EARLY DIAGNOSIS AND PREVENTION OF BRONCHIAL ASTHMA IN CHILDREN

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Abstract: Bronchial asthma is one of the most common chronic respiratory diseases in children and remains a significant public health problem worldwide. Early diagnosis and effective preventive strategies are crucial for reducing disease severity, preventing complications, and improving the quality of life of pediatric patients. This article discusses the current approaches to early diagnosis of bronchial asthma in children, including clinical assessment, identification of risk factors, functional diagnostic methods, and biomarkers. Particular attention is paid to primary, secondary, and tertiary prevention strategies, with an emphasis on environmental control, allergen avoidance, health education, and early medical intervention. The role of family history, prenatal and postnatal factors, and lifestyle influences in the development of asthma is also analyzed. The article highlights the importance of an integrated and multidisciplinary approach to early diagnosis and prevention in pediatric practice.

Keywords: bronchial asthma, children, early diagnosis, prevention, risk factors, pediatric pulmonology.

Introduction

Bronchial asthma is one of the leading chronic non-communicable diseases of childhood and represents a major challenge for modern pediatric healthcare systems worldwide. It is characterized by chronic airway inflammation, bronchial hyperresponsiveness, and variable airflow limitation, which together lead to recurrent respiratory symptoms such as wheezing, coughing, chest tightness, and dyspnea. According to international epidemiological studies, the global prevalence of bronchial asthma among children has shown a steady increase over the past decades, particularly in low- and middle-income countries undergoing rapid urbanization and environmental changes [1,2].

In children, bronchial asthma often begins early in life, and its clinical manifestations may vary significantly depending on age, genetic predisposition, environmental exposure, and comorbid conditions. Early childhood asthma is frequently underdiagnosed or misdiagnosed due to nonspecific symptoms, limited ability of young children to describe their complaints, and the overlap of asthma manifestations with other respiratory disorders such as recurrent viral infections or bronchiolitis [3]. As a result, many children do not receive timely and adequate medical care, which may lead to poor disease control and increased risk of long-term complications.

Early diagnosis of bronchial asthma plays a decisive role in preventing disease progression and irreversible structural changes in the airways, commonly referred to as airway remodeling. Delayed recognition and insufficient treatment during critical periods of lung development can negatively affect respiratory function in later life and increase the risk of persistent asthma into adulthood [4]. Therefore, identifying asthma at its earliest stages is considered a priority in pediatric pulmonology.

Prevention is another cornerstone in reducing the burden of bronchial asthma in children. Preventive strategies encompass not only medical interventions but also public health measures aimed at minimizing exposure to modifiable risk factors. These include environmental pollution,

passive smoking, indoor allergens, and unfavorable socio-economic conditions. Increasing awareness among parents, caregivers, and healthcare professionals about early symptoms, risk factors, and preventive measures is essential for successful asthma control at the population level [5].

Given the multifactorial nature of bronchial asthma, an integrated approach that combines early diagnostic methods with comprehensive preventive strategies is required. This article aims to analyze contemporary approaches to the early diagnosis of bronchial asthma in children and to highlight effective preventive measures that can be implemented at different stages of disease development. By synthesizing current scientific evidence, the study emphasizes the importance of early intervention and coordinated care in improving clinical outcomes and quality of life for pediatric patients.

Etiology and Risk Factors

The development of bronchial asthma in children is influenced by a complex interaction of genetic predisposition and environmental factors. A positive family history of asthma or other atopic diseases significantly increases the risk of asthma development in children [4]. Prenatal factors such as maternal smoking, exposure to air pollution, stress during pregnancy, and poor maternal nutrition have been associated with impaired lung development and increased asthma risk [5].

Postnatal risk factors include exposure to indoor and outdoor allergens, respiratory viral infections in early childhood, passive smoking, air pollution, and unfavorable living conditions [6]. Early-life exposure to house dust mites, pet dander, mold, and pollen plays a crucial role in the sensitization process and subsequent development of allergic asthma.

Clinical Features and Challenges of Early Diagnosis

In young children, especially those under five years of age, asthma symptoms may be nonspecific and intermittent. Recurrent episodes of wheezing, prolonged cough after viral infections, exercise-induced respiratory symptoms, and nocturnal coughing should raise suspicion of asthma [7]. However, similar manifestations can be observed in conditions such as bronchiolitis, recurrent viral-induced wheezing, and congenital airway anomalies.

Early diagnosis relies primarily on a detailed medical history, assessment of symptom patterns, identification of triggers, and evaluation of response to bronchodilator therapy. Objective diagnostic methods may be limited in younger children due to poor cooperation and technical difficulties [8].

Diagnostic Methods in Pediatric Asthma

The diagnostic approach to bronchial asthma in children includes clinical evaluation, functional tests, laboratory investigations, and, in some cases, imaging studies. Spirometry remains the gold standard for assessing airway obstruction and reversibility in children older than five years [9]. Peak expiratory flow monitoring can be used for dynamic assessment and long-term monitoring.

Allergy testing, including skin prick tests and measurement of specific immunoglobulin E levels, helps identify sensitizing allergens and guide preventive strategies [10]. Biomarkers such as fractional exhaled nitric oxide (FeNO) are increasingly used as non-invasive indicators of airway inflammation, particularly in allergic asthma.

Table 1. Main Diagnostic Methods for Early Detection of Bronchial Asthma in Children

Diagnostic method	Age applicability	Purpose	Advantages	Limitations
Clinical history and examination	All ages	Identification of symptoms and triggers	Non-invasive, widely available	Subjective, depends on caregiver reporting
Spirometry	≥5 years	Assessment of airway obstruction	Objective, standardized	Requires cooperation
Peak flow monitoring	≥5 years	Disease monitoring	Simple, low cost	Less sensitive than spirometry
Allergy testing	All ages	Detection of allergen sensitization	Guides prevention and treatment	Limited availability in some settings
FeNO measurement	≥5 years	Evaluation of airway inflammation	Non-invasive, rapid	Cost and equipment requirements

Prevention of Bronchial Asthma in Children

Preventive strategies for bronchial asthma are traditionally divided into primary, secondary, and tertiary prevention. Primary prevention aims to reduce the risk of disease development in healthy children, particularly those with a genetic predisposition [11]. This includes smoking cessation during pregnancy, promotion of breastfeeding, reduction of exposure to indoor pollutants, and improvement of environmental conditions.

Secondary prevention focuses on early detection of asthma and prevention of disease progression. Timely diagnosis, early initiation of anti-inflammatory therapy, and regular follow-up are essential components of secondary prevention. Health education for parents and caregivers plays a critical role in recognizing early symptoms and avoiding known triggers [12].

Tertiary prevention aims to prevent complications, reduce exacerbations, and improve disease control in children with established asthma. This includes individualized pharmacotherapy, adherence to treatment plans, monitoring of disease control, and psychosocial support.

Conclusion

Early diagnosis and effective prevention of bronchial asthma in children are essential for reducing disease burden and improving long-term outcomes. A comprehensive approach that integrates clinical assessment, functional diagnostics, identification of risk factors, and implementation of preventive measures is crucial in pediatric practice. Collaboration between healthcare providers, families, and public health institutions can significantly enhance early detection and prevention efforts, ultimately improving the quality of life of children with asthma.

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