

The independent risk factors that affect the hospitalization of acute bronchiolitis

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Abstract

Aim: The aim of this study is to find out the independent risk factors that affect the period of hospitalization in acute bronchiolitis.

Material and Methods: The patients who were hospitalized with the diagnosis of bronchiolitis at the Pediatric Emergency and Intensive Care Unit were included.

Results: 61 (64 %) of the patients were males and 34 (36%) were females. The median age of the patients was 7 (1.5-23) months. The median hospitalization period was 6 (3-18) days. Factors affecting prolonged acute bronchiolitis were premature birth history ($p=0.005$), infant age group ($p=0.03$), breastfeeding < 2 months ($p=0.02$), tachypnea in admission ($p<0.001$), wheezing in admission ($p<0.001$), retraction in admission ($p=0.045$), apnea ($p=0.021$), cyanosis ($p=0.032$). In the logistic regression analysis which was conducted for independent risk factors that increased the risk of prolonged acute bronchiolitis, premature birth history, breastfeeding less than 2 months, wheezing in admission and tachypnea in admission were found to be independent risk factors that affected the length of hospitalization. Premature birth history increased acute bronchiolitis risk 3.74 times (95% CI:1.19-11.8; $p=0.024$), while tachypnea in admission increased the risk 3.54 times (95% CI:1.15-10.9; $p=0.028$), wheezing increased 3.6 times (95% CI:1.13-11.4; $p=0.030$) and breastfeeding for less than 2 months increased the risk 3.11 times (95% CI: 1.12-8.6; $p=0.03$).

Conclusion: In conclusion, premature birth history, wheezing in admission, tachypnea in admission and breastfeeding less than 2 months were found to be independent risk factors for prolonged acute bronchiolitis.

Keywords: Prolonged Acute Bronchiolitis; Duration of Hospitalization; Risk Factors.

INTRODUCTION

Acute bronchiolitis is an acute lower respiratory tract disease which is characterized by cough, tachypnea, expiratory prolongation, wheezing and retraction and which is frequently caused by viral factors. It courses with the inflammation of small airways (bronchioles) and inflammatory obstruction (1,2). Acute bronchiolitis, the prevalence of which differs in terms of seasons, is most frequently seen in winter and spring. It is found in 10-20% of children under the age of two and it is common especially in boys.

The disease is more common in children younger than one year old, in infants who have families with low socio-economic level and crowded living conditions, in infants who are exposed to cigarette smoke and in infants who are not breastfed (3).

Average hospitalization period of acute bronchiolitis that requires hospitalization in previously healthy infants is generally 3-4 days. Symptoms related with the respiratory system generally start to improve 2-5 days later; however, in young infants and in those who have underlying diseases, wheezing can continue for a week or longer (4).

In patients who have hemodynamically significant congenital heart defect, chromosomal anomalies, chronic lung diseases, immunodeficiency and neuromuscular disease, the risk of hospitalization for acute bronchiolitis and the risk of having a severe disease increases (5). The aim of this study is to find out the independent risk factors that affect the period of hospitalization in acute bronchiolitis.

MATERIAL and METHODS

Files of 95 children who were hospitalized with the

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diagnosis of bronchiolitis at the Pediatric Emergency and Intensive Care Unit between October 2016 and June 2017 were reviewed retrospectively. The diagnosis and treatment of acute bronchiolitis were planned according to acute bronchiolitis diagnosis and treatment consensus report of Turkish Thorax Society. The treatment and follow-up of the patients were conducted in line with this guide (3). Demographic data such as age, gender, premature birth history, length of breastfeeding, number of siblings attending kindergarten, heating system of the house and passive smoking and data such as the patients' admission complaints, physical examination findings, treatment given at the hospital and length of hospitalization were recorded from the patient files. Patients with a known chronic disease history, mild attack acute bronchiolitis and outpatients were not included in the study.

Definitions

Infant: Patients younger than 1-year-old were accepted as infant.

