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Original Article

Evaluation of the Clinical Features of Bronchiolitis in Paediatric Patients and Exploration of the Risk Factors

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Abstract

Background*:** In general, bronchiolitis presents as a progressive viral respiratory illness in children younger than 2 years of age, most commonly between 2-6 months. ***Objective: The study was conducted to assess the clinical presentations of acute bronchiolitis in infants and young children and to evaluate the individual characteristics and environmental factors which can increase the risk of severe disease and hospitalization. ***Methodology:*** This descriptive study was conducted in the department of Paediatrics, Khwaja Yunus Ali Medical College and Hospital, Enayetpur, Sirajganj. A total of 70 patients were included in the study, who were admitted to the hospital with a clinical and radiological diagnosis of acute bronchiolitis and were followed up in the Paediatric department during January, 2021 to December, 2021. Data collection was done by using a questionnaire form and by physical examination. The information for the questionnaire was provided by the childrens' mothers. The SPSS software was used for data analysis. ***Results:*** According to the results of the study, 39(55.7%) children were infants, aged between 2-6 months, 21(30.0%) were between 7-12 months and 10(14.3%) children of more than 12 months of age. Boys (47, 67.1%) were affected more commonly than girls (23, 32.9%) in a ratio of 2:1. Some 60 (85.7%) of the children had siblings and 46 (65.7%) children lived in crowded environment at home. Many (25, 35.7%) parents of the children were cigarette smokers and 37(52.9%) children were given formula feeds. There was previous history of hospitalization among 14(20.0%) cases and 5(7.1%) children were pre-term. The most common clinical presentations of bronchiolitis were cough among 61(87.1%) cases, wheeze in 56(80.0%), respiratory distress in 49(70.0%) and feeding difficulty in 28(40.0%) children. ***Conclusion:*** The risk factors for bronchiolitis were young age (2-6 months), presence of a sibling, a history of hospital admission, crowding and paternal smoking at home and formula feeding. The most common clinical presentations were cough, wheeze and respiratory distress.

Key Words: Bronchiolitis, Cough, Wheeze, Respiratory distress

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Introduction

Bronchiolitis is a common acute viral inflammation of the bronchioles in infants and children younger than 2 years of age, characterized by airway obstruction, wheezing and increased respiratory effort.[1] Respiratory Syncytial virus (RSV) is the primary cause of bronchiolitis for >80% of cases in infants and young children.[2] It is followed by human metapneumovirus, parainfluenza virus, influenza virus, adenovirus and rhinoviruses. These viruses are very

contagious and spread from person-to-person by respiratory droplets or contact with infected respiratory secretions.[3] It is a seasonal disease, most common during winter months (November to March) but sporadic cases occur throughout the year.[4] During the peak in winter season, these viruses widely circulate in the community and re-infection can occur in one season.[5] The majority of cases of bronchiolitis occur in children under 1 year of age.[6] Male children are affected more commonly with acute Bronchiolitis compared to females.[7] The infection rate with RSV is around 70% in infants in their first year of life and 22% develop symptomatic disease.[8] There is a high disease burden and the burden of disease has significantly increased over years, the reasons which are most likely to be multifactorial.[9] Although the risk factors of severe disease in children are congenital heart disease, chronic lung disease of prematurity, neuromuscular disorders or immunodeficiency, the majority of illness occurs in term, otherwise healthy infants.[10] Approximately 50% of children experience bronchiolitis during the first 2-years of life with a peak between age 2- to 6-months, which corresponds to the availability of protective maternal IgG.[11] Preterm infants are at higher risk of RSV bronchiolitis.[12] Bronchiolitis is associated with preventable social risk factors. Bronchiolitis in infancy is higher in households with a low socio-economic status.[13] Direct effect of passive smoke due to parental smoking is also associated with bronchiolitis in children.[14] Presence of older sibling and family history of Asthma increase the risk of clinically diagnosed bronchiolitis.[15-16] Breast-feeding has a strong protective mechanism against the disease and maintaining exclusive breast-feeding for 6 completed months is associated with a lower risk of bronchiolitis in infants.[17] Considering the above facts regarding the Bronchiolitis, the present study was designed to assess the clinical presentations of acute bronchiolitis in infants and young children and to evaluate the individual characteristics and environmental factors which can increase the risk of severe disease and hospitalization.

Methodology

The study was a descriptive study conducted in the department of Paediatrics, Khwaja Yunus Ali Medical College and Hospital (KYAMCH), Enayetpur, Chauhali, Sirajganj-6751, Bangladesh during January, 2021 to December, 2021. A total of 70 children, aged less than 2 years, hospitalized with the diagnosis of acute Bronchiolitis, were enrolled in the study and followed up in the Paediatrics department of the hospital.

Inclusion criteria for enrolment of the cases were: (i) infants and young children aged less than 2 years of age at the time of clinical diagnosis of acute bronchiolitis; (ii) symptoms and signs of acute bronchiolitis during hospitalization, e.g. fever, cough, coryza, respiratory distress, tachypnoea and chest indrawing; (iii) first-episode of wheezing in previously healthy children; (iv) radiologically having hyper-inflation and increased translucency on chest radiographic finding.

Children with diagnosis of pneumonia, pulmonary tuberculosis, otitis, sinusitis, gastro-oesophageal reflux disease, congenital airway anomalies and congenital heart diseases were excluded.

Data regarding age, sex, past history of hospitalization, number of siblings, paternal smoking and environment at home, formula feeding and gestational age of the infant were collected. Data was collected by pre-coded questionnaire about the risk factors and history of the disease. Informants were the childrens' mothers or guardians after acquiring an informed consent from them. Data analysis was conducted with SPSS software version 22.0. The study was approved by the local Ethics Committee of the hospital.

