ORIGINAL RESEARCH PAPER

Volume-7 | Issue-1 | January-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CLINICORADIOLOGICAL FINDINGS IN A COHORT OF CHILDREN WITH WHEEZING: DATA FROM A RURAL MEDICAL CENTRE

Pediatrics

Sambhav Yadav MD, Junior Resident, Department of Pediatrics, M.M Institute of Medical Sciences and Research, Mullana, Ambala, Haryana-133207.

Gauri Chauhan* MD, Senior Resident, Department of Pediatrics, M.M Institute of Medical Sciences and Research, Mullana, Ambala, Haryana-133207.*Corresponding Author

S.P Gupta MD, Professor, Department of Pediatrics, M.M Institute of Medical Sciences and Research, Mullana, Ambala, Haryana-133207.

Anand Kumar Bhardwaj DCH, MD, Professor, Department of Pediatrics, M.M Institute of Medical Sciences and Research, Mullana, Ambala, Haryana-133207.

Aarti Sareen MD, Professor, Department of Pediatrics, M.M Institute of Medical Sciences and Research, Mullana, Ambala, Haryana-133207.

ABSTRACT

Background: Wheezing in infants and children is a common clinical finding. However, it may be due to varying aetiologies and hence requires detailed clinical and radiological correlation to arrive at a correct diagnosis. The present study was done prospectively to note the various clinical presenting features and findings along with radiograph abnormalities in children with wheeze as a primary symptom.

Methods : A total of 100 pediatric patients with wheeze as main symptom and under the age of 18 years were enrolled. All the patients were thoroughly examined and X-ray done were evaluated.

Results: Out of 100 patients, majority were less than 5 years of age group (63%). Of the total, 69% were males and 31% females. Socioeconomic status revealed 71%l lying below poverty line and rest above poverty line. Amongst the various diagnosis the most common were LRTI (35%) and Bronchial Asthma (32%). The various demographic parameters, clinical features and X-ray were studied and correlated. Correlating with LRTI, majority were less than 5 years of age (45.3%), more were males (36.2%) and mostly above poverty line (48.3%). The clinical findings pertaining to respiratory illness were found more in Bronchial Asthma than in LRTI like breathing difficulty and cough, 47.4 & 41.7% to 42.1 & 37.5% respectively. The significant radiograph findings in both these conditions were Hyperinflation (82.6%)in Bronchial asthma and pneumonitis (53.7%) in LRTI. The parameters were also studied for the other less diagnosis but not majorly highlighted in our study.

Conclusion: Study highlights that wheeze is most commonly seen in less than 5 years age group and in addition to bronchial asthma, lower respiratory tract infections are the most common underlying aetiology in these cases. In addition, breathing difficulty and cough were found to be the main indicators of both the conditions and these could be substantiated by findings on a plain radiograph.

KEYWORDS

Cohort Study, Wheezing, Bronchial Asthma, LRTI, radiograph

INTRODUCTION:

Wheeze is a musical and continuous sound that originates from oscillations in narrowed airways. Wheeze is heard mostly on expiration as a result of critical airway obstruction[1] Weiss LN[2], depicts causes of wheezing in children and infants as common- allergies, asthma or reactive airway disease, gastro-esophageal reflux disease (GERD), infections (bronchiolitis, bronchitis, pneumonia, upper respiratory infections) and obstructive sleep apnea. Uncommon causes found as Broncho-pulmonary dysplasia and foreign body aspiration. Rare causes being, bronchiolitis obliterans, congenital vascular abnormalities, congestive heart failure, cystic fibrosis, immunodeficiency diseases, mediastinal masses, primary ciliary dyskinesia, tracheobronchial anomalies, tumor or malignancy, vocal cord dysfunction. It's seen, approximately 25 to 30 percent of infants have at least one episode of wheezing. By three years of age, an episode of wheezing occurs in 40 percent of children and by six years of age, almost one half of children have at least one episode of wheezing. Most infants and children with recurrent wheezing have asthma, but other causes should be considered in the differential diagnosis. The pattern of wheezing may highlight the the etiology ranging from episodic to persistent wheeze. Associated symptoms can direct the diagnosis of the particular wheeze. The most helpful radiological examination is plain skiagram of chest. Chest radiography is indicated in children who present with unexplained wheezing that is unresponsive to bronchodilators or with recurrent wheezing. Plain-film radiography can identify congenital anomalies of the lung, parenchymal lung disease and some foreign bodies and cardiac abnormalities. Thus being the most reliable and prompt investigation. This study focus on the clinical features and findings of such children and their correlation with the radiograph findings.

