EVALUATION OF ENVIRONMENTAL RISK FACTORS IN CHILDREN WITH RECURRENT BRONCHIOLITIS ATTACKS

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ABSTRACT

Background: Patients with recurrent bronchiolitis attacks in early childhood may present to the emergency department, which may result in repeated hospitalisations. Environmental factors play an important role in the severity and continuation of attacks. The aim of our study was to investigate environmental risk factors in children with recurrent bronchiolitis.

Materials and Methods: Our study was conducted on 100 patients aged zero to 36 months who presented to the Paediatric Emergency Department of Bursa High Specialisation Training and Research Hospital with recurrent bronchiolitis attacks between May 2014 and May 2015. The characteristics considered when diagnosing acute bronchiolitis in these cases included tachypnoea, typical auscultation findings and signs of viral upper respiratory tract infection. Nineteen pre-determined questions were asked of the parents of the children in the study group in a survey format, and their responses were analysed. SPSS 15.0 for Windows was used for the statistical analysis. A level of $p < 0.05$ was considered statistically significant.

Results: The patients' ages ranged from one to 35 months, with a mean of 11.5 ± 8.6 months. Moreover, 44% of the cases were female, and 56% were male. The total number of emergency department applications ranged from one to 15, with an average of 4.6 ± 3.9. The number of acute bronchiolitis attacks ranged from one to 20, with an average of 3.8 ± 4.6. The number of previous hospitalisations due to acute bronchiolitis ranged from zero to three, with an average of 0.5 ± 0.7. The average hospital stay ranged from zero to 30 days, with an average of 3 ± 5.1 days. In addition, 25% of the mothers and 61% of the fathers were identified as active smokers. The rate of active smoking during pregnancy was 21%, while passive smoking exposure was detected in 52%. In 16% of the cases, a notable finding was present in the postnatal history, such as incubator care, oxygen requirement or asphyxia. The number of hospital admissions and the length of stays were noticeably higher ($p < 0.05$) in patients with postnatal complications than those without.

Conclusion: This study identified important risk factors for acute bronchiolitis, particularly highlighting the impact of low income and socio–economic status. Additionally, preterm birth and postnatal complications were found to exacerbate the disease course.

Keywords: Acute bronchiolitis, child, risk factors

TEKRARLAYAN BRONŞİOLİT ATAKLARI OLAN ÇOCUKLARDA ÇEVRESEL RİSK FAKTÖRLERİNİN DEĞERLENDİRİLMESİ

ÖZET

Giriş: Erken çocukluk döneminde tekrarlayan bronşiolit atakları, acil servis başvurularına ve dolayısıyla tekrarlayan hastane yatışlarına neden olabilir. Atakların şiddeti ve sürekliliğinde çevresel faktörler önemli bir rol oynamaktadır. Bu çalışmada, tekrarlayan bronşiolit atağı geçiren çocuklarda çevresel risk faktörlerinin araştırılması amaçlanmıştır.

Gereç ve Yöntemler: Çalışmamız, Mayıs 2014-Mayıs 2015 tarihleri arasında Bursa Yüksek İhtisas Eğitim ve Araştırma Hastanesi Çocuk Acil Servisi'ne tekrarlayan bronşiolit atağı nedeniyle başvuran 0-36 ay arasındaki 100 hasta üzerinde gerçekleştirildi. Akut bronşiolit tanısı için değerlendirilen özellikler arasında taşipne, tipik oskültasyon bulguları ve viral üst solunum yolu enfeksiyonu belirtileri yer almaktaydı. Çalışma grubundaki çocuklarn ebeveynlerine önceden belirlenmiş 19 sorudan oluşan bir anket uygulandı ve yanıtları analiz edildi. İstatistiksel analiz için SPSS 15.0 for Windows programı kullanıldı. $p < 0.05$ değeri istatistiksel olarak anlamlı kabul edildi.

Bulgular: Hastaların yaşları 1 ile 35 ay arasında değişmekte olup, ortalama yaş 11.5 ± 8.6 aydı. Olguların %44'ü kız, %56'sı erkekti. Acil servise başvuru sayısı 1 ile 15 arasında değişirken, ortalama başvuru sayısı 4.6 ± 3.9 idi. Akut bronşiolit atağı sayısı 1 ile 20 arasında değişmekte olup, ortalama 3.8 ± 4.6 idi. Akut bronşiolit nedeniyle daha önce hastaneye yatış sayısı 0 ile 3 arasında değişmekte olup, ortalama 0.5 ± 0.7 idi. Hastanede kalış süresi 0 ile 30 gün arasında değişmekte olup, ortalama 3 ± 5.1 gündü. Annelerin %25'inin, babaların ise %61'inin aktif sigara içicisi olduğu tespit edildi. Gebelik sırasında aktif sigara kullanımı oranı %21 iken, pasif sigara maruziyeti %52 olarak belirlendi. Olguların %16'sında postnatal öyküde küvöz bakımı, oksijen ihtiyacı veya asfiksi gibi dikkate değer bulgular mevcuttu. Postnatal komplikasyonları olan hastalarda hastane yatış sayısı ve hastanede kalış süresi anlamlı derecede daha yüksekti (p<0.05).

