males and 104(40.78%) females (Table 1).

Table 1: Age and sex distribution of children with bronchial asthma (n=536)

| Age Range (Years) | Total | | Male | | Female | |
|---|---|---|---|---|---|---|
| | No. | %age | No. | %age | No. | %age |
| 0-1 | 46 | 8.58 | 34 | 73.9 | 12 | 26.1 |
| 1 –5 | 235 | 43,84 | 144 | 61.28 | 91 | 3R.72 |
| 5-15 | 255 | 47.58 | 151 | 59.22 | 104 | 40.78 |

Although the number of patients in age group 0-1 years was significantly less, there was no difference between the other two groups. Majority of the patients, 472(88.06%) were from Lahore while only 64(11.94%) were from outside Lahore. The patients presented with a wide spectrum of symptoms. The distribution of common presenting symptoms was wheeze, 519(96.83%), day time cough 530(98.88%), night cough 401(7481%) and shortness of breath 351(65.49%). Other presenting symptoms were chest pain 278(51.87%), Exertional breathlessness 351(43.84%), limitation of activity 230(42.91%) and fever 365(68,10%). In 233(43.47%) children there was an effect on education while 390(72.76%) patient had sleep disturbances (Table2). These symptoms were found to be more common in male patients. Detailed history of the patients revealed involvement of different precipitating factors. They included, upper respiratory tract infections (URTI), in 285(53.17%), dust 223(41.60%), food in 281(52.43%), and cigarette smoke in 196(36.57%) patients. Other factors were, exercise in 187(34.89%), pollen in 120(22.39%), and animals/pets in 98(18.28%). Emotional stress and drugs were contributory in 12.3 1% and 2.80% respectively, (Table3)

Table 2: Distribution of presenting symptoms in children with bronchial asthma (n=536)

| Symptoms | Total | | Male | | Female | |
|---|---|---|---|---|---|---|
| | No. | %age | No. | %age | No. | %age |
| Wheeze | 519 | 96.83 | 325 | 60.63 | 194 | 36 19 |
| Day time cough | 530 | 98.88 | 332 | 61.94 | 198 | 36.94 |
| Night couth | 401 | 74.81 | 244 | 45.52 | 157 | 29.29 |
| Shortness of breath | 351 | 65.49 | 205 | 38.25 | 146 | 27.24 |
| Chest pain | 278 | 51.87 | 171 | 31.90 | 107 | 19.96 |
| Exertional breathlessness | 235 | 43.84 | 138 | 25.75 | 97 | 18.10 |
| Limitation of activity | 230 | 42.91 | 140 | 26 12 | 90 | 16.79 |
| Fever | 365 | 68.10 | 216 | 40.30 | 149 | 27.80 |
| Effect of education | 233 | 43.47 | 129 | 14.07 | 104 | 19.40 |
| Sleep disturbance | 390 | 72.76 | 228 | 42.54 | 162 | 30.22 |

Table 3 Distribution of precipitating factors in children with bronchial asthma (n=536)

| Symptoms | Total | | Male | | Female | |
|---|---|---|---|---|---|---|
| | No. | %age | No. | %age | No. | %age |
| URTI | 285 | 53.17 | 166 | 30.97 | 119 | 22.20 |
| Exercise | 187 | 34.89 | 117 | 21.3 | 70 | 13.06 |
| Cigarette smoke | 196 | 36.57 | 109 | 20.34 | 87 | 16.23 |
| Dust | 223 | 41.60 | 130 | 24.25 | 93 | 17.35 |
| Animal/ pets | 98 | 18.28 | 56 | 10.45 | 42 | 7.84 |
| Food | 281 | 52.43 | 173 | 32.28 | 108 | 20.15 |
| Pollen | 120 | 22.39 | 64 | 11.94 | 56 | 10.45 |
| Emotions | 66 | 12.31 | 40 | 7.46 | 26 | 4.85 |
| Drugs | 15 | 2.80 | 4 | 0.75 | 11 | 2.05 |