Prolonged acute bronchiolitis: Prolonged acute bronchiolitis definition was used for patients who had hospitalization periods of longer than 6 days.

Approvals both from the patients' parents and Malatya Clinical Researches and Publications Ethical Board for the study. Ethical board (07.27.2016-2016/163) were taken. All participants provided written informed consent.

Statistical Analysis

For data analysis use was made of SPSS statistics ver.18.0 for Windows (SPSS Inc, Chicago, IL). The data were given as median (min-max), mean (\pm SD) and percentage. Kolmogorov-Smirnov test was used to control the distribution of the parameters. Chi-square and Mann-Whitney U tests were used for statistical analyses. In order to assess the independent risk factors, logistic regression model was performed on the data which were found to be significant with one-way analysis of variance. $p < 0.05$ value was considered as statistically significant.

RESULTS

Sixty-one (64 %) of the patients were males and 34 (36%) were females. The median age of the patients was 7 (1.5-23) months and 78% of the patients constituted the infant group of patients younger than one year of age. The median of discharge time for the patients was 6 (3-18) days. The demographic characteristic of the patients were shown in the Table 1.

When prolonged acute bronchiolitis risk factors were analyzed with one-way ANOVA, the risk factors were found to be premature birth history ($p=0.005$), infant age group ($p=0.03$), breastfeeding for less than 2 months ($p=0.02$), tachypnea in admission ($p < 0.001$), wheezing in admission ($p < 0.001$), retraction in admission ($p=0.045$), apnea history ($p=0.021$) and cyanosis history ($p=0.032$) (Table 2). History of passive smoking, history of cigarette use during pregnancy, presence of siblings attending kindergarten, heating system of the house (coal or natural

gas) were risk factors that did not affect the hospitalization period ($p > 0.05$).

Table 1. Demographic characteristic of patients

	n (%)
Age, mean (min-max), months	7 (1.5-23)
Gender, male	61 (64.2)
Gender, female	34 (35.7)
Premature birth history	27 (28.4)
Breastfeeding for < 2 months	22 (23.1)
Smoking during pregnancy	7 (7.4)
Passive smoking history	47 (49.5)
History of having upper respiratory tract infection at home	63 (66.3)
Apnea history	7 (7.4)
Cyanosis history	11 (11.6)

Table 2. The risk factors for prolonged acute bronchiolitis

Variables	Hospitalization period < 6 days n (%)	Hospitalization period \geq 6 days n (%)	p value
Infant age group	38 (51.4)	36 (48.6)	0.030
Being male	31 (50.8)	30 (49.2)	0.048
Premature birth history	9 (33.3)	18 (66.7)	0.005
Breastfeeding for < 2 months	7 (33.3)	14 (66.7)	0.020
Smoking during pregnancy	2 (28.6)	5 (71.4)	0.128
Passive smoking	26 (54.2)	22 (45.8)	0.457
Passive smoking	29 (52.7)	26 (47.3)	0.232
Having siblings attending kindergarten	26 (59.1)	18 (40.9)	0.826
Tachypnea in admission	13 (34.2)	25 (65.8)	<0.001
Tachypnea in admission	15 (36.6)	26 (63.4)	<0.001
Tachypnea in admission	13 (41.9)	18 (58.1)	0.045
Apnea	1 (14.3)	6 (85.7)	0.021
Cyanosis	3 (27.3)	8 (72.7)	0.032

When significant factors that affected prolonged acute bronchiolitis in one-way ANOVA were taken in logistic regression model, premature birth history, breastfeeding for less than 2 months, wheezing in admission and tachypnea in admission were found to be independent risk factors that affected the length of hospitalization (Table 3).