Sonuç: Bu çalışma, akut bronşiolit için önemli risk faktörlerini belirlemiş olup, özellikle düşük gelir ve sosyoekonomik durumun hastalık üzerinde etkili olduğunu göstermiştir. Ayrıca, prematür doğum ve postnatal komplikasyonların hastalık seyrini kötüleştirdiği saptanmıştır.

Anahtar Sözcükler: Acute bronchiolitis, child, risk factors

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INTRODUCTION

Bronchiolitis is an acute lower respiratory tract disease characterised by the inflammatory obstruction of the bronchioles, mostly caused by viral agents, and is observed in early childhood, mostly under two years of age (1,2). The most common cause of bronchiolitis is respiratory syncytial virus (RSV), which has caused epidemics (1). Acute bronchiolitis is diagnosed based on clinical findings; laboratory tests are unnecessary unless other clinical conditions are included in the differential diagnosis or if the patient has a chronic disease. In this case, further examination may be requested (2). Patients with recurrent bronchiolitis attacks in early childhood may present to the emergency department, which may result in repeated hospitalisations. Environmental factors play an important role in the severity and continuation of attacks (3,4). The aim of our study was to investigate environmental risk factors in children with recurrent bronchiolitis.

MATERIALS AND METHODS

Our study was conducted on 100 patients aged zero to 36 months who presented to the Paediatric Emergency Department of Bursa High Specialisation Training and Research Hospital with recurrent bronchiolitis attacks between May 2014 and May 2015. Ethics committee approval was obtained with a decision dated 16.03.2014 and numbered 2014/0806.

Anamnesis was obtained from the parents of patients in the pediatric emergency room. Physical examinations were performed, and cases with a clinical diagnosis of acute bronchiolitis were included in the study. The characteristics considered when diagnosing acute bronchiolitis in these cases included tachypnoea, typical auscultation findings (i.e. prolonged expiration, sibilant rales and/or crepitant rales) and signs of viral upper respiratory tract infection. Patients with chronic diseases and those who did not wish to participate in the study were excluded. Nineteen pre-determined questions were asked of the parents (mothers or fathers) of the children in the study group in a survey format, and their responses were analysed. The questionnaire included items about demographic characteristics, family history, socioeconomic status, environmental risk factors (e.g., exposure to tobacco smoke, presence of pets, humidity), birth and feeding history, and frequency of hospital admissions related to bronchiolitis. Informed consent was obtained from the parents of all participants prior to their inclusion in the study.

Statistics

SPSS 15.0 for Windows was used for the statistical analysis. Descriptive statistics are presented as frequencies and percentages for categorical variables and as means, standard deviations, minimums, maximums and medians for continuous variables. The Kruskal–Wallis test was used to compare numeric variables across more than two independent groups because the assumption of normal distribution was not met. For nonparametric tests involving more than two groups, subgroup analyses were conducted using the Mann–Whitney U test, with results interpreted using the Bonferroni correction. Proportions in independent groups were compared using the chi-square test. The relationships between numeric variables were assessed using Spearman's rank correlation analysis because the assumption for parametric testing was not met. Determinant factors were analysed using linear regression. A level of $p < 0.05$ was considered statistically significant.

RESULTS

The patients' ages ranged from 0 to 35 months (mean: 11.5 ± 8.6 months). The youngest participant was a 20-day-old newborn, and only one newborn (aged less than 1 month) was included in the study Moreover, 44% of the cases were female, and 56% were male. Their weights varied from 3 kg to 15 kg, with an average of 8.5 ± 2.8 kg. When the weight percentiles of the cases were examined, 25% were below the 10th percentile, 21% were in the 10th–25th percentile, 31% were in the 25th–50th percentile, 6% were in the 50th–75th percentile, 11% were in the 75th–90th percentile, and 6% were above the 90th percentile.

When the height percentiles of the cases were examined, 24% were below the 10th percentile, 19% were in the 10th–25th percentile, 25% were in the 25th–50th percentile, 13% were in the 50th–75th percentile, 10% were in the 75th–90th percentile, and 9% were above the 90th percentile.

