

## Bronchiolitis in young children: Demographic features, risk factors and seasonal patterns

**Nasrin Hoseiny Nejad:** (\*Corresponding author) Assistant Professor of Pediatric pulmonology Department, Ali-Asghar Children's Hospital, Iran University of Medical Sciences, Tehran, Iran. nasrnejad@yahoo.com

Received: 09 May 2016 Accepted: 20 Nov 2016

### Abstract

**Background and Objective:** Bronchiolitis is a lower respiratory tract infection leading to hospitalization of children under two years of age. It is common in cases with younger ages, history of prematurity, cardiopulmonary diseases and immune deficiency. This study was performed to determine demographic features, frequency of risk factors seasonal patterns in children with bronchiolitis.

**Methods:** In this descriptive, cross sectional study, 96 children with diagnosis of bronchiolitis were admitted to the pulmonology ward of Ali-Asghar Children's Hospital from April to March 2016. They were evaluated about age, sex, frequency of risk factors and seasonal patterns of disease. Data were analyzed using SPSS v.20.

**Results:** In this study, 96 patients with diagnosis of bronchiolitis were evaluated. Mean age was  $6.54 \pm 3.7$  months. Fifty (52%) cases were male. 70 (73%) patients had history of breast-feeding. Twenty-two (23%) and 34 (35.5%) of patients had weight lower than 2500 grams and gestational age lower than 37 weeks at birth. Forty-two (44%) cases had at least one smoker in their first relatives. There was asthma and allergy history in 42 (44%) and 14 (14.5%) of cases, respectively. Most admissions were in January to April.

**Conclusion:** Bronchiolitis was seen in patients less than one year-old and frequent risk factors was passive smoking. Most cases were admitted in winter.

**Keywords:** Bronchiolitis, Child, Risk factors, Season

### Introduction

Bronchiolitis is an acute lower respiratory tract disease in children under 2 year of age (1). It is usually due to viral pathogens including respiratory syncytial virus (RSV), para-influenza virus, influenza virus, adenovirus, rhinovirus and metapneumovirus (1,2). It is demonstrated that in developing countries, RSV is predominant pathogen of bronchiolitis and lead to lower respiratory infections and hospitalization (3). Bronchiolitis has a geographic and seasonal pattern, as outbreaks are due to RSV in winter and para-influenza virus during spring in northern hemisphere (4). Risk factors are including age less than 3 months, history of prematurity, low birth weight, allergy, parental smoking, non-breast milk feeding, congenital heart or chronic lung diseases and low socioeconomic situation (4,5). Main pathologic feature is bronchial obstruction due to increased mucus secretion, alveolar cell death and debris. All of these abnor-

malities result in air trapping, atelectasis, ventilation-perfusion mismatch and hypoxia (6). Diagnosis of bronchiolitis is clinical and characterized by fever, tachypnea, and wheezing. Other symptoms and signs are cough, cyanosis, irritability and apnea (7). Although diagnostic investigations are not routinely necessary, chest X ray, blood and urine cultures, arterial blood gas, lumbar puncture, serum electrolyte - glucose measurement, PPD test and echocardiography may be performed for ruling out other causes that mimic bronchiolitis such as sepsis, pneumonia, asthma and foreign body aspiration (8,9). Treatment is supportive including hydration, oxygenation, antipyretics and hypertonic saline (10).

This study was designed to determine demographic features, risk factors and seasonal pattern in our patients who were admitted due to bronchiolitis.

## Methods

This descriptive, cross sectional study was performed on admitted children with diagnosis of bronchiolitis in Ali-Asghar Children's Hospital in Tehran, Iran from April to March 2016. Ninety-six patients 4-24 months enrolled the study. Data about age, gender, risk factors of disease and seasons on admission were recorded from medical files. The collected data was analyzed by software of SPSS (version 22). Statistics analysis including frequency, mean, standard deviation, chi-square and t-test was performed. P values less than 0.05 was considered significant.

