

Epidemiological Features of Bronchiolitis in the Pediatric Clinic of Clinical center of Sarajevo University

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ABSTRACT

Objective: To present the epidemiological features of bronchiolitis in a one-year period in patients of Pediatric Clinic, Clinical Centre of Sarajevo University. **Introduction:** Bronchiolitis is the most common respiratory infection of early infant age. The disease is one the most common reason for hospitalization of children under the age of six months. The disease is characterized by occurrences in the winter season November–March. For daily diagnosing of severe forms of bronchiolitis as a clinical syndrome, often sufficient are the knowledge of the epidemiological data, age of the patient, clinical examination and insight into the risk factors. **Patients and methods:** The history of the disease in 155 infant patients, who were clinically treated because of bronchiolitis in the period from February 2013 to February 2014 in the Department of Pediatric Pulmonary Clinic in Sarajevo was retrospectively analyzed. **Results:** The majority of patients were aged less than 6 months (87.7%). The monthly distribution of bronchiolitis had a peak in January and February. Almost 50% of patients had a risk factors for the development of severe forms of bronchiolitis out of which the most common were artificial diet (53.5%), low birth weight below 2500g (17%), prematurity (16.1%), congenital heart anomalies (14.2%), bronchopulmonary dysplasia (1.9%). 46,5% of patients were on natural nutrition. 46 patients (29.6%) were serologically or by respi-strip test in nasopharyngeal lavage positive on respiratory syncytial virus (RSV). There were no patients who required mechanical ventilation. **Conclusion:** During the one-year period, bronchiolitis was the most common diagnose in the early infantile period up to 6 months, with a peak incidence in January and February. Risk factors such as prematurity, low birth weight, congenital heart anomalies and bronchopulmonary dysplasia have been less present in the studied period compared to the period before the introduction of RSV chemoprophylaxis. The epidemiological data obtained have facilitated the diagnosis, and accordingly the timely and appropriate treatment of bronchiolitis.

Key words: bronchiolitis, infant, epidemiology.

1. INTRODUCTION

Bronchiolitis is the most common respiratory infection in early infant age. This disease is one of the most common reasons for hospitalization of children under the age of six months. The disease is characterized by frequency of occurrence with prevalence in the winter season November–March. To diagnose severe forms of bronchiolitis as a clinical syndrome in daily practice, knowledge of epidemiological data, the patient's age, clinical examination and insight into the risk factors for the disease's development are often sufficient factors.

Bronchiolitis is an acute inflammatory disease of the small bronchial tubes, most often caused by viral infection. The most frequent cause of the disease in about 4/5 of the total number of diseased is the respiratory syncytial virus (RSV). In the US and the UK, 1-3% of the infected infants are hospitalized each winter because of this respiratory infection. Bronchiolitis with severe clinical features is usually seen in younger infants. Out

of the total number of children hospitalized with bronchiolitis, 2-5% is in need for mechanical ventilation and those are usually children with RSV bronchiolitis. This is more frequent in premature born infants and those with pre-existing chronic pulmonary diseases. According to the same studies, the mortality is less for 1% for the infants without existing risk factors while it is to a certain degree higher (3-10%) for the infants with chronic pulmonary diseases and with congenital cardiac anomalies. According to the data disaggregation based on patients' gender, the number of boys hospitalized with bronchiolitis is higher than the number of girls.

This disease can also occur in older children, even up to two years of age, but in this case the clinical features are less severe.

It is believed that RSV infection affects 70-80% of infants and practically all children until the second year of age. Incubation of the RSV lasts four days and a child is contagious five to twelve days after onset of the illness (1).

After the first infection, the immunity is not permanent, consequently, the reinfections are common but with more subtle illness symptoms. If the disease occurs in the spring or summer, the cause is the human metapneumovirus. Other important causing agents are adenovirus, influenza virus and parainfluenza (1).

The disease occurs epidemically every year. Usually, the epidemic occurs during the winter months with shorter and longer periods of absence in between. The virus is almost always transmitted from a collective into the family by an older child, and given its high contagiousness and transferability by sharing of items and goods, it affects young children. The virus remains alive for around 30 hours on objects and for about an hour on hands what is sufficient time for an easy transmission amongst family members(1).

