

Clinical Features to Differentiate Asthma from Wheeze Associated With Lower Respiratory Infection in Children

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Abstract

Background and Objectives: Both Asthma and wheeze associated lower respiratory infection (WALRI) has wheeze as common feature. Under diagnosis of asthma would result in over use of antibiotics and under use of controller therapy for asthma. We conducted a study to differentiate WALRI and Asthma based on clinical symptoms in order to optimize both short term and long term management of these two conditions.

Methods: This was a cross sectional study conducted in 44 children aged between 0 – 5 years getting admitted with respiratory distress in the department of Paediatrics. The case records of patients admitted were entered in proforma and were diagnosed as asthmatics and having WALRI based on clinical. The relation of various parameters with asthma or WALRI was observed.

Results: All subjects with asthma had wheeze and 40.5% of children with WALRI had wheeze (P=0.004). Our study showed that fever and day symptoms were related to asthma and WALRI (P=0.001), whereas night symptoms were unrelated (P=1.0). When data was analysed for the relationship between recurrent symptoms, asthma and WALRI, the results were highly significant (P=0.001). Climatic variation (P=0.001), family history of asthma (P=0.001) and abnormal chest X-ray (P=0.01) were related to asthma and WALRI.

Conclusion: Our study shows that H/O recurrent wheeze, family history of asthma and symptoms such as breathlessness, and wheeze were indicative of asthma. Fever with respiratory distress was found to be indicative of WALRI. Both day and night symptoms are present for WALRI, but night symptoms are predominant in asthma.

Keywords: children; asthma; WALRI; wheeze; symptoms

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Introduction

Asthma is a Greek word meaning breathlessness or breath with open mouth. The prevalence of bronchial asthma is 4 to 7% of the people worldwide. Asthma is prevalent among 4 to 32% among children of U.K at six to seven years of age, and represents the population with highest incidence of this disease¹. Childhood bronchial asthma has multifactor causation. Geographical location, environmental, racial as well as factors related to behaviour and lifestyle is the major

contributors to this disease. The burden of asthma affects patients, their families and society in terms of lost school, lessened quality of life, hospital visits, hospitalization and deaths. The prevalence of asthma varies from one to 18% among different populations, and while its prevalence is increasing in few countries, it has stabilized or has begun to decline in some^{2,3}.

Wheezing in children, particularly in infancy, does not mean that chronic asthma will develop later in life. At least 20% of the

children less than 2 years of age experience transient episodes of wheezing during viral infections. As these infants grow, this relationship becomes more normal, and it is thought that these are the children who come out of asthma. However, at least 15% of the children who wheeze during infancy continue to wheeze beyond 6 years of age. Finally, at least 15% of children develop late-onset wheezing patterns characterized by the initial development of symptoms beyond 6 years of age⁴.

Both Asthma and wheeze associated lower respiratory infection (WALRI) has wheeze as common feature. Under diagnosis of asthma would result in over use of antibiotics and under use of controller therapy for asthma. We conducted a study to differentiate WALRI and Asthma based on clinical symptoms in order to optimize both short term and long term management of these two conditions.

Materials and Methods

This was a cross sectional study conducted in 44 children aged between 0 – 5 years getting admitted in the department of Paediatrics of a tertiary care hospital with respiratory distress from November 2019 – October 2020. The study was approved by Institutional Ethics Committee. The details of the study were explained and informed consent was obtained from the parents or the guardian of children included in the study.

Inclusion criteria:

- H/O cough
- H/O wheeze
- H/O breathlessness
- Fever

Exclusion criteria:

- Definite H/O foreign body aspiration
- Known heart disease

- Severe systemic illness

The study was a retrospective cohort study. The case records of patients admitted were reviewed by a set proforma (master chart) filed for each patient who got admitted and fulfilled the inclusion criteria, who were diagnosed as asthmatics and having WALRI for demographic, clinical and laboratory parameters. The relation of these parameters with asthma or WALRI was observed. *P* value was calculated by chi square method and by this study we tried to differentiate asthma and WALRI. Asthma is defined as inflammatory disease of airways with bronchial hyper responsiveness presenting as reversible airflow obstruction with features of cough, wheeze, breathlessness and chest tightness. WALRI denoted child presenting with recurrent wheeze invariably of viral LRI.

Statistical analysis was done SPSS 15.0.

Results

In this cross sectional study, we included 44 children, from newborn period to 5 years of age.

