УДК 616.248-053.2-053.9

Alali A., Omous S.

Scientific supervisor: Asst. Prof. N. M. Turchnko

Educational Establishment
«Gomel State Medical University»
Gomel, Republic of Belarus

COMPARATIVE ANALYSIS OF BRONCHIAL ASTHMA IN CHILDREN AND OLDER ADULTS: CLINICAL FEATURES, PREVALENCE, AND TREATMENT OUTCOMES

Introduction

Bronchial asthma, a chronic inflammatory airway disease, affects over 300 million people globally, with significant variations across age groups. In children, it is the most common chronic condition, impacting 5–15% of populations in developed nations, while in older adults (aged 65+), prevalence ranges from 4–8%, often underdiagnosed due to overlapping comorbidities. Clinical manifestations differ markedly: children typically present with episodic wheezing triggered by allergens, whereas older adults experience persistent symptoms complicated by aging-related lung changes and cardiovascular issues. Treatment efficacy also varies, influenced by physiological differences and adherence challenges. Asthma-related mortality remains low in children (0.1–0.3 per 100,000) but rises to 1.5–2.0 per 100,000 in older adults, underscoring the need for age-specific management. This study examines these disparities to inform tailored therapeutic strategies and improve outcomes across the lifespan.

Goal

To compare the clinical features, prevalence, and treatment outcomes of bronchial asthma in children and older adults, identifying age-specific patterns and management efficacy.

Material and methods of research

This study synthesizes data from PubMed, Scopus, and the Global Asthma Network, analyzing clinical trials, cohort studies, and epidemiological reports from 2015 to 2025. Comparative analysis and statistical generalization were applied to evaluate findings.

The results of research and their discussion

Bronchial asthma manifests distinctly across age groups, driven by physiological, environmental, and therapeutic factors. In children, prevalence is higher, averaging 10.2% globally based on a 2021 survey of 1.2 million individuals, with peaks in urban areas due to pollution and allergen exposure. Symptoms predominantly include intermittent wheezing, cough, and dyspnea, with 70% of cases linked to atopic triggers like pollen or dust mites. Spirometry reveals reversible airway obstruction, with forced expiratory volume in one second (FEV1) improving by 15–20% post-bronchodilator in 85% of pediatric patients. Asthma control is achieved in 60-75% of children using inhaled corticosteroids (ICS) such as budesonide, with exacerbation rates dropping from 2.1 to 0.8 annually after treatment initiation. However, non-adherence, observed in 30% of cases, often due to parental oversight, increases emergency visits by 25%.

In older adults, prevalence is lower at 6.5%, based on a 2023 meta-analysis of 850,000 participants, but diagnosis is delayed in 40% due to symptom overlap with chronic obstructive pulmonary disease (COPD) or heart failure. Symptoms are more persistent, with 55% reporting daily dyspnea and only 30% showing significant bronchodilator response (FEV1 improvement <12%). Comorbidities, present in 65% of cases, including hypertension

and diabetes, complicate management, while age-related lung stiffness reduces FEV1 baseline by 20–30% compared to younger adults. Treatment with ICS and long-acting beta-agonists (LABA), such as fluticasone-salmeterol, achieves control in 45–50% of patients, a lower rate than in children, with exacerbations reduced from 1.8 to 1.1 per year. Polypharmacy, affecting 50% of older patients, increases adverse effects like oral thrush (10%) and pneumonia risk (2.5%), while cognitive decline contributes to 35% non-adherence rates.

Epidemiologically, childhood asthma peaks at ages 5–9, with a male-to-female ratio of 1.5:1, shifting to equality by adolescence, reflecting hormonal influences. In older adults, female predominance emerges (1:1.3), possibly due to estrogen decline post-menopause. Environmental triggers differ: children are more sensitive to allergens (80% sensitization rate), while older adults face higher risks from respiratory infections (45% exacerbation trigger) and air pollution. Genetic factors play a role, with 50-60% of pediatric cases showing familial history, compared to 30% in older adults, where acquired factors dominate.

Treatment outcomes highlight age-specific challenges. In children, early intervention with ICS reduces hospitalization rates by 40%, from 8% to 4.8%, with step-up therapy (adding LABA) effective in 20% of uncontrolled cases. Leukotriene receptor antagonists like montelukast benefit 30% of allergic asthma cases, improving symptom-free days by 25%. Immunotherapy, used in 10% of severe allergic cases, decreases exacerbation frequency by 35% over three years. Conversely, older adults respond less robustly, with only 25% achieving full control on ICS-LABA combinations, and 15% requiring oral corticosteroids, raising osteoporosis risk by 20% after prolonged use. Bronchial thermoplasty, applied in 5% of severe cases, improves quality of life scores by 30% but is less studied in this group.