In the temperate climate zone the RSV epidemics occur every winter and last four to five months. Over the remaining months, the infections with this virus are sporadic. In the northern hemispheres, the epidemics usually has a peak in January and February. At the time of the epidemic, the number of infants hospitalized because of bronchiolitis varies depending on the number of the RSV infected individuals in the community. In the tropical zone, the epidemical pattern is less clear (2).

With regards to the virus prevalence in differently populated communities, it has been seen that in urban areas around half of vulnerable infants are exposed to the infection during each epidemic season.

The RSV antibodies which have a protective effect with the full term infants *healthy term* infants are transplacentally transmitted, which explains the decreased rates of infected infants, especially those with more severe clinical features, in the first four to six weeks of life.

To diagnose in daily practice the severe forms of bronchiolitis as a clinical syndrome, knowledge of epidemiological data, the patient's age, clinical examination and insight into the risk factors for the disease's development are often sufficient elements.

As for the prognoses, in most of the cases the disease is gone within two weeks of time without consequences. More recently, the studies have shown that the rates of hospitalizations of children with risk factors and sever clinical features have decreased most probably thanks to the introduced palivizumab immunoprophylaxes.

The RSV infection is highly contagious disease. Since it is spread through droplets and contacts, it is important to conduct rapid diagnostic and to undertake adequate preventive measures aimed at preventing occurrence and spread of the RSV nosocomial infections (3).

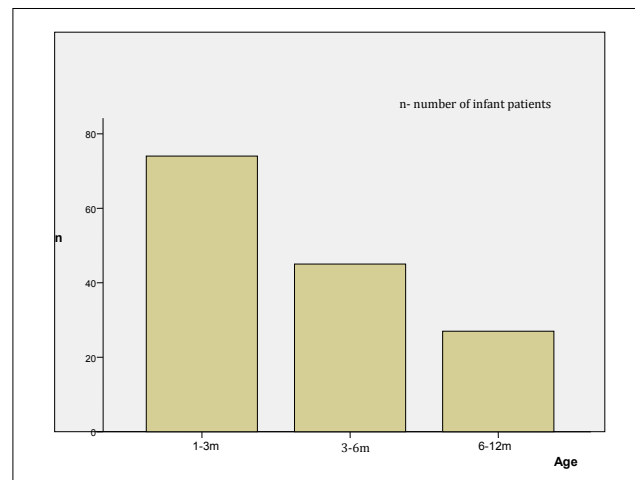
2. PATIENTS AND METHODS

The history of the disease in 155 infant patients, who were clinically treated because of bronchiolitis in the period from February 2013 to February 2014 in the Department of Pediatric Pulmonary Clinic in Sarajevo was retrospectively analyzed.

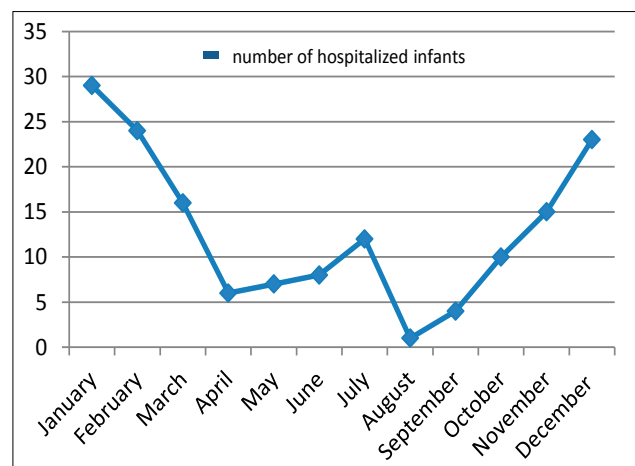
3. FINDINGS AND DISCUSSION

The research results are presented in tables and graphics.