The percentage of cases that occurred in winter (December–January–February) was 71%, followed by 2% in spring (March–April–May), 4% in summer (June–July–August), and 23% in autumn (September–October–November).

The total number of emergency department admissions ranged from 1 to 15 (median: 3), with a mean of 4.6 ± 3.9. The number of acute bronchiolitis attacks ranged from 1 to 20 (median: 2), with a mean of 3.8 ± 4.6. The number of previous hospitalisations due to acute bronchiolitis ranged from 0 to 3 (median: 0), with a mean of 0.5 ± 0.7. The length of hospital stay ranged from 0 to 30 days (median: 0), with a mean of 3 ± 5.1 days (Table 1).

A scoring system that considered the respiratory rate per minute, wheezing, retractions and general condition was used to assess the severity of the diseases (5). According to this scoring system, acute bronchiolitis was classified as mild, moderate and severe (mild disease: 1–3 points, moderate disease: 4–8 points and severe disease: 9–12 points). Bronchiolitis scores ranged from two to 10, with a mean of 5.7 ± 1.6. Nine percent of the cases constituted a mild disease, 88% comprised a moderate disease, and 3% composed a severe disease (Table 1).

Table 1. Distribution of Emergency Admission, Attack Frequency, and Bronchiolitis Severity					
Variable	Min–Max	Median	Mean ± SD	n	%
Number of Emergency Visits	1 – 15	3	4.6 ± 3.9		
Number of Attacks	1 – 20	2	3.8 ± 4.6		
Number of Hospitalizations	0 – 3	0	0.5 ± 0.7		
Average Hospital Stay (days)	0 – 30	0	3.0 ± 5.1		
Bronchiolitis Score	2 – 10	6	5.7 ± 1.6		
Mild				9	9.0%
Moderate				88	88.0%
Severe				3	3.0%

The maternal ages ranged from 17 to 45 years, with a mean age of 27.5 ± 5.6 years. The paternal ages ranged from 21 to 44 years, with a mean age of 31 ± 5.3 years. It was determined that 60% of the mothers were primary school graduates, 22% were secondary school graduates, 12% were high school graduates, and 6% were university graduates. Moreover, 43% of the fathers had completed primary school, 26% had completed secondary school, 25% had completed high school, and 6% had completed university.

In addition, 25% of the mothers and 61% of the fathers were identified as active smokers. The rate of active smoking during pregnancy was 21%, while passive smoking exposure was detected in 52%. Consequently, 73% of the infants were exposed to prenatal tobacco smoke (Table 2).

When the mother and father were questioned about the presence of atopy, such as allergic rhinitis, dermatitis or asthma, a positive history was obtained from 18% of the mothers and 13% of the fathers.

Among the mothers, 61% underwent a vaginal delivery, while 39% had a caesarean section. The birth weights of the cases ranged from 1,100 g to 5,030 g, with an average of 3,032 ± 679 g. While 89% of pregnancies received follow-up care, 11% did not. In 16% of the infants, a notable finding was present in their postnatal history, such as admission to the neonatal intensive care unit (NICU) or asphyxia..

A history of coughing during feeding was reported in 13% of the cases. Regarding feeding history, 18% of the infants had never consumed breast milk. Upon further analysis of feeding patterns, 66% of the infants were exclusively breastfed during the first six months, 18% were fed with formula, and 16% received both breast milk and formula. After the sixth month, 32% of the infants were fed breast milk and complementary foods, 9% with formula and complementary foods and 18% with only complementary foods, whereas 6% were classified as undernourished (defined as receiving only breast milk or formula beyond the appropriate age for complementary feeding or being given complementary foods inappropriate for their age).

Table 2. Distribution of Parental and Socioeconomic Characteristics		
Mother's Age (years) Mean ± SD / Min-Max (Median)	27.5 ± 5.6 / 17–45 (26)	
Mother's Education Level	n	%
No formal education (literate)	3	3
Illiterate	15	15
Primary school graduate	42	42
Middle school graduate	22	22
High school graduate	12	12
University graduate	6	6
Mother's Employment		
Housewife	86	86
Employed	14	14
Maternal Smoking	25	25
Maternal Alcohol Use	0	0
Maternal Chronic Disease	82	82
Father's Age (years) Mean ± SD / Min-Max (Median)	31.0 ± 5.3 / 21–44 (30)	
Father's Education Level	n	%
Illiterate	4	4
Primary school graduate	39	39
Middle school graduate	26	26
High school graduate	25	25
University graduate	6	6
Paternal Smoking	61	61
Paternal Alcohol Use	10	10
Paternal Chronic Disease	13	13
Home Ownership	n	%
Homeowner	61	61
Tenant	39	39
Number of Rooms in the House Mean ± SD / Min-Max (Median)	3.8 ± 0.7 / 2–7 (4)	
Number of Household Members Mean ± SD / Min-Max (Median)	5.3 ± 2.2 / 3–15 (5)	
Pet Ownership	n	%
No	88	88
Yes	12	12

