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THE LEVEL OF PRO-INFLAMMATORY AND ANTI-INFLAMMATORY INTERLEUKINES IN CHILDREN WITH ACUTE BRONCHIOLITIS

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Abstract
Currently, information about the characteristics of the immune response depending on the severity of acute bronchiolitis in young children is still not fully studied and contradictory. Studies are devoted to studying the activity of interleukins in acute bronchiolitis depending on the severity of the disease. The results obtained will make it possible to clarify the basic mechanisms of the occurrence and course of the inflammatory response in the mucous membranes of the bronchial tree and will make it possible to consider them as additional markers of inflammation that provide a humoral response.

Keywords: Acute bronchiolitis, children, cytokines.

INTRODUCTION

Bronchiolitis is the leading cause of hospitalization in infants during their first year of life, accounting for 90% of cases. Every year, the number of registered cases of acute bronchiolitis in children worldwide exceeds 150 million, with 12 million cases requiring hospitalization. [1,2,10]. Cytokines are signaling molecules that play a key role in the immune system both under normal conditions and in pathological states. Acting as mediators of the immune system, they regulate the strength and duration of immune responses and inflammatory processes, ensuring intercellular interactions and positive and negative immune regulation. The production of cytokines can be stimulated by biological, physical, and chemical irritants. The cytokine system includes more than 300 polypeptide substances that connect various bodily systems (immune, endocrine, hematopoietic, etc.) and serve as part of a unified defense response against pathogen invasion. [2,3,5].

Pro-inflammatory cytokines, such as interferons (IFN-α, IFN-β, IFN-γ), interleukins (IL-1, IL-6, IL-12), tumor necrosis factor-alpha (TNF-α), and chemokines (IL-8, MCP-1, RANTES, etc.), activate the inflammatory response in tissues and serve as markers of disease activity and severity. Anti-inflammatory cytokines, including IL-4, IL-10, and TGF-β, inhibit inflammation in tissues.

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Regulating cytokine production is essential for maintaining immune balance in the body. An imbalance in cytokine production can lead to severe inflammatory conditions. [5,7,10]. The levels of cytokines can provide insight into the severity, extent, and stage of the inflammatory process, as well as its systemic spread, which helps in predicting the course of the disease. [1,8,9].

Currently, significant attention is given to both pro-inflammatory and anti-inflammatory cytokines involved in immune processes. Their effects determine the severity and outcome of respiratory viral infections, including acute bronchiolitis. Along with the well-studied properties of tumor necrosis factor-alpha (TNF-α), which has universal antiviral properties, special attention is paid to IL-4, IL-6, IL-8, and IL-10. Through indirect immune regulation of inflammatory processes, these cytokines contribute to the body's defense against various pathogens.

Purpose of the study

To assess the levels of pro-inflammatory and anti-inflammatory cytokines in children with acute bronchiolitis, depending on the presence of bacterial complications, and to determine their clinical and differential diagnostic significance.

Materials and Methods

We examined 94 children aged 1 to 12 months diagnosed with acute bronchiolitis. Exclusion criteria included congenital diseases of the bronchopulmonary, cardiovascular, and central nervous systems. The study included an analysis of the clinical course of the disease, laboratory and instrumental data, and the determination of immunological parameters (IL-4, IL-6, IL-8, IL-10, TNF-α, INF-γ) using the enzyme-linked immunosorbent assay (ELISA) in blood serum samples from children with acute bronchiolitis.

Study Results

Medical history analysis revealed that all examined children experienced acute bronchiolitis for the first time. The clinical course of the disease showed that 20 children developed bacterial complications, such as pneumonia, urinary tract infections, and acute enterocolitis, confirmed by elevated C-reactive protein (CRP) levels and corresponding clinical, laboratory, and instrumental findings.

In this group of children, pro-inflammatory interleukin levels were significantly elevated. IL-6 and IL-8 levels reached 63.51±3.75 ng/ml and 84.36±2.94 ng/ml, respectively, which were significantly higher compared to children without bacterial complications ($p<0.0001$ and $p<0.0001$). Additionally, TNF-α levels were 51.05±2.46 ng/ml, indicating an intense inflammatory process ($p<0.0001$). These intense inflammatory reactions were accompanied by a significant decrease in anti-inflammatory IL-10 levels (1.75±0.26 ng/ml), which were markedly lower compared to children without bacterial complications ($p<0.0001$) and the general study group (3.02±0.17 ng/ml; $p<0.0001$).

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Table:1 Indicators of pro-inflammatory and anti-inflammatory interleukins in children depending on the presence of bacterial complications in acute bronchiolitis.

