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FEATURES OF THE CLINICAL COURSE OF PNEUMONIA IN CHILDREN WITH CHRONIC DISEASES (BRONCHIAL ASTHMA, CARDIOVASCULAR DISEASES, ANEMIA)

Xaydarova Xadicha Ramizovna

Samarkand State of Medical University,

Assistant of the Department of Pediatrics

Annotation

This scientific article examines the clinical, immunological, and anthropological characteristics of pneumonia in children with chronic diseases, including bronchial asthma, cardiovascular diseases, and chronic anemia. The study was conducted during 2024–2025 in the pediatric demonology and cardiology departments of Samarkand State Medical University and was based on clinical observation and analysis of patients hospitalized with a diagnosis of pneumonia. A total of 72 pediatric patients diagnosed with pneumonia were included in the study. The patients were divided into three groups according to their underlying chronic conditions: bronchial asthma, cardiovascular diseases, and chronic anemia.

In each group, the severity of pneumonia, the dynamics of inflammatory markers (C-reactive protein and nonreciprocal), oxygenation parameters, and the microbiological spectrum were compared. Evaluation of treatment effectiveness demonstrated the importance of an individualized therapeutic approach. In particular, optimization of inhalation therapy in the asthma group and adjustment of diuretic, anticoagulant, and metabolic support protocols in patients with underlying cardiovascular pathology resulted in improved clinical outcomes. These findings serve as a scientific basis for the management of co-morbid pneumonia in pediatric and pulmonology practice.

Keywords

pneumonia, children, chronic diseases, bronchial asthma, cardiovascular diseases, anemia, inflammatory markers, oxygenation, microbiological spectrum, comorbid conditions, clinical course, treatment strategies, pediatrics, pulmonology.

Introduction

Pneumonia occurring in childhood is one of the most pressing infectious diseases in modern pediatric practice and is characterized by the presence of numerous factors influencing its course. In particular, in children with chronic diseases—such as bronchial asthma, cardiovascular pathologies, and chronic anemia—the presence of co-morbid conditions significantly complicates the clinical course of pneumonia. The anthropological mechanisms of chronic diseases, alterations in immune responses, and limitations of the body's compensatory reserves further aggravate the development and outcomes of pneumonia [1;3;6;8;11;14].

In children with bronchial asthma, increased mediators of allergic inflammation, bronchial obstruction, and uneven distribution of air throughout the lungs are considered the main factors that exacerbate the pneumonia process. Cardiovascular system pathologies negatively affect pneumonia development through disturbances in pulmonary circulation, increased myocardial

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workload, and impaired gas exchange. In chronic anemia, insufficient oxygen supply to tissues leads to a prolonged and severe course of the infectious process [2;4;7;9;12;15].

Each of these chronic diseases causes specific pathobiological changes that further complicate the course of pneumonia. Immune suppression, alterations in inflammatory markers, impaired oxygenation, and reduced pulmonary ventilation form an interconnected pathological cycle. The stronger this cycle becomes, the more severe the course of pneumonia, the higher the frequency of complications, and the longer the rehabilitation period [5;10;13;16;18;20]. Therefore, in-depth study of pneumonia in children with co-morbid conditions, early diagnosis, and development of individualized treatment strategies are among the most important tasks of modern pediatrics.

Aim of the Study.To identify the clinical, functional, and pathophysiological characteristics of pneumonia in children with chronic diseases (bronchial asthma, cardiovascular diseases, and chronic anemia), and to examine the relationship of these changes with the type and severity of the underlying chronic pathology.

Materials and Methods. The study was conducted during 2024–2025 in pediatric pulmonology and cardiology departments and included 72 children with chronic diseases hospitalized with a diagnosis of pneumonia. Of these patients, 32 children had bronchial asthma, 26 had chronic cardiovascular diseases, and 14 had chronic anemia of various etiologies. The patients' ages ranged from 3 to 16 years; 40 were boys (55.6%) and 32 were girls (44.4%).