Cockroach Presence in Home	42	42
Heating System	n	%
Coal stove	52	52
Natural gas central heating	31	31
Natural gas stove	14	14
Electric heater	1	1
Coal central heating	1	1
Wood stove	1	1
Dampness in Home	39	39
Housing Type	n	%
Apartment	56	56
Detached house	44	44
Average Net Income (TRY) Mean ± SD / Min-Max (Median)	1634.5 ± 1122.2 / 300–8000 (1300) tl	

The age at which patients experienced their first bronchiolitis episode ranged from 1 to 24 months, with a mean of 5.8 ± 5.0 months. A history of coughing during feeding was present in 13% of the cases. Additionally, 17% of the patients received a concurrent diagnosis of gastroesophageal reflux disease (GERD).

The onset of upper respiratory tract infection (URTI) symptoms, such as nasal discharge and cough, before presenting to the emergency department ranged from one to 30 days, with a mean of 4.4 ± 3.8 days. Among the complaints at the time of the emergency department presentation, 76% had a cough, 27% had dyspnoea, and 27% had wheezing. The oxygen saturation values measured by pulse oximetry during presentation ranged from 86% to 100%, with a mean of 94.8% ± 3.1% (Table 3).

The average net income of the families ranged from 0 to 8,000 TRY, with a mean of 1,618 ± 1,128 TRY. All income values are presented in Turkish Lira (TRY). For international comparison, the approximate exchange rate of 1 USD = 2.15 TRY, valid during the study period (2014), can be used to interpret the values. Thirty-nine percent of the families lived in rented accommodations, 42% owned their homes, and 12% had pets. Forty-two percent of the families had cockroaches in their homes, and 39% had dampness. Fifty-six percent of the families lived in apartment buildings, while 44% resided in detached houses (Table 2).

Table 3. Descriptive Characteristics of Cases		
Variable	n	%
Prenatal Follow-up		
Followed-up	89	89
Not followed-up	11	11
Maternal Smoking Exposure During Pregnancy		
Active and passive exposure	21	21
Passive exposure only	52	52
No exposure	27	27
Delivery Type		
Vaginal delivery	61	61
Cesarean section	39	39
Birth Weight (g) Mean ± SD / Min-Max (Median)	3032.3 ± 678.8 / 1100-5030 (3025)	
Postnatal Complications	16	16
Breastfeeding History		
Received breast milk	82	82
Did not receive breast milk	18	18
Coughing While Feeding	13	13
Reflux	17	17
Primary Complaint at Emergency Admission		
Cough	52	52
Cough and wheezing	12	12
Cough and shortness of breath	11	11
Wheezing	9	9
Wheezing and shortness of breath	6	6
Shortness of breath	8	8
Shortness of breath and cough	2	2
Age at First Wheezing Episode (months) Mean ± SD / Min-Max (Median)	5.8 ± 5.0 / 0.5-24 (4)	
Duration of Runny Nose & Cough Before Last Episode (days) Mean ± SD / Min-Max (Median)	4.3 ± 3.9 / 0-30 (3)	
Pulse Oximetry (%) Mean ± SD / Min-Max (Median)	94.8 ± 3.1 / 86-100 (96)	

There were no significant differences ($p > 0.05$) between the cases' descriptive characteristics, nutritional status, home living environment, and paternal characteristics in relation to the number of emergency department visits. Specifically, no statistically significant differences were found when patients were compared based on sex, maternal employment status, paternal chronic disease, paternal alcohol use, household dampness, presence of cockroaches, type of heating system, and breastfeeding history ($p > 0.05$ for all). However, when evaluating maternal characteristics, a significant negative correlation was found between maternal smoking and the number of emergency visits. Furthermore, the number of emergency visits differed significantly ($p < 0.05$) based on the history of tobacco exposure during pregnancy. The number of emergency visits was significantly lower among active and passive smokers (Figure 1).