The research involved 155 children from 1 to 12 months old who were hospitalized with the clinic features of bronchiolitis in the Department of Pediatric Pulmonary Clinic in Sarajevo in the period from 01.02.2013 to 01.02.2014. The infants with



Graph 1. The age distribution of infant bronchiolitis



Graph 2. Monthly distribution of bronchiolitis in one-year period

repeated infections of lower respiratory tubes were not included in the research.

Out of the total number of children hospitalized with bronchiolitis (155), 91 (58.7 %) were boys and 64 (41.3%) were girls. As evidenced by literature, there is a greater incidence of bronchiolitis in boys. The study conducted in 2007 in the Pediatric Clinic in Sarajevo also stated the higher percentage of hospitalized male infants (4).

In relation to age distribution of bronchiolitis incidence, all children observed through the study are classified in three groups. The first group is composed of children 1-3 months old, the second group were children 3-6 months old and the third group was composed of children 6-12 months old. In the first group there were 74 children (47.7%), in the second group 54 (34.8 %) and in the third group 27 (17.4%) as presented in the graph 1. Thus, the most widely affected children were under the age of three months. According to the study conducted in the Sarajevo clinic in 2007, the greatest number of patients was in the group of children 3-6 months old, which was consistent with current research. The study registered a larger number of patients shifting to lower age groups, and although the clinical features are milder, none of the children were ventilated or situations with latent consequences. The RSV infection has been proven in less than 1/3 of cases. In the comprehensive 10-year study in the USA (1997-2006), which included survey of the RSV infection in children up to 5 years of age, 26 of 1000 were children up to 1 year old amongst which the most represented

Risk factors	Present number	Present %	Non br	Non %	Total number	Total %
Natural nutrition	72	46.5	83	53.5	155	100,0
USA*	22	14,2	133	85,8	155	100,0
BPD**	3	1,9	152	98,1	155	100,0
ASF***	4	2,6	151	97,4	155	100,0
Prematurity****	25	16.1	130	83.9	155	100,0

*congenital hearth anomalies, **bronchopulmonary dysplasia, ***asphyxia, ****prematurity <36NG

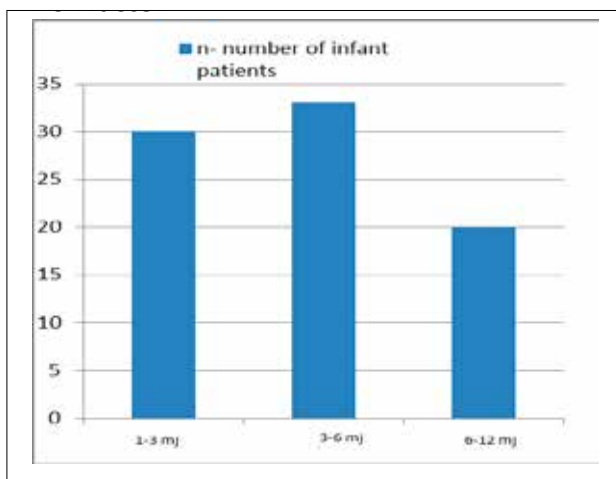
Table 1. The frequency of risk factors for infant bronchiolitis in one-year period.

Gestation weeks NG	Frequency Number	Percentage %
>36NG	130	83,9
32-35NG	16	10,3
28-31NG	9	5,8
Total	155	100,0

Table 2. Gestational age in infant bronchiolitis

Dob	Muški		Ženski	
	n	%	n	%
1	44	48,4	30	46,9
2	30	33	24	37,5
3	17	18,7	10	15,6
Ukupno	91	100	64	100

Table 3. Gender disaggregation of patients in age groups



Graph 3. Distribution of tested patients on age according to the artificial nutrition as risk factor

age group were children up to 3 months of age (48 of 1000) and the least represented were children older than 12 months, 1.8 of 1000 (5).