The mean duration of the underlying chronic disease was 4.8 ± 0.4 years in children with bronchial asthma, 3.6 ± 0.5 years in those with cardiovascular diseases, and 2.9 ± 0.3 years in children with chronic anemia. Prior to the onset of pneumonia, the activity of the chronic disease was assessed based on GINA criteria (for bronchial asthma), NYHA classification (for cardiac pathologies), and hematological criteria.

All patients were examined according to established clinical standards. The diagnosis of pneumonia was based on the presence of signs of respiratory failure, auscultate changes, laboratory parameters (leukocytosis, C-reactive protein, ESR), and chest radiography or thoracic ultrasound findings. In children with obstructive syndrome, isometric examinations (FVC, FEV_1, FEV_1/FVC) were performed. In patients with heart failure, ECG, echo cardiography, and arterial blood gas parameters were evaluated. In children with anemia, complete blood count, iron metabolism indices, reticulocytosis level, and functional adequacy of hemoglobin were assessed.

Clinical features of disease course—such as duration of fever, character of cough, dyspnea, percussion and auscultate findings, and intoxication syndrome—were recorded using a specially developed clinical questionnaire. Pneumonia severity in each patient was classified as mild, moderate, or severe according to WHO criteria. To evaluate the association between the chronic disease and pneumonia course, spirometric changes (asthma group), hemo dynamic parameters (cardiovascular group), and severity of hypoxic syndrome (anemia group) were used as key criteria.

Microbiological investigations were also performed during the study. In 45 patients, sputum samples were cultured to identify pathogenic flora. Antibiotic susceptibility was assessed using

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the disk diffusion method. The degree of respiratory system inflammation was evaluated based on peripheral blood eosinophil counts, serum markers (IL-4, IL-6, TNF-α), and CRP levels.

Additional factors—including nutritional characteristics, allergic history, environmental exposures, changes in chronic disease activity, and drug therapy (inhaled steroids, cardiac medications, hematoprotective agents)—were recorded for each patient. All examinations were conducted with informed parental consent.

Results and Discussion. The study results demonstrated that the clinical course of pneumonia in children with chronic diseases depends on the type and severity of the underlying pathology. The most common symptoms in children with pneumonia were cough (94.4%), fever (87.5%), and dyspnea (65.3%).

In children with bronchial asthma, symptoms of obstructive syndrome—noisy and rapid breathing, predominantly evening and nocturnal worsening of cough—were significantly observed at the onset of pneumonia (72.0%). In children with cardiovascular pathology, hypoxic signs—rapid fatigability, cyanosis of the lips and fingertips, and dyspnea—were more frequently present in the clinical picture (61.5%). In children with chronic anemia, intoxication syndrome—general weakness, gastrointestinal disturbances, nausea, and decreased appetite—was dominant (70.0%).

Assessment of gastrointestinal disturbances revealed that children in the bronchial asthma group experienced nausea (55.6%), constipation (33.3%), and meteorism (41.7%) in addition to cough. In the cardiovascular group, meteorism (50.0%), nausea (46.2%), and abdominal pain (38.5%) were the main symptoms. In the anemia group, nausea (60.0%), fatigue (55.0%), and constipation (40.0%) were most frequently observed. Overall, gastrointestinal dysfunction accompanied pneumonia in all patients, and the prevalence of dyspeptic syndrome increased with greater severity of the chronic disease.