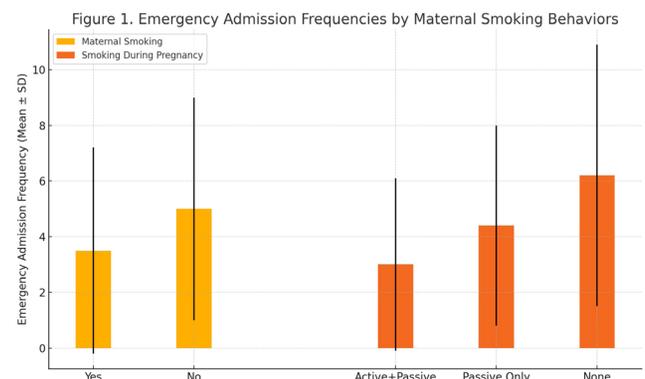Figure 1. Emergency Admission Frequencies by Maternal Smoking Behaviors

Figure 1. Emergency admission frequencies by maternal smoking and smoking during pregnancy. Error bars represent standard deviations. Although some findings appear contrary to expectations, they may be influenced by underreporting bias related to social pressure on mothers.

Postnatal complications such as incubator care, oxygen requirement, or asphyxia were present in 16% of the cases. The number of hospital admissions and the duration of hospitalization were significantly higher ($p < 0.05$) in patients with postnatal complications compared to those without (Figure 2, Table 4).

Figure 2. Hospitalization Duration by Postnatal Complications and Maternal Smoking History
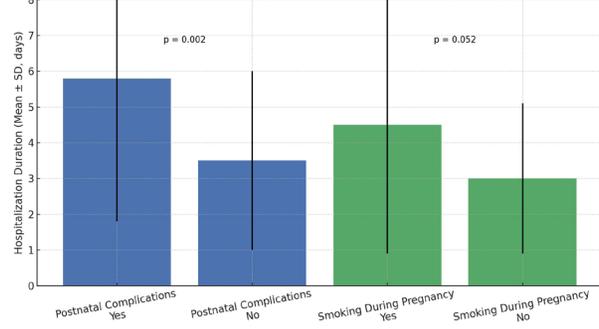
Figure 2. Hospitalization duration (mean ± SD, in days) by presence of postnatal complications and maternal smoking during pregnancy. Infants with postnatal complications had significantly longer hospital stays (p = 0.002). Maternal smoking during pregnancy was associated with longer hospital stays, although the difference did not reach statistical significance (p = 0.052).

DISCUSSION

Acute bronchiolitis is a respiratory tract disease that initially presents with symptoms such as rhinorrhoea and occasionally mild fever. It progresses within a few days to include cough, tachypnoea, retractions, diffuse wheezing and/or rales, along with increased airway resistance (1,2). It is rare in children over age four. Viruses are the primary etiological agents, with RSV being responsible for approximately 50% of cases. Other causative agents include parainfluenza viruses, adenovirus and mycoplasma (2). Environmental factors play a significant role in the development, clinical severity and recurrence of acute bronchiolitis (3,4).

Table 4. Evaluation of the Relationship Between Family and Case Characteristics with Emergency Visits, Attacks, Hospitalizations, Length of Stay, and Bronchiolitis Score					
	Emergency Visits	Attack Count	Hospitalizations	Length of Stay	Bronchiolitis Score
Age (months)	r 0.634	r 0.490	r 0.283	r 0.268	r −0.207
	p 0.000	p 0.000	p 0.004	p 0.007	p 0.039
Weight (kg)	r 0.565	r 0.447	r 0.231	r 0.218	r −0.269
	p 0.000	p 0.000	p 0.021	p 0.026	p 0.002
Maternal Age	r −0.117	r −0.081	r −0.084	r −0.061	r −0.046
	p 0.248	p 0.423	p 0.406	p 0.545	p 0.649
Paternal Age	r −0.162	r −0.111	r −0.073	r −0.042	r 0.001
	p 0.108	p 0.271	p 0.473	p 0.676	p 0.992
Household Size	r 0.026	r 0.083	r −0.018	r −0.053	r −0.068
	p 0.794	p 0.409	p 0.856	p 0.598	p 0.503
Income	r −0.016	r −0.122	r −0.158	r −0.195	r −0.007
	p 0.873	p 0.228	p 0.117	p 0.052	p 0.947
Birth Weight	r −0.041	r −0.026	r −0.083	r −0.085	r −0.036
	p 0.688	p 0.798	p 0.414	p 0.402	p 0.356
Age of First Wheezing (months)	r 0.174	r −0.026	r 0.060	r −0.077	r −0.055
	p 0.083	p 0.795	p 0.554	p 0.445	p 0.588
Runny Nose & Cough Duration Before Last Attack (days)	r 0.041	r −0.027	r −0.082	r −0.085	r −0.049
	p 0.791	p 0.819	p 0.419	p 0.399	p 0.393
Pulse Oximeter	r 0.235	r 0.023	r −0.117	r −0.168	r −0.308
	p 0.019	p 0.822	p 0.248	p 0.096	p 0.008

In our study, 71% of the cases presented in winter, 2% in spring, 4% in summer and 23% in autumn. Bronchiolitis epidemics in temperate climates typically begin in late autumn and continue until mid-spring, with the highest incidence observed during winter, particularly in January and February (2,6). Similarly, in our study, most patients (71%) sought medical attention during the winter season.