Table 3. Independent risk factors increasing the risk of prolonged acute bronchiolitis in logistic regression analysis

Risk Factors	Odds ratio	95% confidence interval of odds ratio		p value
		Lowest	Highest	
History of prematurity	3.74	1.19	11.77	0.024
Breastfeeding for <2 months	3.11	1.12	8.62	0.030
Tachypnea history	3.54	1.15	10.89	0.028
Wheezing history	3.6	1.13	11.45	0.030

The variable that included in logistic regression model: infant, history of prematurity, breastfeeding for < 2 months, history of apnea or cyanosis, siblings attending kindergarten, passive smoking history, smoking during pregnancy and tachypnea, wheezing and retraction in admission

Premature birth history increased acute bronchiolitis risk 3.74 times (95% CI:1.19-11.8; p=0.024), while tachypnea in admission increased the risk 3.54 times (95% CI:1.15-10.9; p=0.028), wheezing increased 3.6 times (95% CI:1.13-11.4; p=0.030) and breastfeeding for less than 2 months increased the risk 3.11 times (95% CI: 1.12-8.6; p=0.03).

DISCUSSION

Acute bronchiolitis is the most common lower respiratory tract infection in infants. It has a significant level of morbidity and the reason for 17% of hospitalizations in all infants is acute bronchiolitis (6). The risk of hospitalization is high in infants with a premature birth history, congenital heart defect history and in patients who are less than three months old (7). Acute bronchiolitis is more common in infants who are not breastfed and in those who live in a crowded environment (1). In their study, Lanari et al (8) found that being male, mother's smoking during pregnancy, corticosteroid treatment during pregnancy, single birth, respiratory problem during newborn period and history of receiving surfactant, crowded and unhealthy living conditions, not breastfeeding, having siblings younger than 10 years old, and being exposed to epidemic respiratory syncytial virus in the first three months of life increased the risk for hospitalization. In infants younger than six weeks old, in infants who have underlying cardiopulmonary diseases (cystic fibrosis, bronchopulmonary dysplasia and congenital heart diseases), in premature infants and in patients who have suppressed immunosystem, the course of the disease is more severe and it can threaten life (3). Passive smoking increases the length of hospitalization in RSV-related bronchiolitis and the risk of undergoing a severe disease (9). In our study, independent risk factors that increased the period of hospitalization were found as premature birth history, wheezing in admission, tachypnea in admission and breastfeeding for less than 2 months.

The age group in which acute bronchiolitis is seen is almost always infants, especially in those younger than 1-year-old. In this age group, it is the most common reason for hospitalization. Breastfeeding is a factor protecting from

acute bronchiolitis. The antibodies from the mother with breastfeeding can protect the infant in the first 6 months (10). In Dixon DL's study (11), the length of hospitalization, risk of respiratory failure and need for oxygen support decreased in infants who were breastfed. Similarly, in our study, breastfeeding for less than 2 months increased the risk for prolonged acute bronchiolitis 3.11 times more.

In a study which included 734 patients who were hospitalized for acute bronchiolitis, it was found that 22% of the patients had a history of ICU hospitalization and intubation and mechanic ventilator need was observed in 10% of these patients. In patients hospitalized in ICU, young infants and premature birth history were found to be risk factors (12). In our study, premature birth history was found to increase the risk of prolonged acute bronchiolitis 3.74 times more.

Although severity scoring is not conducted in infants referring with acute bronchiolitis in clinical practice, a few severity scoring systems have been developed to be used in finding out the severity of acute bronchiolitis. In most of the clinical severity scoring systems, respiratory rate and wheezing are included in severity scoring. Tachypnea and wheezing in admission were found to be factors prolonging the length of hospitalization. Tachypnea in admission was found to increase the risk of prolonged acute bronchiolitis 3.54 times, while wheezing in admission was found to increase the risk of prolonged acute bronchiolitis 3.6 times.

Our study had a few limitations. Since our study was retrospective, the fact that the patients whose file records were not complete may have affected our results. Secondly, although our results cannot be generalized since there were few patients in our study; it will shed light on future studies that will include more comprehensive case series.

CONCLUSION

As a conclusion, in patients who refer with acute bronchiolitis, tachypnea and wheezing in admission, premature birth history and breastfeeding for less than two months can be indicators that the length of hospitalization for acute bronchiolitis can prolong.

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