Epidemiology, Clinical, and Laboratory Characteristics of Bronchiolitis in Hospitalized Children

Gholamreza Soleimani 1,*, Elham Shafighi Shahri 2; Somayeh Rashidi 2; Zahra Salari 2; Alireza Ansari Moghadam 3

1Research Center for Children and Adolescents, Department of Pediatric, Zahedan University of Medical Sciences, Zahedan, IR Iran
2Departments of Medicine, Zahedan University of Medical Sciences, Zahedan, IR Iran
3Health Promotion Research Center, Department of Epidemiology and Biostatistics, Zahedan University of Medical Sciences, Zahedan, IR Iran

*Corresponding author: Gholamreza Soleimani, Research Center for Children and Adolescents, Department of Pediatric, Zahedan University of Medical Sciences, Zahedan, IR Iran. Tel: +98-5412440482, Fax: +98-5414255596, E-mail: Soleimanismd@yahoo.com

Received: March 9, 2014; Revised: August 20, 2014; Accepted: September 25, 2014

Background: Bronchiolitis is the most common lower respiratory tract infection in infants, which is often due to respiratory syncytial virus. The treatment is supportive; therefore, epidemiology, clinical, laboratory, and radiologic findings can help to prevent inappropriate use of antibiotics.

Objectives: The aim of this study was to evaluate the clinical, and laboratory characteristics of bronchiolitis in hospitalized children.

Patients and Methods: In this cross-sectional study, we recruited 117 patients with the bronchiolitis who with one to 24 months old who were hospitalized in Ali-Ebne Abitaleb Hospital of Zahedan, Iran, from December 1, 2011 to December 1, 2013. The participants were included according to the clinical diagnostic criteria. We tried to select the patients from the same demographic characteristics and health condition. Based on exclusion criteria, 17 patients were excluded from the study. Demographic, radiologic, and laboratory data were recorded in separate data forms were analyzed by SPSS 21.

Results: A total of 117 patients were recruited, 57% were male and 43% female. The most common age at disease onset was one to six months old. Winter was the most common season for bronchiolitis. The most common clinical signs were cough, wheezing, rhinorrhea, fever, and dyspnea, consecutively. In radiologic studies, hyperinflation was the most prevalent finding. Leukocytosis was seen in 67% of patients.

Conclusions: We can prevent inappropriate use of antibiotics in bronchiolitis with early diagnosis and supportive measures. Moreover, we obtain symptoms of bronchiolitis in southeastern Iran.

Keywords: Bronchiolitis; Pneumonia; Wheezing

1. Background

Bronchiolitis is the most common infection of the lower respiratory tract during the first year of life. It is characterized by obstruction of bronchioles and their necrotic epithelium, increased secretion of mucus, inflammatory cell infiltration, submucosal edema, and constriction of the smooth muscles in the walls of the bronchioles (1, 2). Bronchiolitis usually occurs in three- to six-month-old infants (3). About 70% of cases of bronchiolitis are caused by respiratory syncytial virus and 80% to 100% of them occur during the cold months (4).

Only 10% of children with bronchiolitis and wheezing require hospitalization; however, hospitalization rates for lower respiratory tract infection associated with bronchiolitis has increased from 22.2% in 1980 to 47.4% in 1996 (5). In the first two to three days, bronchiolitis begin with symptoms of runny nose and sneezing (6). Patients might have a mild fever or history of fever (7, 8). Thereafter, dry cough and wheezing occur (9, 10). In severe cases, loss of appetite occurs due to dyspnea, intercostal and supraclavicular retractions, and increased respiratory rate. Nutritional problems are often the reason for the admission to the hospital (6, 7, 11, 12). A diffuse inspiratory crackle is a common finding in acute bronchiolitis. Moreover, inspiratory wheezing would be heard (9, 12). Bronchiolitis is diagnosed based on history and physical examination; in addition, except in mild cases, the chest X-ray (CXR) and complete blood cell count (CBC) are helpful (11). Air trapping in chest or chest expansion is evident in 20% to 40%. Thickening of prebronchial interstitium or pneumonia are seen in 35% to 50% of cases (13).