In our study, the ages of the patients with acute bronchiolitis ranged from one to 35 months, with a mean age of 11.5 ± 8.6 months. A significant positive correlation (p < 0.05, r=0,634) was observed between the age and the number of emergency department visits, the number of bronchiolitis attacks, the number of hospitalisations and the length of hospital stays. Conversely, a significant negative correlation (p < 0.05, r = -0.207) was found between the age and the bronchiolitis severity score. These findings correspond with the literature. Although acute bronchiolitis generally affects children under the age of two years, it is most observed in infants between 2 and 12 months (1,2). Infants have more mucous glands in their respiratory tracts, and their airway mucosa is more fragile. Correspondingly, submucosal oedemas develop more easily (7).

Acute bronchiolitis was more frequently observed in male patients in our study, consistent with previous reports in the literature. The literature also reports that acute bronchiolitis is more common and tends to be more severe in males, perhaps because the ratio of the airway's diameter to the lung's volume is smaller in male infants than in females (6,8).

However, a prospective cohort study conducted in 2012 suggested that the impact of gender varies across age groups, with the male sex playing a more important role in cases of acute bronchiolitis and asthma diagnosed after three years of age (9). Similarly, in our study, acute bronchiolitis was more frequently observed in male patients. However, the bronchiolitis severity score and the number of hospitalisations were significantly higher (p < 0.05) in female patients than males. Conversely, there were no significant differences (p > 0.05) between males and females regarding the number of emergency department visits, the number of attacks or the length of hospital stays.

In our study, the weights of the cases ranged from 3 kg to 15 kg, with a mean weight of 8.5 ± 2.8 kg. The height and weight percentiles of the cases were assessed using the growth charts developed by Neyzi et al. (10). When the weight percentiles were examined, 25% of the cases were below the 10th percentile. Similarly, an evaluation of height percentiles revealed that 24% of the cases were below the 10th percentile.

The World Health Organization (WHO) considers malnutrition a significant risk factor for the development of lower respiratory tract infections (11). In our study, no significant differences were found in bronchiolitis scores, emergency department visits, number of attacks, hospital admissions or length of hospital stays based on weight and height percentile distribution (p > 0.05). However, it is well known that malnutrition increases the susceptibility to infections, particularly due to impaired cellular immunity (12). Therefore, children with low socio-economic status may be more vulnerable to lower respiratory tract infections due to malnutrition.

The relationship between maternal education and child health is well documented. Indeed, many studies have shown that the incidence of lower respiratory tract infections increases as maternal education decreases (13,14). In our study, most parents had low levels of educational attainment. However, no statistically significant differences were observed in the number of emergency visits, number of attacks, hospitalisations, length of hospital stays, or bronchiolitis scores in relation to parental age and educational status.

No alcohol use was detected among the mothers, while 10% of the fathers were found to consume alcohol. Additionally, 25% of the mothers and 61% of the fathers were identified as active smokers. The number of emergency department visits, the number of attacks, the number of hospital admissions, the length of hospital stays and bronchiolitis scores did not show a significant difference (p > 0.05) based on the smoking status of the parents. However, several studies and the literature have illustrated that exposure to passive smoke, especially when the mother smokes, is a risk factor for the development of acute bronchiolitis and its continued occurrence in episodes in infants (8,15). In our study, 21% of the mothers were active smokers during pregnancy, while 52% were exposed to passive smoking. Consequently, 73% of the infants were exposed to prenatal tobacco smoke.

There were no significant differences (p > 0.05) in the number of attacks, hospital admissions, length of hospital stays and bronchiolitis scores based on prenatal tobacco smoke exposure. However, the number of emergency department visits revealed a significant difference (p < 0.05) based on the smoking history during pregnancy. The number of emergency visits was significantly lower among active and passive smokers, perhaps because families, especially mothers, may conceal smoking habits and hesitate to report them. It is well known that prenatal exposure to active or passive smoke has adverse effects, including low birth weight, prematurity and underdeveloped lungs. Every day, new negative impacts are seemingly, added to this list (16,17,18). This highlights the necessity of taking precautions and protecting children from tobacco smoke, starting from the prenatal period, to protect their health and development.

Acute bronchiolitis is most mistaken for an asthma attack in clinical practice. Since viral infections can cause acute bronchiolitis and trigger asthma attacks, distinguishing between the two can be difficult. A family history of asthma or atopy and the presence of wheezing attacks support an asthma diagnosis. Severe bronchiolitis cases that require hospitalisation and cases with more than three episodes should be monitored for the development of asthma, and chronic treatment should be initiated when necessary (2,9,19).