**Discussion**

Numerous studies have confirmed that there is a substantial variation between physicians, between areas, and over time in the degree to which 'the asthma label' has been applied to wheezing illness[11]. Concern about under diagnosis and inadequate treatment of asthmatic symptoms in school aged children[12] led to a clinical and epidemiological consensus that all wheezing should be considered as "asthma". More recently, however this convention has been questioned, particularly for wheezing in preschool children[3,5,6,12,13,14,15]. It is evident that childhood asthma displays a wide spectrum of symptoms with variable severity so that no one dimension can adequately describe all aspects. Therefore definition of asthma in terms of symptoms has the advantage that the

disease ascertainment is not sensitive lo variations in doctor's preference for specific diagnosis[1]. Recognizing early asthma is of utmost importance. Asthma symptoms often develop during the first year of life. Longitudinal studies show that at least 40% of children with wheezing lower respiratory illnesses (LRIs) during the first three years of life still have wheezing episodes at six years of age[16]. It is important to identify children at risk of developing asthma and to distinguish these from those in whom the wheeze is transient[16] .In our study most of the children were in the l-5 years (43.84%) and 5-15 years (47.58%) age group. A similar study reviewed the prognostic characteristics of asthma diagnosis in early childhood in clinical practice. The age group 0-1 year, and 2-4 year. were analyzed separately, because respiratory symptoms are often transient and sensitization to inhalant allergens is uncommon before the age of 2 years. The clinical diagnosis 'asthma' was made in 113 of 231 (49%) children aged 0-1 years and 111 of 188(77%) children aged 2-4 years[17]. In both groups shortness of breath was the most prognostic symptom. Eczema, wheeze and non-allergic provoking factors like weather conditions were further predisposing factors in the 0-1 year group. As were allergic provoking factors (inhalant allergens) and absence of ear-nose-throat- history in the 2-4 year group[18] . In our study, however, daytime cough (98.88%) and wheeze (96.83%) were the predominant symptoms followed by night cough (74.81%), sleep disturbances (72.76%) and shortness of breath (65.49%), Surprisingly many patients presented with fever (68.10%). This can be explained by the fact that in many patients intercurrent respiratory tract infections were an important precipitating factor- A number of genetic markers and epidemiological risk factors for asthma have been identified. Infants who later develop asthma in childhood have high serum IgE and peripheral eosinophil counts than those who do not develop asthma. However these factors are not sufficiently sensitive and specific[16]. The pathogenesis of allergy depends on the interaction between the time and amount of allergen exposure alongwilh the presence of certain nonspecific "adjuvant" factors in genetically susceptible individuals[6]. In early life there seems lo be a period during which an individual is susceptible to sensitization to various potential risk Factors of childhoodasthma. Various environmental factors that may enhance sensitization lo innocuous agents include, tobacco smoke, $N0_2$, $SO_2$. Passive smoking is by far the best-established risk factor, particularly in childhood[6]. Experimental, epidemiologic, and clinical observations strongly support the concept that immune response to allergens is influenced by the conditions under which the primary encounter with an allergen occurs[18]. There is a period in early childhood during which exposure to inhalant allergens may result in allergy many years later. Early contact with allergens like pollen, pets, and house-dust mites and early feeding with foreign proteins have been associated with an increased risk of development of allergic disease[19]. Results of numerous epidomiologic studies lend support to a relationship between air pollution and increased incidence of sensitization to inhalant allergens. Compounds like $N0_2$, $S0_2$, ozone and tobacco smoke have shown enhanced sensilization in animal models[20]. In our study URTI (53.17%) and food (52.43%) were round to be the frequent precipitating factors. URTI being a common precipitating factor maybe responsible for the high prevalence or fever (68.10%) at the time of presentation. Other precipitating factors included dust (41.60%) and cigarette smoke (36.57%). In 34.89% children, exercise induced the symptoms. A more recent study identified predisposing risk Factors related to asthma exacerbations. They increased damp housing, colds and sensitization to inhalants[21]. Another cross-sectional study on different patterns of risk factors for atopic and non-atopic asthma among children revealed that risk factors for asthma m children who were not sensitized were Family history of asthma (odds ratio OR 3.6), breast-feeding <3mths. (OR1.8), past or present dampness at home (OR-1:0), smoking mother (OR 1.7) and male sex (OR 1.6). Among the sensitized asthmatics, only a family history of asthma was a significant factor (OR 3.0)[22]. It has been reported that family history of atopy, asthma, and eczematoid dermatitis and parental and pregnancy smoking are substantially more common in wheezy infants than in controls ($p<0.05$ for each parameter)[23]. The relationship between lower respiratory tract illnesses in early life caused by the respiratory syncytial virus (RSV) and the subsequent development of wheezing and atopy in childhood is not well understood. A recent study however suggested that RSV lower respiratory tract illnesses in early childhood are an independent risk factor for the subsequent development of wheeling upto 11 years. This association was not caused by an increased risk of allergen sensitization[24]. Epidemiological studies of temporal and geographic variations in asthma morbidity have identified asthma as an important public health concern[26]. The present study was therefore undertaken to assess the recent trends and patterns and to explore the various associated potential risk factors,