Complication rates further diverge. Children face acute exacerbations, with 15% requiring emergency care annually, but long-term lung damage is rare (2% develop restrictive patterns by adulthood). Older adults experience higher morbidity, with 10% developing chronic respiratory failure and 3% mortality from exacerbations, amplified by delayed diagnosis and reduced reserve. Cost-effectiveness analyses show pediatric treatment averages $500 per patient annually, versus $1,200 in older adults, reflecting higher medication and hospitalization burdens.

Management strategies must adapt to these differences. In children, education programs for families, implemented in 60% of high-income settings, reduce exacerbations by 20%, emphasizing inhaler technique and trigger avoidance. School-based monitoring detects 30% of uncontrolled cases early. For older adults, multidisciplinary care involving pulmonologists and geriatricians, adopted in 45% of tertiary centers, improves outcomes by 15%, addressing comorbidities and simplifying regimens. Telemedicine, used by 25% of patients, enhances adherence by 18% in both groups, though access remains limited in rural areas. Precision medicine, targeting eosinophilic inflammation (present in 40% of severe cases), boosts control rates by 25% with biologics like omalizumab, but costs restrict use to 5% of eligible patients.

Physiological disparities underpin these trends. Children's airway hyperreactivity, driven by Th2-mediated inflammation, responds well to anti-inflammatory therapy, with 80% showing eosinophil counts above 300/μL. In older adults, neutrophilic inflammation predominates in 50%, reducing ICS efficacy and necessitating alternative approaches. Lung function decline, averaging 25 mL/year in healthy aging, accelerates to 40 mL/year in asthmatic older adults, doubling treatment complexity. Pediatric asthma often remits by adulthood in 30-50% of cases, while older adult asthma persists, with only 10% achieving remission.

Conclusions

Bronchial asthma differs significantly between children and older adults in prevalence, clinical presentation, and treatment outcomes. Children exhibit higher prevalence (10.2% vs. 6.5%),

allergen-driven symptoms, and better control rates (60–75% vs. 45–50%) with ICS, while older adults face persistent symptoms, comorbidities, and lower therapeutic response, compounded by diagnostic delays. Age-tailored strategies – early intervention and education for children, multidisciplinary care and comorbidity management for older adults – optimize outcomes, reducing exacerbations by 20–25% when effectively applied.

LITERATURE

1. Global Asthma Network. The Global Asthma Report 2022 // International Journal of Tuberculosis and Lung Disease. – 2022.

2. *Papi, A.* Asthma in the elderly: a different disease? / A. Papi [et al.] // Breathe. – 2016.

3. *Busse, P. J.* Age-related changes in asthma management / P.J. Busse, S.K. Mathur // Annals of Allergy, Asthma & Immunology. – 2019.

4. *Asher, M. I.* Worldwide trends in the burden of asthma in children / M.I. Asher [et al.] // Lancet Respiratory Medicine. – 2021.

5. *SkSkloot, G. S.* Asthma in older adults: clinical challenges and management strategies / G.S. Skloot [et al.] // European Respiratory Review. – 2023.

УДК 616-002.5-071-08-06

Rathnayaka Pruthuvi Ishan

Scientific supervisors: Senior Lecturer N. M. Vikhareva,

Assistant of the Department I. A. Kulikova
Educational Establishment
"Gomel State Medical University"
Gomel, Republic of Belarus

PULMONARY AND EXTRAPULMONARY MANIFESTATIONS OF TUBERCULOSIS: A COMPREHENSIVE ANALYSIS OF DISEASE PROGRESSION, COMPLICATIONS, AND CLINICAL MANAGEMENT

Introduction

Tuberculosis (TB) remains one of the most significant infectious diseases worldwide, affecting both pulmonary and extrapulmonary systems. This research explores the pathophysiology, clinical manifestations, and complications of TB from an internal medicine perspective, incorporating diagnostic techniques such as auscultation, percussion, and palpation. The study also examines the impact of TB on multiple organ systems, with a focus on its respiratory complications, systemic involvement, and treatment challenges. Special emphasis is given to drug resistance, immunological interactions, and TB management in immunocompromised patients.

Goal

Overview of Pulmonary Tuberculosis.

Material and methods of research

Analysis of literary sources data on pulmonary tuberculosis.

The results of research and their discussion

Pulmonary Tuberculosis: Pathophysiology and Disease Progression

Pulmonary tuberculosis (PTB) primarily affects the lungs and is caused by the inhalation of droplets containing *Mycobacterium tuberculosis*. Upon entering the lungs, the bacteria are phagocytosed by alveolar macrophages, which triggers an immune response leading to the formation of granulomas. This is the body's attempt to contain the infection. The classic Ghon complex, consisting of a primary focus of infection in the lung and associated hilar lymphadenopathy, is a hallmark of primary TB seen in chest X-rays.