In our study, when the presence of atopy, such as allergic rhinitis, dermatitis or asthma, in the mother and father was questioned, 18% of mothers and 13% of fathers had a positive history. No significant differences (p > 0.05) were found in the number of emergency visits, number of attacks, number of hospitalisations, length of hospitalisations or bronchiolitis scores based on the family history.

The birth weights of the cases ranged from 1,100 g to 5,030 g, with an average of 3,032 ± 679 g. There was no significant correlation (p > 0.05) between birth weight and the number of emergency visits, number of attacks, number of hospitalisations, length of hospitalisations or bronchiolitis scores.

However, several studies have found that low birth weight is a risk factor for acute bronchiolitis, and children born with low birth weight are more frequently hospitalised for acute bronchiolitis (20,21). Since birth weight data were not obtained from hospital records, the information obtained from families may not be reliable. Therefore, the expected relationship may not have been observed.

In developed countries, 100% of pregnant women receive PNC, whereas according to the 2018 Turkey Demographic and Health Survey, 96 out of 100 women who gave birth in the last five years in Turkey received PNC during their last pregnancy (21). In our study, 89% of pregnancies were monitored, while 11% were not. There was no significant difference (p > 0.05) in bronchiolitis scores, number of emergency visits, number of hospitalisations and length of hospitalisations based on whether the mother received prenatal care.

However, it is well known that for women to safely become pregnant, give birth and have healthy babies, it is crucial that they be monitored by trained healthcare personnel throughout their pregnancies. Mothers who were not monitored during their pregnancies have a higher risk of maternal mortality, a higher likelihood of giving birth to low-birth-weight babies and a greater risk of postnatal complications for their babies (22).

Newborns with a history of hospitalisation in the neonatal intensive care unit, particularly premature infants and those who develop bronchopulmonary dysplasia, are at high risk for acute bronchiolitis (23). In our study, 16% of the cases had a postnatal history of complications, such as incubator care, oxygen requirements, asphyxia etc. There was no significant difference (p > 0.05) in the bronchiolitis score and number of emergency visits based on the presence of postnatal complications. However, among those with postnatal complications, the number of hospitalisations and length of hospitalisations were significantly higher (p < 0.05) than those without postnatal complications.

Observing the child during feeding can reveal excessive salivation, difficulty in sucking or swallowing and associated symptoms, such as coughing, choking and nasopharyngeal reflux (24). In our study, 13% of the cases had a history of coughing during feeding. There was no significant difference (p > 0.05) in the bronchiolitis scores, number of hospitalisations and length of hospitalisations based on whether the child coughed during feeding. However, among those who coughed during feeding, the number of emergency visits was significantly

higher (p < 0.05) than those who did not cough during feeding.

Feeding problems, vomiting, irritability, hematemesis and non-responses to bronchodilator treatment should be evaluated for GERD because GERD in infants can lead to recurrent wheezing episodes (2,25). In a study evaluating infants with recurrent wheezing episodes, the frequency of GERD was found to be 21.1% (25). In our study, 17% of the cases had a concurrent GERD diagnosis. There was no significant difference (p > 0.05) in the bronchiolitis scores, number of emergency visits and number of hospitalisations between those with and without reflux.

Clinically, an upper respiratory tract infection with symptoms such as a runny nose, mild cough and sometimes low-grade fever is typically present for the first three to five days. Subsequently, lower respiratory tract symptoms develop, including wheezing, prolonged expiratory phase, tachypnoea and signs of expiratory respiratory distress. Nasal flaring and intercostal and subcostal retractions were observed. Initially, wheezing may be faint and only audible with a stethoscope. However, it progressively becomes audible, even without a stethoscope, and becomes more prominent with exertion.

Symptoms of upper respiratory tract infection, such as nasal discharge and cough, typically precede emergency department visits and are known to peak within three days and resolve within 7–10 days (1,19,23). In our cohort, although such symptoms were commonly present prior to presentation, their duration was not significantly correlated with clinical outcomes.

Oxygen saturation values in patients with acute bronchiolitis provide insight into the severity of the disease and guide the direction of treatment (2,23,26). In our study, the oxygen saturation values measured by pulse oximetry at the time of emergency department admission ranged from 86% to 100%, with an average of 94.8 ± 3.1%. There was a significant (p < 0.05) negative correlation between oxygen saturation values and bronchiolitis score.

In our study, certain demographic and environmental variables, such as household size and housing conditions, showed no statistically significant correlation with bronchiolitis severity or related clinical outcomes.