METHODS:

It was a prospective study conducted on 100 children admitted in Department of Pediatrics, Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala for a period of two years. Children upto 18 years of age of both sexes who were admitted having wheeze were included while all children with congenital malformations **and** whose parents did not give consent for investigation were excluded. All the patients who formed the subjects were examined by clinical experts on everyday morning rounds and findings were confirmed. The X-ray chest was ordered to all patients and properly reported by radiologists.

General examination was done in detail, following were noted:

- Vital parameters like heart rate, respiratory rate, blood pressure and oxygen saturation
- Abnormalities like pallor, icterus, clubbing, cyanosis, lymphadenopathy and edema.

Systemic examination was done in detail and abnormalities like use of accessory muscles, presence of abnormal sound (stridor, grunt, audible wheeze), percussion of all the areas of chest, auscultation to assess the breath sounds and any added characters. Other systems were also examined in detail and abnormalities noted. Clinical diagnosis was made on the basis of this examination and only relevant findings were noted and tabulated in this study.

Various investigations were ordered according to the clinical impression. Chest X-ray was done in all the patients and was reported by radiologist. The first X-ray sent and reported was included in our study, as many patients were further evaluated with series or repeat chest radiographs depending on their treatment and prognosis.

STATITICALANALYSIS:

Statistical analysis is used to find out the clinical profile of wheezing children in the present study as well as its correlation with radiological findings by using terms like frequencies, contingency coefficient, cross tab, chi-square test. All the statistical methods were performed through SPSS software, P value of < 0.05 was considered statistically significant. Microsoft word & excel were used to generate graphs and tables.

RESULTS:

As depicted in the Table, the demographic profile; there were 53 patients (53%) of age group less than 5 years, 25(25%) between 5-12 years and 22(22%) were of 13-18year age group. Majority of patients were less than 5 year of age . Of them 69 patients (69%) were male and 31 patients (31%) were females. Majority of patients were male. Distribution of patients according to their socioeconomic status showed 71 patients (71%) were below poverty line and 29 patients (29%) were above poverty line. Clinical features, findings and radiological findings ranging from fever to chest sounds to CXR findings were tabulated. Highlighted in the Figure, the highest no. of patients were diagnosed as LRTI (35%), followed by Bronchial Asthma (32%), Septicemia (13%), Fluid overload (11%) while Bronchiolitis, CNS infection and URTI were least in number 6, 4 and 3% respectively.

Patient's age, gender & socioeconomic status correlated with Bronchial Asthma, majority of patients were of age group 5-12 years (48%), 41.9% were females with 34.5% above poverty line but none of the variable is statistically significant. Among 32 cases of bronchial asthma 41.7% had cough without expectoration, 47.4% had breathing difficulty at rest, 21.7% had crepts and 7.9% had pallor with significant p-value(<0.05) while rest of the variables fever without chills, cough with expectoration, loss of consciousness, seizures & loose stools were 26.5%, 23.5%, 33.3%, 25% & 16.7% respectively which were not statistically significant. Evaluating the clinical and radiological findings most common findings found were Anemia (11.1%) and Hyperinflation (82.6%) were statistically significant while others were Tachycardia (27.8%), Tachypnoea (27.1%), prominent Broncho-vascular markings (35.6%), Pneumonitis (22%), U/L pleural effusion (12.5%) but not significant.

Parameters correlated with LRTI; majority of patients were of age group less than 5 year (45.3%), more were male (36.2%) and 48.3% of patients were above poverty line. Evaluating clinical features and findings of LRTI patients 83.3% had loose stools, 52.6% had pallor and are statistically significant while rest of the variables fever without chills (39.7%), Breathing difficulty at rest (42.1%), cough without expectoration (37.5%), pain abdomen (33.3%), loss of consciousness (22.2%), seizures (25%), crepts (43.5%), other sounds (63.6%) showing no statistically significance. Evaluating the clinical and radiological findings most common findings found was anemia (46.7%) and pneumonitis (53.7%) and were statistically significant while rest of the variables Tachycardia (37.5%), Tachypnoea (43.8%), BV markings prominent (35.6%), pleural effusion- U/L&B/L (50%), consolidation (50%) were not significant.

These all parameters were also studied and tabulated for the other less common diagnosis, but not majorly highlighted in our study as the main focus we try to pertain is on the common respiratory diagnosis related to wheeze and its radiological correlation. Although the main significant findings in each were as follows as they may be helpful in the daily practise. In Bronchiolitis, none of the studied variables were significant. In children with fluid overload, finding of breathing difficulty on exertion was found significant (60%) and cardiomegaly, tachypnoea had significant values of 100 and 4.2% respectively. In septicemic children, findings of loss of consciousness, pain abdomen, breathing difficulty at rest were significant (44.4%,50%,2.6% respectively) and CXR finding of pleural effusion were significant: U/L 25% and B/L 25%. CNS infections found in 4% of children has features of loss of consciousness and seizures as significant that is 22.2% and 25% respectively.