## Results

In this Study, 96 patients with diagnosis of bronchiolitis were evaluated. Mean age was  $6.54 \pm 3.7$  months. Peak of age of patients was 4-5 months. Seventy-four (77%) cases had age less than 6 months and 94 (98%) under 12 months. Fifty (52%) cases were male. There was a significant relationship between age and gender, more patients with age less than 6 months were male ( $p=0.006$  CI=95%, Lower= -3.5, upper= -50). Twenty-two (23%) patients had birth weight lower than 2500 grams. Thirty-four (35.5%) of patients had gestational age lower than 37 weeks at birth. There was significant relationship between gestational age, birth weight and age under 6 months on admission ( $p=0.03$  and  $p=0.002$ ). Seventy (73%) patients had history of breast-feeding. Although age of cases who fed with breast milk was higher than others, significant difference was not seen ( $p=0.8$ ). Forty-two (44%) cases had history of asthma in their first relatives. Age of these cases was lower than the cases without history of asthma but was not seen any significant difference ( $p=0.4$ ). There was allergy history in 14 (14.5%) of cases. Forty-two (44%) cases had at least one smoker in their first relatives. There was most admission in January (22%) and continued to April (Figure 1). Eight (8.3%) patients were admitted in pediatric intensive care unit. Mean duration of hospitalization was  $6.00 \pm 2.62$  days.

## Discussion

Bronchiolitis is an acute inflammation of bronchioles due to usually viral infections during infancy and early childhood period specially 2-6 months (11). In present study, mean age of the patients was near to six months and most of them had age of less than 12 months. More cases were male. The literature demonstrates that bronchiolitis occurs in great number of children younger than one year-old and incidence of it has increased be-

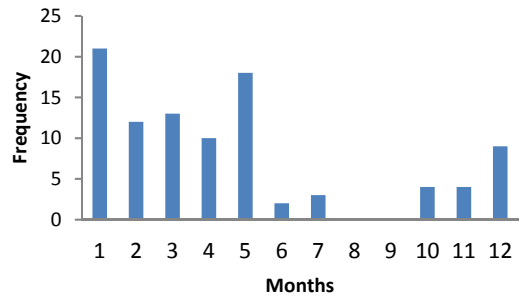


Fig. 1. Seasonal pattern of bronchiolitis on admission

cause of better survival of preterm neonates (12). Risk of bronchiolitis is higher in age under 3 months, male gender, history of prematurity, low birth weight, non-breast feeding, living in crowded conditions, daycare, smoker parents, chronic lung diseases, immune deficiencies, congenital heart diseases and respiratory system anomalies (5,13,14). In our study, age of all cases was higher than 3 months and more cases were male. In a study, 304 infants with bronchiolitis were evaluated about effect of prematurity on outcome. It showed that prematurity  $\leq 35$  weeks could lead to poor outcome with increasing rate of intubation, ICU admission and duration of hospitalization (5).

In our study, 23% of cases did not have breast milk feeding and had lower age on admission in comparison to breast fed infants. It means that breast milk infants can be more protected against bronchiolitis for a longer time. Lanari et al followed 1814 neonates fed with breast milk, formula and mixed feeding. After 12 months, 85 infants were hospitalized for bronchiolitis and 22.9% of infants were fed only by formula. They had higher risk of hospitalization for bronchiolitis in the first year of life (15).

In present study, 44% of patients' family members were smokers. Carroll et al found that major risk factors of bronchiolitis in term, non-low birth weight healthy infants, without preexisting cardio-pulmonary diseases were maternal smoking and asthma (16). Jones et al performed a meta-analysis and showed that smoking by parents or other household members increased risk of bronchiolitis (17). In Our study, 44% of cases had history of asthma in their first relatives and 14% history of allergy. Some researchers have suggested allergic reactions and wheezing may occur after RSV bronchiolitis (18,19). However, a study defined mother asthma can increase risk of bronchiolitis in their children (15). In present study, bronchiolitis was seen more in winter, beginning of spring and late fall. This finding was coincide with RSV sea-

son in northern hemisphere (4). Unfortunately, we were not able to document RSV by polymerase chain reaction (PCR) and it was one of limitations of our study. Other limitations were small size sampling and incomplete personal records.

### Conclusion

According to present study, more cases with bronchiolitis were under 12 months of age. More patients were male. Common risk factors were household smokers, history of asthma in relatives and prematurity. Most of cases were admitted in winter.

### Acknowledgement

We would like to thank personnel of medical record division in Ali-Asghar Children's Hospital.

*Conflicts of interest:* None declared.