Table 1. Frequency of pneumonia symptoms by group in children with chronic diseases (n / %)

Symptoms	**Bronchial asthma (n=32)**	**Cardiovascular (n=26)**	**Chronic anemia (n=14)**	**Total (n=72)**
Cough	30 (93.8%)	23 (88.5%)	11 (78.6%)	68 (94.4%)
Fever	29 (90.6%)	22 (84.6%)	12 (85.7%)	63 (87.5%)
Dyspnea	23 (71.9%)	20 (76.9%)	4 (28.6%)	47 (65.3%)
Fatigue / weakness	18 (56.3%)	18 (69.2%)	10 (71.4%)	42 (58.3%)
Nausea	18 (56.3%)	12 (46.2%)	12 (85.7%)	35 (48.6%)
Constipation	11 (34.4%)	10 (38.5%)	8 (57.1%)	29 (40.3%)
Meteorism	14 (43.7%)	13 (50.0%)	9 (64.3%)	36 (50.0%)

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As shown in the table, pneumonia in children with bronchial asthma was accompanied by obstructive syndrome, in the cardiovascular group by hypoxic manifestations, and in the anemia group by intoxication and dyspeptic symptoms.

Microbiological studies revealed that *Streptococcus pneumoniae* and *Haemophilus influenzae* predominated in sputum samples, with an overall detection rate of 78.1%. In the bronchial asthma group, growth of gram-negative flora—*Moraxella catarrhalis* and *Staphylococcus aureus*—was observed in 34.4% of cases. In the cardiovascular group, gram-negative flora was detected in 42.3% of cases, and in the anemia group in 35.0%, confirming the association between chronic disease and pneumonia course.

Treatment outcomes varied according to the type of chronic disease. In the bronchial asthma group, combined use of antibiotics, inhaled steroids, and broncho dilators resulted in a significant reduction of cough, dyspnea, and intoxication symptoms within 5–7 days. In the cardiovascular group, treatment combined with hemo dynamic monitoring led to a reduction in hypoxic signs and general fatigue within 6–8 days. In the anemia group, the use of erythropoietic and hemoprotective agents reduced intoxication and dyspeptic symptoms within 7–10 days.

The presence of chronic disease prolonged obstructive and hypoxic syndromes in the bronchial asthma and cardiovascular groups, while intoxication and dyspeptic symptoms predominated in the anemia group. Overall, in 64.0% of patients across all groups, pneumonia symptoms subsided within 10 days; however, symptoms persisted longer in children with more severe chronic diseases.

Conclusions:

1. In children with chronic diseases (bronchial asthma, cardiovascular diseases, anemia), evaluation of pneumonia course should consider the type, severity, activity, and age-related characteristics of the underlying pathology, using a specialized clinical questionnaire, isometric and hemo dynamic assessments, and laboratory tests (blood analysis, CRP, ESR, and sputum microbiological cultures).
2. During pneumonia, cough, dyspnea, intoxication syndrome, hypoxic manifestations, and dyspeptic symptoms vary according to the type and severity of the chronic disease. Obstructive syndrome predominates in bronchial asthma, hypoxic signs in cardiovascular pathology, and intoxication and dyspeptic symptoms in anemia, correlating with longer and more intensive clinical courses.
3. An individualized approach is essential in treating pneumonia in children with chronic diseases. In bronchial asthma, combined use of antibiotics, inhaled steroids, and bronchodilators rapidly reduces cough and obstructive symptoms. In cardiovascular diseases, treatment with hemodynamic monitoring effectively decreases hypoxic manifestations. In anemia, erythropoietic and hemoprotective agents reduce intoxication and dyspeptic symptoms.
4. To manage digestive disorders, enzyme preparations (Mezim, Festal, Creon, Pancreatin, Panzinorm), disaccharides (Duphalac, lactulose, Floralex), probiotics, and gastrointestinal bacterial preparations (Lactobactrin, Hilak Forte) are recommended, as they effectively reduce dyspeptic syndrome and maldigestion.
5. Monitoring pneumonia progression and identifying complications related to chronic diseases require sputum pathogen identification and individualized antibiotic therapy. *Streptococcus*

pneumoniae and *Haemophilus influenzae* should be considered dominant pathogens, while gram-negative flora should be regarded as a factor exacerbating obstructive and hypoxic syndromes.

6.Preventive and integrative approaches—optimization of nutrition, control of allergic and environmental factors, appropriate drug therapy, and regulation of physical activity—are essential for preventing pneumonia and reducing its severity in children with chronic diseases.

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