Table 1: Age distribution of the study population

Age	Asthma (%)	WALRI (%)	Chi square test
	(n=7)	(n=37)	
<12 months	0	29.7	$\chi^2 = 3.72$
13-24 months	28.5	43.2	P=0.05
25-60 months	71.5	27.1	

The percentage of female children in Asthma group was 14.3% and in WALRI group was 32.5%. All the 44 patients were from urban locality. The percentage of children less than 2.5 kg of birth weight was 42.8% and

16.2% among asthma and WALRI groups respectively. Those between 28.6% and 48.6% among asthmatic and WALRI subjects had birth weight between 2.5 to 3.0 kg. 28.6% of children with asthma and 35.2% of children with WALRI had birth weight above 3 kg. This result was not significantly different between the three groups ($P=0.26$). No significant difference was found between term and pre-term children in both groups for incidence of the respective conditions ($P=0.43$). Breast feeding or history of cough was not related to asthma or WALRI ($P=0.66$).

Children were divided into two groups based on presence/absence of wheeze. All subjects with asthma had wheeze and 40.5% of children with WALRI had wheeze. Chi square test showed that wheeze was significantly related to asthma/WALRI ($P=0.004$). Our study showed that fever and day symptoms were related to asthma and WALRI ($P=0.001$), whereas night symptoms were unrelated ($P=1.0$). When data was analysed for the relationship between recurrent symptoms, asthma and WALRI, the results were highly significant ($P=0.001$). Climatic variation ($P=0.001$), family history of asthma ($P=0.001$) and abnormal chest X-ray ($P=0.01$) were related to asthma and WALRI. Family history of allergic rhinitis was not significantly related to asthma or WALRI. Weight and lymphocyte count were significantly higher among asthma patients compared to WALRI ($P=0.04$ and 0.05 respectively).

Discussion

India is a country undergoing rapid urbanization, leading to increasing prevalence of asthma and other respiratory diseases. The characteristics of the patients and association

of these with the conditions of interest were meticulously studied. Our study showed that children in the age group 13-24 months showed maximum prevalence of wheezing and agrees with other international data. A study done by Martinez et al has showed that incidence of asthma and wheezing peaks in very early childhood⁵. Recent studies on preschool children have documented abnormal lung function in children with persistent wheezing as young as 3 years⁶. Our study showed that these conditions are more prevalent among male children and agrees with the study by Marco et al³. Severity of asthma has also been reported to be more among male children⁸.

The non-significant results observed while comparing children of different birth weight categories could be due to the small sample size of this population, as some earlier studies have reported a correlation between the two factors⁹. Since term Breast feeding has been reported to be protective against respiratory illness, but our findings are not consistent with the above hypothesis. Early morning cough was found to be a very good predictor of asthma in this study. Day symptoms were present in 42% of the children and night symptoms among 100% of the children. Asthma shows diurnal variation, whereas WALRI has symptoms throughout day and night. A study by Horak et al has showed that WALRI is the result of viral infections and produces symptoms throughout day and night¹⁰. Constricted airways in children cause expiratory difficulty that produces the cough. Asthma is known to produce triad of symptoms: cough, wheeze and breathing difficulty. Our study has also made a similar observation. Recurrent symptoms were present among 85% of asthmatic children and 2.8% of WALRI children. Our study showed that family

history of asthma was correlated with asthma, and this agrees with results from a prospective study done by Martinez et al⁵.

In our study, 57% of the patients with asthma had exacerbation with climatic condition, the trigger for asthma being cold, dry air. Goran et al had reported that winter was associated with more incidence of asthma¹¹. Children with asthma did not have fever in our study and fever is not considered as a symptom of asthma by IAP. Rhonchi were found among 100% of the children in our study. The lung volumes of children with atopic and non atopic wheezing were less. In non atopic group, maturation of lungs leads to improvement in wheezing disorder and they are called transient wheezers. As expected abnormal chest X-ray findings were present among all asthmatic and 59% of WALRI children. When asthmatic children have hyperinflation and minimal perihilar infiltrates, WALRI group would have more infiltrates, and involve lung parenchyma.

Conclusions

Our study shows that H/O recurrent wheeze, family history of asthma and symptoms such as breathlessness, and wheeze were indicative of asthma. Fever with respiratory distress was found to be indicative of WALRI. Both day and night symptoms are present for WALRI, but night symptoms are predominant in asthma. Gestational age, birth weight and h/o breast feeding were not related to these conditions.

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