Although crowded and low-comfort living environments are known risk factors for respiratory illnesses (3,4,27), our data did not reveal a significant association (p > 0.05). Therefore, these variables were not emphasized further in the discussion.

The average net income of the families ranged from 0 TL to 8,000 TL, with an average of 1,618 ± 1,128 TL. Moreover, 40% of the families had an income level between 300 TL and 1,000 TL, defined as a low socio–economic status in the country (26). There was no significant (p > 0.05) correlation between net income and the number of emergency visits, number of attacks, number of hospitalisations, length of hospital stays and bronchiolitis scores. However, low socio–economic status increases the incidence of acute bronchiolitis (3,4,26).

In addition, low socio–economic status leads to poor nutrition in children, making them more susceptible to infectious diseases. It also causes delays in seeking early diagnosis and treatment due to the postponement of visits and results in families having insufficient knowledge about the risk factors for acute bronchiolitis (27). The fact that 40% of the families in this study belonged to a low-income group supports the notion that low socio–economic status is a risk factor for acute bronchiolitis.

Moreover, the presence of allergens such as cockroaches, as well as cat and dog hair in the home may lead to recurrent bronchiolitis attacks through airway irritation and immune system upregulation against viruses (27). In our study, 12% of the families had pets (e.g. cats, dogs and birds) in their homes. There was no significant (p > 0.05) difference in bronchiolitis scores, number of emergency visits, number of attacks, number of hospitalisations and length of hospital stays based on whether the family owns pets.

Additionally, 42% of the families had cockroaches in their homes. There was no significant (p > 0.05) difference in bronchiolitis scores, number of emergency visits, number of attacks, number of hospitalisations and length of hospital stays based on the presence or absence of cockroaches in the home.

The presence of humidity in the home creates an environment that increases house dust and other indoor allergens (3,4). In this study, 39% of families lived in homes with humidity. There was no significant (p > 0.05) difference in bronchiolitis scores, number of emergency visits, number of attacks, number of hospitalisations and length of hospital stays based on the presence or absence of humidity in the home.

After exposure to indoor allergens such as cockroaches, house dust and pet hair, children's sensitivity depends on the allergen dose, the child's age and genetic factors (29). The fact that 42% of the families in our study have cockroaches in their homes and 39% live in humid homes is not an insignificant number. This condition not only reflects a low socio–economic status, but also suggests the possibility of a bronchiolitis attack triggered by allergen exposure.

In our study, 66% of the cases were breastfed exclusively during the first six months, 18% were fed with formula, and 16% were fed with both breast milk and formula. After the sixth month, 32% of the babies were fed with breast milk and complementary foods, 9% with formula and complementary foods and 18% with complementary foods only, while 6% were inadequately nourished (breastfed only, formula fed only or introduced inappropriate complementary foods for the child's age before starting complementary feeding). There was no significant (p > 0.05) difference in the number of attacks, number of emergency visits and bronchiolitis score between those who were breastfed and those who were not during the first six months. Similarly, no significant (p > 0.05) difference was found in the second six months in terms of the number of attacks, number of emergency visits and bronchiolitis scores. However, it is well known that breastfeeding is crucial for preventing the development of many viral diseases, including acute bronchiolitis. Studies have illustrated that children who do not receive breast milk experience acute bronchiolitis more frequently (3,27).

CONCLUSION AND RECOMMENDATIONS

This study identified important risk factors for acute bronchiolitis, particularly highlighting the impact of low income and socio–economic status. Additionally, preterm birth and postnatal complications were found to exacerbate the disease course.

Recommendations

- Parent Education: Educational programmes should be implemented for parents, focusing on the dangers of smoking, the benefits of breastfeeding and hygiene practices. Awareness of the transmission of viral infections should also be raised.

- Preterm and Postnatal Monitoring: Regular antenatal care should be provided for infants at risk of preterm birth, and children with postnatal complications should be closely monitored.

- Socio–Economic Support: Health policies should be developed to improve healthcare access for low-income families.

- Allergen Exposure: Parent education regarding household allergens and hygiene should be emphasised, and efforts to minimise allergen exposure in the home should be encouraged.

- Chronic Disease Monitoring: Children with recurrent bronchiolitis should be closely monitored for potential chronic conditions, such as asthma, and early intervention should be considered when necessary.

By implementing these recommendations, the prevention and management of acute bronchiolitis could be improved, potentially reducing both the disease burden and healthcare costs.

Ethical Approval Consideration

Ethics committee approval was obtained from Bursa Yüksek İhtisas Eğitim ve Araştırma Hastanesi, dated 16.03.2014 and numbered 2014/0806.

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