### References

- Oymar K, Skjerven HO, Mikalsen IB. Acute bronchiolitis in infants, a review. *Scand J Trauma Resusc Emerg Med.* 2014 ;3;22:23.
- Garcia-Garcia ML, Calvo C, Casas I, Bracamonte T, Rellán A, Gozalo F, Tenorio T, Pérez-Brena P. Human metapneumovirus bronchiolitis in infancy is an important risk factor for asthma at age 5. *Pediatr Pulmonol.* 2007;42(5):458-64.
- Weber MW, Mulholland EK, Greenwood BM. Respiratory syncytial virus infection in tropical and developing countries. *Trop Med Int Health.* 1998 ;3(4):268-80.
- Lanari M, Prinelli F, Adorni F, Di Santo S, Vandini S, Silvestri M, Musicco M. Risk factors for bronchiolitis hospitalization during the first year of life in a multi-center Italian birth cohort. *Ital J Pediatr.* 2015; 41: 40.
- Horn SD, Smout RJ. Effect of prematurity on respiratory syncytial virus hospital resource use and outcomes. *J Pediatr.* 2003; 143(5 Suppl):S133-41.
- Johnson JE, Gonzales RA, Olson SJ, Wright PF, Graham BS. The histopathology of fatal untreated human respiratory syncytial virus infection. *Mod Pathol.* 2007; 20(1):108-19.
- Wainwright C: Acute viral bronchiolitis in children- a very common condition with few therapeutic options. *Paediatr Respir Rev;* 2010, 11:39-45.
- [Guideline] Diagnosis and management of bronchiolitis. *Pediatrics.* 2006; 118(4):1774-93.
- Sayyahfar S, Karimi A, Fahimzad A, Shamshiri AR. Comparison of Tuberculin Skin Test result and interferon gamma response to human PPD in BCG scar positive and negative children. *J Epidemiol Glob Health.* 2014;4(1):45-50.
- Zamani MA, Nourbakhsh MK, Rafeian M, Keyvani Hafshejani Z, Heidari Soureshjani S. Comparison of Effect of Ventolin and Hypersaline 3% on Recovery Course of Acute Bronchiolitis in Hajar Hospital, Shahrekord in 2013-2014. *J Zanjan Uni Medi Sci Health Serv.* 2016;24(104):1-9.
- Kliegman RM, Behrman RE, Jenson HB, Stanton BF. *Nelson Textbook of Pediatrics.* 19th ed. Philadelphia, PA: WB Saunders; 2015;2044-2046.
- Bronchiolitis in children; Scottish Intercollegiate Guidelines Network - SIGN (2006).
- Papoff P; Moretti C; Cangiano G; Bonci E; Roggini M; Pierangeli A; Scagnolari C; Antonelli G; Midulla F. Incidence and predisposing factors for severe disease in previously healthy term infants experiencing their first episode of bronchiolitis. *Acta Paediatr.* 2011; 100(7):e17-23.
- Glezen WP; Paredes A; Allison JE; Taber LH; Frank AL. Risk of respiratory syncytial virus infection for infants from low-income families in relationship to age, sex, ethnic group, and maternal antibody level. *J Pediatr.* 1981; 98(5):708-15.
- Lanari M, Prinelli, Adorni F, Di Santo S, Faldella G, Silvestri M, Musicco M. Maternal milk protects infants against bronchiolitis during the first year of life. Results from an Italian cohort of newborns. *Early Hum Dev J.* 2013; 89S1: S51-S57.
- Carroll KN, Gebretsadik T, Griffin MR, Dupont WD, Mitchel EF, Wu P, Enriquez R, Hartert TV. Maternal asthma and maternal smoking are associated with increased risk of bronchiolitis during infancy. *Pediatrics.* 2007; 119(6):1104-12.
- Jones LL, Hashim A, McKeever T, Cook DG, Britton J, Leonardi-Bee J. Parental and household smoking and the increased risk of bronchitis, bronchiolitis and other lower respiratory infections in infancy: systematic review and meta-analysis. *Respir Res.* 2011 Jan 10;12:5.
- Schauer U, Hoffjan S, Bittscheidt J, Köchling A, Hemmis S, Bongartz S, Stephan V. RSV bronchiolitis and risk of wheeze and allergic sensitization in the first year of life. *Europ Resp J.* 2002;20:1277-1283
- Jartti T, Lehtinen P, Vuorinen T, Ruuskanen O. Bronchiolitis: age and previous wheezing episodes are linked to viral etiology and atopic characteristics. *Pediatr Infect Dis J.* 2009;28(4):311-7.