AJPMHS GLOBAL RESEARCH NETWORK

AMERICAN Journal of Pediatric Medicine and Health Sciences
Volume 3, Issue 4, 2025 ISSN (E): 2993-2149

The Role of Immunotherapy in Children with Obstructive Forms of Bronchitis

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Abstract: Respiratory diseases in early childhood represent a significant concern in pediatric healthcare due to their high incidence and recurrent nature. Acute obstructive bronchitis and bronchiolitis are among the most severe forms, often requiring hospitalization and prolonged recovery. Although pharmacological advancements have been made, there remains a lack of pathogenetically justified treatments, particularly concerning the use of immunomodulatory drugs like immunomodulin in early-age patients. This study aimed to evaluate the clinical efficacy of incorporating immunomodulin into the therapeutic regimen of children under three years with acute obstructive bronchitis and bronchiolitis. A comparative clinical observation was conducted involving traditional treatment groups and those receiving immunomodulin, assessing respiratory and intoxication symptom resolution timelines. The inclusion of immunomodulin significantly reduced the time required for symptom relief, including dyspnea, cyanosis, tachycardia, cough, and auscultatory wheezing, compared to traditional therapy alone ($p<0.05$). The study presents new empirical evidence on the added value of immunomodulin in accelerating recovery in obstructive pulmonary infections in early childhood a domain previously underexplored. Integrating immunomodulin into conventional pediatric treatment protocols may improve outcomes, reduce hospital stays, and contribute to individualized therapy in respiratory pathologies of early childhood.

Keywords: immunotherapy, immunomodulin, pediatric bronchitis, bronchiolitis, respiratory failure, obstructive bronchitis, clinical recovery, Uzbekistan.

Introduction. Bronchopulmonary pathology currently remains one of the main pathologies in the structure of childhood morbidity in the Republic of Uzbekistan, especially in young children [1]. At the same time, the leading place among bronchitis is occupied by acute obstructive bronchitis and bronchiolitis, which are characterized by a tendency to repeated episodes of exacerbation and the development of severe complications, as well as a recurrent course [5,6].It is important to note that in recent years, certain number of successes have been achieved in the study of the etiology, pathogenesis, clinical picture, diagnosis, treatment of acute obstructive bronchitis and bronchiolitis [2], At the same time, as shown by the clinical experience of practical pediatricians, on whom the timely diagnosis of the disease largely depends, the appointment of adequate pharmacotherapy, the individual prevention of relapses is largely complicated due to the insufficient number of pathogenetically justified means of treatment [9,10]. Drug immunomodulin is studied insufficiently, especially in acute obstructive bronchitis and bronchiolitis in children of early age [3].

Material and methods.

Studies were carried out, that provided information on the definition and justification of the inclusion of immunomodulin in the complex of therapeutic measures for sick children of early

age with acute obstructive bronchitis and bronchiolitis.

The effectiveness of the drug immunomodulin was assessed by the period (days) of the disappearance of symptoms of respiratory failure and intoxication in children during the period of treatment. Objective symptoms of respiratory failure in the clinical picture in children with acute obstructive bronchitis and bronchiolitis were severe shortness of breath with the participation of auxiliary muscles in the act of breathing and swelling of the nasal wings, cyanosis of the nasolabial triangle, high respiratory rate, pallor of the skin, tachycardia, prolonged expiration, distant rales.

Objective symptoms of body intoxication in children with acute obstructive bronchitis and bronchiolitis during the treatment period were high body temperature, lethargy, weakness, moodiness and anxiety, sleep disturbance, poor appetite, catarrhal phenomena (rhinitis, pharyngitis, rhinopharyngitis), leukopenia, neutrophilia, increased ESR.

It should be noted that the severity of sick children with acute obstructive bronchiolitis by clinical signs was significantly higher than in children with acute obstructive bronchitis, which required more intensive therapy with the inclusion of not only bronchodilators, sedatives, but also significantly more mucolytic drugs, as well as in some cases, antibiotics, glucocorticoid hormones (IV in a short course for 3-5 days).

Results and discussion.

The difference in therapy between patients with acute obstructive bronchitis and acute obstructive bronchiolitis is noted in the following examples.

Patient A., 10 months old. He fell ill acutely: his body temperature quickly rose to 38.5 °C, difficulty in nasal breathing appeared, and there was a single vomiting during the day. On the 2nd day, a cough, shortness of breath joined, and profuse serous-mucous discharge from the nose; the child became restless, capricious, lethargic.