Looking at the seasonal distribution of bronchiolitis in a one year period, the greatest registered number of diseased was in the winter time. The number of diseased has been growing from November 15/155 (9.7%), during December 23/155 (14.8%) and reaches its peak occurrence in January 29/155 (18.7%) and in February 24/155 (15.5%). After February, it is gradually decreasing, in March 16/155 (10.3%), April 6/155 (3.9%), graph 2. The one-year retrospective study conducted at the Pediatric clinic in Sarajevo in 2007 also alleges the highest number of diseased in the winter months (5). Seasonal distribution of RSV and non-

RSV bronchiolitis follows different rates in different months, depending on climate and epidemiological seasonal conditions in the world (6). According to the study, the greatest number of diseased has been registered in the period January-February what corresponds to the quotes of the mentioned literature. As risk factors, artificial food, prematurity, birth weight, congenital hearth anomalies, broncho-pulmonary dysplasia, and asphyxia were considered.

Having researched the influence of the risk factors on the bronchiolitis incidence, when compared with previous years, in the US different results relating to the risk factor of prematurity were reached. In the observed group (155) the risk factor of artificial food was dominantly present with 53.5% (83/155). According to Milanović V. breast feeding and breast milk play an important protective role (7). According to Scottish Intercollegiate Guidelines Network, if the breast feeding lasted less than two months there is a greater possibility of hospitalization of the children affected by bronchiolitis (8). In the conclusion of the study conducted on 384 children, Čukalović and associates claimed that breast fed children get sick from bronchiolitis less often than others (9).

According to the study, amongst the children hospitalized with bronchiolitis the number of those on artificial food was dominant, which is in accordance with the quoted literature. The findings are presented in the Graph 1.

The prematurity as a risk factor is represented in the percentage of 16.1 (25/155). According to this risk factor, the patients have been divided into three age groups: above 36 weeks of gestation, 32-35 weeks of gestation and 28-31 weeks of gestation. In the first group there were 83.9% (130/155) of children, in the second group 10.3% (16/155) of children and in the third group 5.8% (9/155) of children as presented in the Graph 2. We can see that when compared with the number of diseased under the influence of the prematurity risk factor, the greater number of diseased is amongst the healthy term children, what is perhaps the consequence of other viral ethology. The fewest number of diseased was registered in the group of children born with 28-31 weeks of gestation. However, on contrary to this data, the study conducted at the Sarajevo Pediatric Clinic in Sarajevo in 2007 stated that there was greater rate of hospitalized children with the prematurity risk factor and with the shortest gestation period. Thus reduced number of patients in premature infants in our study may be explained by the introduction of the regular RSV prophylaxis as of 2007. The findings are presented in the Graph 3.

The congenital heart anomaly was represented with 14.2 % (22/155). A higher percent of illness caused by this risk factor when compared with the previous study in Sarajevo Pediatric Clinic may be explained with the usual more frequent respiratory infections in children with hearth anomalies and with the fact that larger number of children was observed in this case. Broncho-pulmonary dysplasia (BPD) was represented with 1.9% (3/155) and asphyxia with 2.6% (4/155). Small share of BPD as a risk factor causing severe bronchiolitis may be explained by the protocol use of the RSV chemoprophylaxis.

The tested sample of 83 patients on artificial nutrition was divided into three groups: 1-3 months, 3-6 months, 6-12 months. The most numerous group was the 3-6 months with 33 patients. The age group 1-3 months had 30 while the age group 6-12 months had 20 patients. According Bulkow LR et al. The

breast feeding is associated with reduced risk for hospitalization in children younger than 6 months. (10) Using the chi-squared test, we compared gender-related differences in groups and no significant statistical deviations were found in any of controlled age groups.

4. CONCLUSIONS

- The highest number of affected patients in our climate zone occurs in the winter months (January and February).
- All the patients had a favorable outcome of treatment; there were neither fatal outcomes nor patients who required mechanical ventilation.
- Risk factors such as prematurity, low birth weight, USM and BPD as well as RSV etiology are less present in the examined period compared to the period before the introduction of RSV chemoprophylaxis at the Sarajevo Pediatric Clinic.
- This study confirms the well-known importance of breast feeding in the prevention of early respiratory infections and the importance of RSV chemoprophylaxis.
- These epidemiological findings contribute to timely diagnosis and adequate treatment of non RSV and RSV bronchiolitis.

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