In terms of clinical diagnosis, bacterial pneumonia is sometimes confused with bronchiolitis; however, the latter does not require antibiotic therapy. In a study based on differences in epidemiology, the lowest prevalence rates in infants younger than six months of age and the highest prevalence rate between six to eight months of age were reported (14). While in another study the highest prevalence rate was reported in infants between one...
Table 1. Symptoms and Signs in Studied Patients

| Signs                                | Frequency, % |
|--------------------------------------|--------------|
| Cough                                 | 89           |
| Fine Crackles                         | 88           |
| Wheezing                              | 79           |
| Rhinorrhea                            | 73           |
| Fever                                 | 72           |
| Dyspnea                               | 71           |
| Complete Blood Count Abnormality      | 67           |
| Tachypnea                             | 59           |
| Nasal Flaring                         | 59           |
| Anorexia                              | 57           |
| Irritability                          | 55           |
| Nausea And Vomiting                   | 51           |
| Nasal Congestion                      | 45           |
| Sneeze                                | 42           |
| Poor Feeding                          | 34           |
| Cyanosis                              | 32           |
| Hepatosplenomegaly                    | 29           |
| Intercostal Muscle Retraction         | 18           |
| Chest X-Ray Abnormal Findings         | 18           |
| Apnea                                 | 14           |
| Respiratory Distress                  | 4            |
| Hypoxia                               | 3            |

month to one year of age (15), which could indicate that role of epidemiologic, racial, and health differences in the prevalence of bronchiolitis.

2. Objectives

The aim of this study was to evaluate the clinical, and laboratory characteristics of bronchiolitis in hospitalized children.

3. Patients and Methods

In this cross-sectional comparative study, we studied 117 patients with one to 24 months of age who had developed the first episode of wheezing, were diagnosed with bronchiolitis based on clinical symptoms and were hospitalized in Ali-Ebne Abitaleb Hospital of Zahedan, Iran, from December 1, 2011 to December 1, 2013. We tried to select from the same epidemiology, racial and health conditions. All patients had criteria of bronchiolitis disease. Those with chronic neurologic, renal, heart, or lung disease and patients with immune deficiency were excluded. Data were extracted from information forms. The assessment bronchiolitis parameters included fever, sneeze, wheezing, nasal congestion, cough, irritability, poor feeding, nausea and vomiting, cyanosis, and anorexia, which are described in the Table 1. The season of contracting bronchiolitis was also recorded. Moreover, data forms contained CBC parameters to report lymphocytosis and leukopenia. Finally, data was analyzed by SPSS 21 (SPSS Inc., Chicago, IL, USA) and qualitative variable was presented as number and percent.

4. Results

After excluding 17 patients, 100 patients remained including 57 males (57%) and 43 females (43%). Regarding age of the patients, 62 (62%) were one to six, 30 (30%) were six to 12, and eight (8%) were 12 to 24 months of age. Symptoms, signs, and abnormal clinical laboratory findings are shown in Table 1 Figure 1. Most common sign detected by physical exam was cough (Figure 1). Lymphocytosis was reported in 67 patients (67%) and all others had normal results in CBC (33%) (Figure 2). Hyperinflation and pulmonary congestion were seen in CXR of 39% and 16% of patients, respectively; others had normal findings in CXR. Regarding season, 50% had contracted the disease during winter, 26% during spring, 15% during fall, and 9% during summer.
findings and therefore, inappropriate antibiotic use can be prevented. The correct diagnosis of bronchiolitis can be made by considering the most common season of contracting disease, age, laboratory and radiologic signs, and clinical findings and therefore, inappropriate antibiotic use can be prevented.

Acknowledgements

The authors thank all colleagues in pediatrics ward and Research Center for Children and Adolescents Health and laboratories for their help in preparing data.