DISCUSSION:

Respiratory illnesses are one of the common causes of morbidity and mortality in developing countries. Lower respiratory tract infections and Bronchial asthma are common causes of wheeze in children specially in children less than 5 years. An early diagnosis and treatment are major factors to prevent mortalities.

Demographic variables studied showed, 53% of patients were less than 5 years of age admitted with one of the clinical presentation being wheezing, found significant in cases of LRTI (p<0.05 John Saito et al[3] conducted study for assessing airway disease in young children and found that 74% young children had small airway calibre with significantly limiting airflow which pre disposed them to impaired secretion clearance due to which repeated episodes of wheeze due to various etiology are more common in small children. Evaluating the gender our study had 69% males. The male female ratio by a study from Tarikh Iqbal Bhutta[4] was 2:1 in children with wheeze in Bronchial Asthma. While this propensity may account for some gender variability in the diseases. Assessing Socioeconomic status, 71% of patients were below poverty line. Other studies done by Lidia Panico[5] et al conducted study on ethnic variation in childhood wheezing illness & found that low socio-economic status had higher incidence of having wheeze due to various infective or allergic causes with 25.5% of Black Caribbean children had more frequent episodes of wheeze as compared to white children (19%). Variability in our data highlights the study population, their general condition, poor resource availability and health facility.

Among different clinical features we observed 71% of patients had fever (with or without chills). Lakshmi Muthukrishnan & Radhika Raman[6] reported fever in 65% of cases with wheeze. Highlighting the fact that infective causes are more in a wheezing child than non infective or allergic condition. Breathing pattern of a wheezing child is always characteristic and helpful, in our study 43% of children had breathing difficulty (at rest or on exertion), 41% in bronchial asthma and 39% in patients with LRTI. Motwani Naresh et al[7] conducted study on children with LRTI, found breathing difficulty (hypoxemia) in 39.7% of patients which accounts for a significant percentage in a wheezing child indication the involvement of the lower respiratory tract. Naresh P. et al[7] reported tachypnea in 88% of children in their study and consider it as indicator of LRTI, while 48% children in our study had this presentation of them 43% had LRTI and 27 % had bronchial asthma, which indicated a high sensitivity of lower respiratory tract involvement. Cough without expectoration was observed in 62% of cases , Susanna Espatio et al[8] also showed significant coughing in Bronchial Asthma Also findings like tachycardia (72%), pallor (38%) (p<0.05) were found significant, showing a positive relation of a wheezing child with infective cause and an associated finding of anaemia. On auscultation it was found that 34% had abnormal chest sounds & 31% specifically had crepts which was found significant with cases of Bronchial Asthma. This may be justified with increased propensity of allergic diseases to respiratory infections and children do present with concomitant diseases.

Chest radiographs are an important part of management in a wheezy child. The most peculiar finding in bronchial asthma is hyperinflation, seen in 82% of the total in cases with bronchial asthma. Overinflation was suggestive if the diaphragm appreciated below 7th rib level and dimished heart diameter. G. Simon et al [9] found that the radiograph findings differed with the severity of asthma, 15% of uncomplicated asthma showed pattern of simple overinflation while those with marked radiological abnormaities had the most severe constant asthma. In our study the feature of prominent broncovascular markings (45%) was seen equally in both asthma and LRTI (35%) and 41% had features of pneumonitis, significant in LRTI 53.5% (p<0.05). Kumar Naresh et al[10] showed significant number of patient with wheeze had prominent broncho vascular markings (43.8%) and also find opacities on CXR in children with wheeze. Lakshmi M and Radhika R[11] showed most common radiological abnormality found in children with acute wheeze was prominent bronchovascular markings (67%). Although the radiographs are not a very good tool for the diagnosis, as the features are overlapping for a wheezing child, but the importance still persists.

CONCLUSION:

Majority of children with wheeze have Bronchial asthma which is a known cause of wheezing but our study also highlights the other main cause being lower respiratory tract infection with associated respiratory symptoms. Chest X-ray is a common investigation and a first line assessment tool for a wheezing patient directing towards the cause.