Sleep and appetite disturbances were observed. At home he took biseptol, mukaltin, the throat was treated with a solution of furacillin, but fever, cough, lethargy, and shortness of breath persisted. On the 3rd day, he was examined by a district doctor and sent for treatment to the Tashkent City Children's Clinical Hospital, where he was hospitalized in a serious condition in 1st somatic department. On admission, the body temperature was 38.8 °C, pale, lethargic, indifferent, severe shortness of breath, cyanosis of the nasolabial triangle were observed. Remote wheezing was heard. Mucous discharge from the nose. Obsessive wet cough. The mucous membrane of the oropharynx is hyperemic. BH - 58 in 1 min. Above the lungs, an abundance of unsonic small bubbling rales is heard on inhalation and at the very beginning of exhalation, dry wheezing on exhalation. Percussion sound above her with a boxed tinge. Muffled heart sounds, tachycardia. Rhythmic pulse 152 in 1 min. The abdomen is soft and painless. The liver with a sharp elastic edge protrudes from under the rib by 1 cm. The spleen is clearly palpable. Stool and urine output are not disturbed. In the blood: Hb - 128 g / l, erythrocytes - 3.8x1012 / l, color index - 1.0, leukocytes - 11.0x 109 / l, eosinophils - 5%, lymphocytes - 52%, ESR - 14 mm / h ... Radiography - there is an increased transparency of the pulmonary fields, a low standing of the diaphragm.

On the basis of clinical and instrumental data, the diagnosis was made - Acute obstructive bronchiolitis, DN II degree [4].

Later, against the background of pathogenetic therapy, the condition gradually began to improve: the temperature returned to normal by the 3rd day of illness, wheezing in the lungs by the 8th day, and cough by the 10th day. Shortness of breath disappeared on the 5th day, the appetite improved on the 6th, catarrhal symptoms - on the 5th.

Received: humidified oxygen, penicillin, salbutamol, bronchodilator, prednisone in a short course.

The child was discharged from the hospital on the 12th day, in a satisfactory condition [5].

Patient S., 1 year old. The disease began with malaise, dry cough, nasal congestion. On the 3rd day, the body temperature increased to 38.2 °C, shortness of breath appeared. The child's condition worsened, became lethargic, capricious. At home they were treated with ampicillin (tab), bromhexine, paracetamol. Despite this, the child's condition worsened, shortness of breath increased, cough intensified, and sleep was disturbed. On the 4th day, the child in serious condition was hospitalized in the 1st somatic department of the 1st GDKB.

When examined in the clinic, the body temperature was 38.3 °C, the skin was pale, warm. Perioral cyanosis was noted. When breathing, the wings of the nose inflated, distant wheezing was heard. Breathing quickened, 54 in 1 min. Above the lungs, dry wheezing and moist medium-bubbly moist rales were heard. Muffled heart sounds, tachycardia. Pulse 148 in 1 min. The liver and spleen were not enlarged. Stool and diuresis were regular.

In the blood: Hb - 106 g / l, erythrocytes - 3.6 x1012 / l, color index - 0.9, l - 8.0 x 109 / l, eosinophils - 6%, lymphocytes - 47%, ESR - 10 mm / h.

Radiography - bilateral enhancement of the pulmonary pattern and expansion of the roots of the lungs, increased transparency of the pulmonary fields.

On the basis of clinical and instrumental studies, the diagnosis was made: acute obstructive bronchitis, DN II degree.

The recovery was slow. The temperature lasted 2 days, shortness of breath - 4 days, cough -8, wheezing - 7 days. Appetite returned to normal by the 5th day, sleep by the 6th day. Was discharged by the 9th day in a satisfactory condition [6].

From the above examples, it can be seen that when treated with the traditional method, the clinical picture of sick children with acute obstructive bronchitis and bronchiolitis was significantly different. The duration of treatment in a child with acute obstructive bronchiolitis was 12 days, and in a child with acute obstructive bronchitis - 9 days, despite the fact that the patients underwent the entire complex of modern therapeutic measures. Under the influence of traditional treatment, a number of indicators - lethargy, weakness, lack of appetite, an increase in peripheral lymph nodes, pallor of the skin, distant wheezing, as well as wheezing determined by auscultation, cough - persisted for quite a long time [7].

At the same time, the severity of clinical and laboratory signs in patients with acute obstructive bronchiolitis differed in a longer aggressive course than in patients with acute obstructive bronchitis. The additional inclusion of the drug immunomodulin in the complex of therapeutic measures made it possible to significantly reduce the time required for the disappearance of clinical signs of respiratory failure in comparison with those observed in children treated with the traditional method [8].