## References


1. Sears M R. The definition asthma. Allergy 1993:48:12-16.
2. Strachan DP. The Epidemiology of childhood asthma. Allergy 1999; 54:7-11,
3. Williams H, Me Nicol KM. Prevalence, natural history and relationship of wheezy bronchitis and asthma in children. An epidemlological study. BMJ 1969,1V. 32M25.
4. ToelleDG, PeatJK, Salome CM,Mellis CM, Woolcock A, toward a definition of asthma for Epidemiology. Am Rev Respn- Dis 1992, 146: 633-637.
5. Asher Ml, Keil U, Anderson 11R, et al. International study of asthma and allergies in childhood (ISAAC), rationale and methods. Eur Rcspir J 1995,8:483-491.

6. Bjorksten B. The environmental influence on childhood asthma. Allergy 1999,54:17-23,
7. Wahn U, Lau S, Bergmann R el al. indoor allergen exposure is a risk factors for sensitization during the first three years of life. J Allergy Clin Immunol.1997, 99.763-769.
8. Lenney W, Well NEJ, O'Neil RA. The burden of paediatric asthma. Eur Respir Rev 1994,4:49-62,
9. Bauman A. Has the prevalence of asthma symptoms increased in Australian children? J Paediatr Child Health 1993, 29:424-42S.
10. Heish KH, Shen JJ. Prevalence of childhood asthma in Taipei, Taiwan and other Asian Pacific countries. J Asthma 1988, 25. 73-82.
11. Andersen H R. Is asthma really increasing? Paedtr Respir Med. 1993,1:6-10,
12. Speight AN, Lee DA, Hey EN, Underdiagnosis and under treatment of asthma in childhood, BMJ 1983,286:1253-1256.
13. Williams H, Me Nicol KN. Prevalence, nahiral history and relationship of wheezy bronchitis and asthma in children: An epidcmiulogical study, BMJ 1969;iv:321-325.
14. Silverman M. Out of the mouths of babes and sucklings. Lessons from early childhood asthma. Thorax 1993;4S:1200-1204.
15. Wilson NM significance of early wheezing. Clinical Allergy 1994,24:522-529.
16. MartinczFD. Recognizing early asthma. Allergy 1999;54:24-28.
17. Wevcr-T-Tcss J. KouwenWg JM, Duiverman EJ, Herman J, Wever AM. Prognostic characteristics of asthma diagnosis in early childhood in clinical pracucc. Ada Paediatr. 1999,88:827-34.
18. Holt P, Sly F, Bjorksten B, Atopic versus infectious disease in childhood: A question of balance? Pediatr Allergy Iminunol. 1997, S: 1-5.
19. Wahn U, Lau S, Bergmann R, et al. Indoor allergen exposure is a risk factor for sensitization during the first three years of life. J Allergy Clin Immunol. 1997; 99: 763-769..
20. Bjorksten IN. Environmental risk factors for atopy, N Trends Allergy. 1996,4:3-11.
21. Wever-Hess J, Komvenhcrg JM, Duiverman EJ, Hermans J, Wever AM, Risk factors for exacerbations and hospital admissions in asthma of early childhood-Pcdiatr Pulmonol 2000, 29:250-6,
22. Ronmark E, .Lonsson N, Platts-Mills T, Luridliack R. Different patterns of risk factors for atopic and non-atopic asthma among children Ruport from (lie obstructive lung disease in Northern Sweden Study. Allergy 1999, 54.926-35,
23. Karaman 0, Uguz A, Uzuner N. Risk factors in wheezing infants, Pcdiati hit. 1999, 41:147-50,
24. Stein RT, Sherrill D, Morgan W J, Holberg CJ, Halonen M. Taussig LM, Wright AL. Martinez FD. Respiratory syncitial virus in early life and risk of wheeze and allergy by age 13 years. Lancet 1999; 354: 541-5.
25. Grant EN, Wagner R, Weiss KB. Observations on emerging pollen-is of aslhma in our society J Allergy Clin Immunol 1999, 104.S1-9.