Indicators	Bacterial complications		P
	Available (n=20)	Not available (n=74)	
IL-4; ng/ml	2,08±0,21	1,22±0,07	<0,0001
IL-6; ng/ml	63,51±3,75	43,71±1,96	<0,0001
IL-8; ng/ml	84,36±2,94	63,02±1,85	<0,0001
IL-10; ng/ml	1,75±0,26	3,37±0,19	<0,0001
INF γ; ng/ml	22,08±1,84	39,31±1,68	<0,0001
TNF ά; ng/ml	51,05±2,46	33,07±1,34	<0,0001
IgE; ME/ ml	63,52±4,36	47,35±1,63	<0,0001

It is well known that INFγ plays a key role in mounting an adequate immune response to viral infections, with one of its important properties being its non-specific antiviral activity.

The results of our study demonstrated that in children with acute bronchiolitis, the levels of INFγ varied widely. In some cases, INFγ levels were elevated, reflecting an adequate immune response to viral inflammation, while in other cases, they were significantly lower than normal, indicating exhaustion of the interferon response to inflammation. Overall, in children with acute bronchiolitis and bacterial complications, there was a statistically significant reduction in INFγ levels ($p<0.0001$) compared to the control group (22.08±1.84 ng/ml vs. 39.31±1.68 ng/ml).

A comparative analysis of immunoglobulin IgE levels revealed a significant increase ($p<0.0001$) in children with bacterial complications (63.52±4.36 IU/ml) compared to those without complications (47.35±1.63 IU/ml). Although IgE levels remained within reference values, they were statistically higher in children with acute bronchiolitis and bacterial complications.

Conclusions

Thus, in children with acute bronchiolitis, there is a significant imbalance between pro-inflammatory and anti-inflammatory interleukins, characterized by a marked increase in IL-6 and IL-8, reflecting an intense inflammatory process, which was most pronounced in severe cases of acute bronchiolitis.

In the presence of bacterial complications, the levels of these interleukins were even higher, indicating a neutrophilic type of inflammation. Determining interleukin levels can help predict disease severity in children.

References

1. Кудратова З.Е. и др. Роль цитокиновой регуляции при обструктивном синдроме атипичного генеза у детей // Анналы Румынского общества клеточной биологии. – 2021. – Т. 25. – №. 1. – С. 6279-6291.
2. Erkinovna K. Z. et al. Bronchial obstruction syndrome in young children with respiratory infections of different etiology: features of clinical manifestations and immune response //Проблемы науки. – 2021. – №. 1 (60). – С. 60-62.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

3. Кудратова З.Е. и др. Хламидийные инфекции (внутриклеточная инфекция) в развитии бронхита // TJE-Tematics journal of Education ISSN. – 2021. – С. 2249-9822.
4. Kudratova Z. E. et al. Principles of therapy of chlamydial and mycoplasma infections at the present stage //Вопросы науки и образования. – 2021. – №. 28 (153). – С. 23-26.
5. Rustamova G. R., Kudratova Z. E. CHRONIC ENDOMETRITIS OLD ISSUES NEW POSSIBILITIES //Western European Journal of Medicine and Medical Science. – 2024. – Т. 2. – №. 5. – С. 12-14.
6. Erkinovna K. Z., Rustamovna R. G., Suratovna H. F. LABORATORY MARKERS OF PERINATAL HYPOXIC DAMAGE TO THE CENTRAL NERVOUS SYSTEM IN NEWBORNS //Наука, техника и образование. – 2020. – №. 10 (74). – С. 102-104.
7. Mukhamadieva L. A., Rustamova G. R., Kudratova Z. E. IMMEDIATE RESULTS OF COMPLEX TREATMENT OF CHILDREN WITH CHRONIC TONSILLITIS AND CHRONIC ADENOIDITIS ASSOCIATED WITH CMV AND EBV //Western European Journal of Medicine and Medical Science. – 2024. – Т. 2. – №. 5. – С. 20-24.
8. Азимова К.Т., Гарифулина Л.М. Факторы риска развития острого бронхиолита у детей //Журнал гепато-гастроэнтерологических исследований-2022. Материалы международной научно-практической конференции с международным участием. Специальный выпуск.-№2(том1).-С. 61-64.
9. Азимова К.Т., Гарифулина Л.М. Клинические особенности течения вирусных бронхиолитов у детей //Журнал гепато-гастроэнтерологических исследований-2022.-№2(том3).-С.13-16.
10. Азимова К.Т., Гарифулина Л.М. Особенности течения респираторно-синцитиального вирусного бронхиолита у детей // Проблемы биологии и медицины. Материалы 76-й международной научно-практической конференции студентов медицинских вузов и молодых ученных-2022. - С.202.
11. Азимова К.Т., Гарифулина Л.М. Показатели цитокинового статуса при бронхиолите у детей // Журнал кардиореспираторных исследований -2023.- №2(том4).-С.45-47
12. Азимова К.Т. Корреляционная взаимосвязь клинических показателей и тяжелого течения острого бронхиолита у детей //Актуальные вопросы современной науки и инноватики Уфа -2023. - С.- 24-29.