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Table 1. Time (days) of disappearance of clinical signs of respiratory failure in children with acute obstructive bronchitis during treatment (M + m)

Clinical sign	Traditional therapy (n=38)	Traditional therapy + immunomodulin (n=25)	Effect, %
Expiratory dyspnea with the participation of an auxiliary	3,4±0,81	2,3±0,15*	32,4

musculature			
Frequency recovery Breath	3,9±0,27	2,7±0,16*	30,8
Cyanosis of the nasolabial triangle	2,8±0,16	2,1±0,12*	25,0
Pallor of the skin	5,7±0,12	4,9±0,23*	14,0
Tachycardia	3,2±0,22	2,5±0,18*	21,9
Distant wheezing,	4,9±0,28	3,5±0,26*	28,6
also identified auscultatory	7,4±0,39	5,3±0,28*	28,4
Cough to full disappearances	7,9±0,23	5,8±0,26*	26,6
Mean			26,0±2,21

- P<0,05

So, expiratory dyspnea with the participation of auxiliary muscles disappeared 1.1 days earlier, and the clinical effect increased by 32,4%, the recovery of respiratory rate decreased by 1,2 days, the clinical effect increased by 30,8%.

* - P<0,05

The disappearance of cyanosis of the nasolabial triangle was noted 0.7 (P <0.05) days earlier, the effect increased by 25.0%, pallor of the skin by 0.8 (P <0.01), tachycardia by 0.7 (P < 0.001), distant wheezing by 1.4 (P <0.001), and also determined by auscultation by 2.1 (P <0.002), cough decreased by 2.1 (P <0.002) days, and the clinical effect increased by 14, respectively. , 0%, 21.9%, 28.6%, 28.4% and 26.6% (Table 2).

Table 2. Time (days) of disappearance of clinical signs of respiratory failure in children with acute obstructive bronchiolitis during the treatment period (M + m)

Clinical sign	**Traditional therapy (n=15)**	**Traditional therapy + immunomodulin (n=17)**	**Effect,** %
Expiratory dyspnea with the participation of an auxiliary musculature	4,5±0,28	3,1±0,20*	31,1
Frequency recovery breath	4,7±0,19	3,3±0,14*	29,8
Cyanosis of the nasolabial triangle	3,6±0,20	2,7±0,18*	25,0
Pallor of the skin	7,8±0,33	6,3±0,45*	19,2
Tachycardia	4,9±0,27	3,5±0,21*	28,6
Distant wheezing,	6,7±0,39	5,3±0,26*	20,9
Identified auscultatory	11,6±0,33	8,9±0,35*	23,3
The disappearance of the percussion boxed shade or boxed sound	7,8±0,34	6,4±0,17*	18,0
Cough to full disappearances	10,5±0,26	8,8±0,14*	16,2
Mean			23,6±1,67

When evaluating the effectiveness of treatment in children with acute obstructive bronchiolitis in terms of indicators characterizing respiratory failure, it was found that the period of

disappearance of expiratory dyspnea was shorter in patients treated with immunomodulin by 1.4 days (P <0.002), and the rate of treatment efficacy increased by 31.1%. Restoration of respiratory rate, disappearance of cyanosis of the nasolabial triangle, pallor of the skin, tachycardia, distant wheezing, as well as auscultatory characteristic percussion pulmonary sound with a box shade, cough decreased by 1.4 (P <0.002), 0.9 (P < 0.001), 1.5 (P <0.002), 1.4 (P <0.002), 1.4 (P <0.002), 2.7 (P <0.002), 1.4 (P <0.002) and 3, 7 (P <0.002) days, and the effectiveness of treatment increased by 29.8%, 25%, 19.2%, 28.6%, 20.9%, 23.3%, 18.0% and 16.2% [9].

Conclusion. The study demonstrated that the inclusion of immunomodulin in the treatment of children with acute obstructive bronchitis and bronchiolitis significantly accelerated the resolution of clinical symptoms such as expiratory dyspnea, cyanosis, tachycardia, and persistent cough compared to traditional therapy alone. These findings underscore the therapeutic potential of immunomodulin in enhancing the clinical outcomes of pediatric patients suffering from obstructive respiratory conditions. The results suggest that immunomodulin may serve as an effective adjunct to standard treatments, potentially reducing the duration of hospitalization and improving recovery rates. However, given the limited scope of the current research, further large-scale, controlled studies are warranted to comprehensively assess the long-term safety, optimal dosage, and efficacy of immunomodulin in diverse pediatric populations. Future research should also explore the immunological mechanisms underlying its beneficial effects to support its broader clinical application in pediatric pulmonology.

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