Funding/Support

This study was supported by Zahedan University of Medical Sciences, Iran.

References

1. Hartling L, Fernandes RM, Bialy L, Milne A, Johnson D, Plint A, et al. Steroids and bronchodilators for acute bronchiolitis in the first two years of life: systematic review and meta-analysis. BMJ. 2011;342:d714.
2. Hall CB. Respiratory syncytial virus and parainfluenza virus. N Engl J Med. 2001;344(25):1917–28.
3. Zorc JJ, Hall CB. Bronchiolitis: recent evidence on diagnosis and management. Pediatrics. 2010;125(2):342–9.
4. Marguet C, Lubrano M, Gueduin M, Le Roux P, Deschilde A, Forget C, et al. In very young infants severity of acute bronchiolitis depends on carried viruses. PLoS One. 2009;4(2).
5. Shay DK, Holman RC, Newman RD, Liu LL, Stout JW, Anderson LJ. Bronchiolitis-associated hospitalizations among US children, 1980-1996. JAMA. 1999;282(15):1440–6.
6. Gadomski AM, Brower M. Bronchodilators for bronchiolitis. Cochrane Database Syst Rev. 2010(12):CD008266.
7. Fitzgerald DA, Kilham HA. Bronchiolitis: assessment and evidence-based management. Med J Aust. 2004;180(8):389–404.
8. Antonow JA, Hansen K, McKinstry CA, Byington CL. Sepsis evaluations in hospitalized infants with bronchiolitis. Pediatr Infect Dis J. 1998;17(3):213–6.
9. Lakhanaul M, MacFaul R, Weneke U, Armon K, Hemingway P, Stephenson T. An evidence-based guideline for children presenting with acute breathing difficulty. Emerg Med J. 2009;26(12):850–3.
10. Plint AC, Johnson DW, Wiebe N, Bulloch B, Pusic M, Joubert G, et al. Practice variation among pediatric emergency departments in the treatment of bronchiolitis. Acad Emerg Med. 2004;11(4):353–60.
11. Viswanathan M, King VJ, Bordley C, Honeycutt AA, Wittenborn J, Jackman AM, et al. Management of bronchiolitis in infants and children. Evid Rep Technol Assess (Summ). 2001(69):1–5.
12. Fitzgerald DA. Viral bronchiolitis for the clinician. J Pediatr Child Health. 2011;47(4):160–6.
13. McIntosh K. Respiratory Syncytial Virus. In: Evans A, Kaslow R editors. Viral Infections in Humans: epidemiology and control. 4 ed. New York: Plenum; 1997. pp. 691-705.
14. Simoes EA, Mutyara K, Soh S, Agustian D, Hibberd ML, Kartasasmita CB. The epidemiology of respiratory syncytial virus lower respiratory tract infections in children less than 5 years of age in Indonesia. Pediatr Infect Dis J. 2011;30(9):777–84.
15. Espinola Docio B, Casado Flores J, de la Calle Cabrera T, Lopez Guinea A, Serrano Gonzalez A. [Pleural effusion in children with pneumonia: a study of 63 cases]. An Pediatr (Barc). 2008;69(3):210–4.
16. Flores P, Rebello-de-Andrade H, Goncalves P, Guimaraes R, Carvalho C, Sousa EN, et al. Bronchiolitis caused by respiratory syncytial virus in an area of Portugal: epidemiology, clinical features, and risk factors. Eur J Clin Microbiol Infect Dis. 2004;23(1):39–45.
17. Liebelt EL, Qi K, Harvey K. Diagnostic testing for serious bacterial infections in infants aged 90 days or younger with bronchiolitis. Arch Pediatr Adolesc Med. 1999;153(5):525–30.
18. [Pleural effusion in children with pneumonia: a study of 63 cases]. In: Espinola DB, Casado FJ, de la Calle CT, Lopez GA, Serrano GA editors. Anales de pediatria. 2003 Barcelona, Spain. pp. 210-4.