Results

Regarding the age of the child as a risk factor for bronchiolitis, 39(55.71%) children were infants aged between 2-6 months, 21(30.0%) were between 7-12 months and 10(14.29%) children were more than 12 months of age. Regarding sex ratio, 47(67.14%) affected children were boys, compared to 23(32.86%) girls in a ratio of 2:1. Some 60(85.71%) children had siblings and 46(65.71%) lived in crowded environment at home. As regards parental smoking, 25(35.71%) parents were cigarette smokers, while remaining 45(64.29%) parents were not smokers. Results showed that 14(20.0%) children had a past history of hospitalization, 5(7.14%) were delivered as preterm and 37(52.86%) cases were fed by formula feeding. (Table 1)

Table 1: Risk factors of Bronchiolitis found among the cases (n=70)

SL No.	Risk Factors	Frequency	Percent
1	**Age/months**		
	0-6	39	55.71%
	7-12	21	30.00%
	13-23	10	14.29%
	Total	70	100.00%
2	**Sex**		
	Male	47	67.14%
	Female	23	32.86%
	Total	70	100.00%
3	**Presence of Siblings**		
	Present	60	85.71%
	Absent	10	14.29%
	Total	70	100.00%
4	**Housing Condition**		
	Crowded	46	65.71%
	Not Crowded	24	34.29%
	Total	70	100.00%
5	**Paternal Smoking**		
	Yes	25	35.71%
	No	45	64.29%
	Total	70	100.00%
6	**Past History of Admission**		
	Yes	14	20.00%
	No	56	80.00%
	Total	70	100.00%
7	**Formula Feeding**		
	Given	37	52.86%
	Not Given	33	47.14%
	Total	70	100.00%
8	**Gestational Age**		
	Term	65	92.86%
	Pre Term	5	7.14%
	Total	70	100.00%

Considering the clinical presentations of bronchiolitis among the cases, the highest number of children presented with cough (61, 87.14%), followed by wheeze (56, 80.00%), coryza and nasal congestion (52, 74.29%), respiratory distress (49, 70.00%), chest in-drawing (28, 40.00%), feeding difficulty (28, 40.00%) and fine crepitations (18, 25.71%). Low, moderate and high respiratory rates among respondents were found among 47(67.14%), 14(20.00%) and 10(14.00%) patients respectively. As regards to fever, normal temperature was found in 47(67.14%) and low-grade and high-grade fever were found in 21(30.00%) and 7(10.00%) cases respectively. Some 47(67.14%) of the children with bronchiolitis showed normal level of oxygen saturation, whereas, 6(8.57%) showed moderate levels and 16(22.86%) showed low levels of oxygen saturation. (Table 2)

Table 2: Clinical presentations of the cases of Bronchiolitis (n=70)

Sl No.	Clinical Presentation	Frequency	Percent
1	**Symptoms**		
	Cough	61	87.14%
	Wheeze	56	80.00%
	Respiratory distress	49	70.00%
	Feeding difficulty	28	40.00%
2	**Signs**		
	Coryza & Nasal	52	74.29%
	Congestion	28	40.00%
	Chest In drawing	18	25.71%
	Fine Crepitations		
3	**Tachypnoea (Respiratory Rate)**	47	67.14%
	Low (30-49/min)	14	20.00%
	Moderate (50-59/min)	10	14.29%
	High (≥60/min)		
4	**Fever (Centigrade)**		
	Normal (36.5-37.5)	47	67.14%
	Low- Grade (37.6-38.9)	21	30.00%
	High- Grade (More than 38.9)	7	10.00%
5	**Oxygen Saturation**		
	Normal (More than 95%)	47	67.14%
	Moderate (92%-94%)	6	8.57%
	Low (Less than 92%)	16	22.86%

Discussion

The study showed an increased susceptibility of infection in infants less than six months of age. This finding is in line with studies conducted in Saudi Arabia and Spain.[18] The study showed that 5(7.1%) of the infants with bronchiolitis were premature. A study conducted in Canada showed higher prevalence of prematurity (20.0%) associated with bronchiolitis.[19] Inadequate defense against infection and incomplete development of the airway are probably the most important factors which explain the relation between prematurity and bronchiolitis. The premature infant has a lower number of alveoli and anatomic barriers to gas-exchange leading to increase fatality.[20] Maternal IgG are found to have a protective role against RSV infection. This transfer of antibodies occurs at the later stage of pregnancy and therefore, prematurity holds a greater risk for RSV infection.[21] Results showed that 60(85.7%) of the children had siblings. Infants with older siblings are most likely to have bronchiolitis than those without siblings; this explains

the greater likelihood for viral exposure to infection among infants with an older sibling.[15] Our findings showed that 25(35.7%) parents were smokers which is in line with a study conducted in Saudi Arabia.[18] On the other hand, no maternal smoking was reported in this study- this could be due to social reasons that female smoking is unacceptable and rare in our society.[22] However, the study showed that 37(52.9%) of the children with bronchiolitis were given formula feeding during infancy.

The limitation of the study was the smaller sample size and it did not take into account the particular season during hospitalization of the younger aged infants of 2-6 months.

Conclusion:

The study concluded that certain factors increase the risk of hospitalization in acute bronchiolitis in infants and young children including individual characteristics and environmental factors. On analysis of the risk-related factors for acute bronchiolitis, the majority children were of very younger age with the illness occurring in first 2-6 months of life. In addition, the other risk factors were male gender, presence of an older sibling, crowded environment at home, paternal history of smoking, past history of hospital admission and formula feeding in infancy. The most common presentations included cough, wheeze, coryza, respiratory distress, chest indrawing, fine crepitations, tachypnoea. The study highlighted the importance of raising parents' awareness for bronchiolitis.

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Conflict of interest: None declared.

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