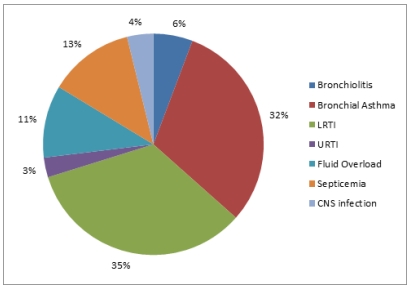


Table : Distribution of patient demographic, clinical sign and symptom profile and radiological features in patients with Bronchial Asthma and other LRTI's

Parameter	N	Bronchial Asthma		LRTI's	
		Yes (n-32)	P-value	Yes (n – 35)	P- value
Age					
<5	53	13	0.116^{NS}	24	0.038*
5 -12	25	12		4	
13 -18	22	7		7	
Gender					
Male Female	69 31	19 13	0.153^{NS}	25 10	0.700^{NS}
Socio economic status					
Below poverty line Above poverty line	71 29	22 10	0.084^{NS} 0.563^{NS}	21 14	0.075^{NS}
Fever without chills	68	18	0.046*	27	0.150^{NS}
Fever with chills	3	0	0.411^{NS}	1	1.000^{NS}
Cough without expectoration	48	20	0.010*	18	0.615^{NS}
Cough with expectoration	17	4	0.279^{NS}	9	0.089^{NS}
Breathing difficulty at rest	38	18	0.200^{NS}	16	0.244^{NS}
Breathing difficulty on exertion	5	0	0.705^{NS}	1	0.810^{NS}
Pain abdomen	6	0	1.000^{NS}	2	1.000^{NS}
Loose stools	6	1	0.962^{NS}	5	0.034*
Loss of consciousness	9	3	0.000*	2	0.634^{NS}
Seizures	8	2	0.042*	2	0.817^{NS}
Pallor	38	3	0.084^{NS}	20	0.004*
Crepts	46	10	1.000^{NS}	20	0.101^{NS}
Stridor	1	0	0.039*	1	0.752^{NS}
Tachycardia	72	20	0.147^{NS}	27	0.401^{NS}
Tachypnoea	48	13	0.311^{NS}	21	0.078^{NS}
Anaemia	45	5	0.000*	21	0.027*
BV markings prominent	45	16	0.491^{NS}	16	0.916^{NS}
Pneumonitis	41	9	0.073^{NS}	22	0.001*
Pleural effusion **U/L** **B/L**	12 8 4	1 1 0	0.223^{NS}	6 4 2	0.532
Hyperinflation	23	19	0.000*	0	0.000*
Consolidation	4	0	0.393^{NS}	2	0.915^{NS}
Cardiomegaly	2	0	0.830^{NS}	0	0.765^{NS}
Collapse	0	0	-	0	-
Foreign body	0	0	-	0	-
Dilated bronchioles	0	0	-	0	-
Laryngotracheobronchitis	0	0	-	0	-

REFERENCES:

1. Kliegman, Stanton, St.Gemme, Behrman.; Kimberly Danieli Watts and Denise M. Goodman. Nelson textbook of Paediatrics 19TH ed. New Delhi :Elsevier;2013.1456.
2. Weiss LN. The Diagnosis of Wheezing in Children. Am Fam Physician. 2008; 77(8):1109-1114.
3. Saito J, William T, Gelfond HJ, Terry L. Noah, Margaret W. Leigh, Robin Johnson RRT and Stephanie D. Physiologic, bronchoscopic and bronchoalveolar lavage fluid findings in young children with recurrent wheeze and cough. Pediatric Pulmonology. August 2006; 709-719.
4. Bhutta TI, Iqbal I. A Clinical Study Of Asthma In Children. Journal Of Pakistan Medical Association. 1988; 38: 14.
5. Panico L, Bartley M, Marmot M, Nazroo J Y, Sacker A and Kelly YJ. Ethnic variation in childhood asthma and wheezing illnesses: findings from the Millennium Cohort Study. International Journal of Epidemiology. 2007; 36: 1093–1102.
6. Muthukrishnan L and Raman R. Analysis of clinical & radiological findings children with acute wheeze. Herbert Open Access Journals. 2013; 2053-6739.
7 Naresh P M, Lalitha J, Subramanian S B and Dhiraj B. Clinical Predictors of Hypoxemia in Children with Acute Lower Respiratory Illness . International Research Journal of Medical Sciences. 2015; 3(3): 11-15.
8 Esposito S, Galeone C, Lelii M, Benedetta, Longhi B, Ascolese B, Senatore L, Prada E, Montinaro V, Malerba S, Patria MF and Principi N. Impact of air pollution on respiratory diseases in children with recurrent wheezing or asthma. BMC Pulmonary Medicine. 2014; 14(1):130.
9 Simon, G., et al., Thorax, 1973; 28: 115
10 s Kumar N, Singh N, Locham K.K, Garg R and Sarwal D. Clinical Evolution Of Acute Respiratory Distress And Chest Wheezing In Infants. Indian Pediatrics. 2002; 39: 478-483.
11 Lakshmi M and Radhika R, Analysis of clinical and radiological finding in children with acute wheeze. Pulmonology & Respiratory Research 2013, http://www.hoajonline.com/journals/pdf/2053-6739-1-1.pdf.