

Review on Treatment and Diagnosis of Asthma Disease

Mr. Palve Yogesh Mahadev, Prof. Prafull R. Avhad, Dr. Sanjay Ingale

Dharmaraj Shaikshanaik Pratishthan College of Pharmacy, Walki, Ahilyanagar, Maharashtra, India

Abstract: *In Canada, asthma is the most prevalent respiratory illness. Notwithstanding a notable progress in the diagnosis and majority of Canadians with asthma still have inadequate control of their illness. However, for the majority of patients, control is achievable with the use of preventative strategies and suitable pharmaceutical interventions. For most individuals, inhaled corticosteroids (ICS) are the recommended course of treatment. Mixture when ICS medication is unable to bring about control, most people would rather use long-acting beta2-agonist inhalers combined with ICS therapy. More recently, biologic treatments that target immunoglobulin E or interleukin-5 have been added to the treatment of asthma. arsenal and might be helpful in certain instances of asthma that is difficult to control. Immunotherapy specific to allergens offers a treatment that has the potential to change the course of many asthma sufferers' conditions, but it should only be administered by doctors with the necessary.*

We address current research on asthma in this review and go over studies that have examined several facets of asthma prevalence, risk factors and prevention, causes, diagnosis, and treatment. Asthma is caused by a variety of molecular pathways, as well as risk and protective factors. A review is conducted of the latest ideas and difficulties in applying the exposome paradigm to allergy disorders and asthma. These include microbial dysbiosis, genetic and epigenetic variables, and environmental exposure, specifically to chemicals found both indoors and outdoors. The most pertinent experimental research that advances our knowledge of immunological and molecular pathways and may provide new targets for the creation of treatments is reviewed. Ensuring an accurate diagnosis of asthma, characterizing the disease, and tracking its intensity are crucial in this a long-term inflammatory respiratory disease that is typified by coughing, wheezing, and intermittent dyspnea. However, it can occasionally be difficult to differentiate asthma from other respiratory disorders because of the generic character of these symptoms. Consistent respiratory symptoms and the detection of fluctuating expiratory airflow obstruction recorded on spirometry are necessary for a definitive diagnosis of asthma. Doctors prioritize symptom control and preventing recurrent exacerbations by using individualized treatment plans that take a step-by-step approach and take into account the frequency, intensity, and potential hazards of the symptoms. It is essential to identify and treat asthma exacerbations as soon as possible in order to stop the disease from getting worse and endangering life. Asthma-related fatalities draw attention to wasted opportunities to detect the severity of the condition and increase treatment, highlighting the vital importance of ongoing patient education and regular symptom management assessment.

Keywords: Asthma, airway inflammation, airway remodeling, infection, epithelial-mesenchymal trophic unit, ADAM33

I. INTRODUCTION

Millions of individuals worldwide suffer from asthma, a common chronic inflammatory respiratory disease that can be difficult to diagnose and treat. The hallmark of this respiratory ailment is airway inflammation, which results in sporadic airflow restriction and bronchial hyperresponsiveness. Coughing, wheezing, and shortness of breath are common asthma symptoms, and they can sometimes be made worse by triggers such as viruses or allergies. A complicated interaction between genetic and environmental variables determines the prevalence and severity of asthma. Disparities in asthma care still exist despite breakthroughs in therapy, with different demographic groups having varying access to diagnosis, treatment, and patient education.

The symptoms of asthma include bronchial hyperresponsiveness and airflow restriction. Asthma is a chronic inflammatory disease of the airways. Differentiated clinical phenotypes result from varying clinical traits in a diversified demographic population (1). Women, African Americans, and people from lower socioeconomic backgrounds have higher prevalence (2). 8.3 percent of American adults (more than 20 million) reported having asthma in 2016, according to data from the Centers for Disease Control and Prevention (CDC) (2). Over the last ten years, more than 400,000 hospital

The illness known as asthma affects the airways that move air into and out of the lungs. Asthmatics are those who have this chronic illness, which can be persistent or recurrent. An asthmatic's airways have enlarged or irritated inside walls. The airways become particularly sensitive to irritations and are more likely to experience an allergic reaction as a result of this swelling or inflammation. Less air can enter and exit the lungs through the narrowed airways that result from inflammation. Chest discomfort, breathing difficulties, coughing, and wheezing—a hissing sound made during breathing—are signs of the constriction. These symptoms are typically most common in the early morning and evening hours for asthmatics. Recent estimates state that 300 million individuals worldwide suffer from asthma, and more than. The airways of eight controls and twelve fatal cases of childhood and teenage asthma were examined in this post mortem investigation. Although thickening RBM was detected in fatal asthma cases, as expected, our theory was not supported by the fact that ASM% rose in just one-third of these instances, and only in big airways. Age-related increases in large airway ASM% were linked with the RB Mand duration of asthma. Our results also demonstrate the robust eosinophil presence in deadly asthma. Additionally, in fatal asthma, there was an increase in PDCs, macrophages, B-cells, fulminant inflammation, and mucus production.

II. PATHOPHYSIOLOGY

Asthma's notable feature of chronic inflammation is present in all asthma sufferers. Specifically, ciliated epithelial cell detachment, goblet cell growth, bronchial smooth muscle spasm, increased permeability of blood vessels, mucosal edema, and enhanced secretion in the respiratory system

Asthma's notable feature of chronic inflammation is present in all asthma sufferers. Specifically, mucosal edema, infiltration of inflammatory cells (such as mast cells, eosinophils, macrophages, lymphocytes, and neutrophils), Generally speaking, asthma drugs are divided into two categories: bronchodilators, which assist avoid asthma episodes by stopping them once they've begun.

DIAGNOSIS :

Diagnosis of asthma involves a thorough medical history, physical examination, and objective assessments of lung function (spirometry preferred) to confirm the diagnosis Bronchoprovocation challenge testing and assessing for markers of airway inflammation may also be helpful for diagnosing the disease.

Asthma is a disease of the lower respiratory tract that affects men and women of all ages. It is diagnosed clinically, but no single gold standard test is available; there is significant heterogeneity to asthma's pathophysiology and clinical presentation, and clinical overdiagnosis can occur, especially in those without spirometric confirmation. Therefore, a thorough history and physical examination along with spirometry are important for the diagnosis of asthma.

EPIDEMIOLOGY

The prevalence of asthma varies in the US depending on a person's age, gender, race, and financial standing. According to estimates from the US Centers for Disease Control and Prevention (CDC), about 25 million Americans suffer from asthma at any given time. Boys are more affected than girls when they are less than eighteen, while women are more affected than males when they are older. Furthermore, the prevalence of asthma is significantly higher among Black people (10.1%) than in White people (8.1%). With the exception of those from Puerto Rico, where the frequency jumps to 12.8%, the overall prevalence among Hispanic Americans is lower at 6.4%. Moreover, the highest incidence of asthma and the highest rates of asthma-related morbidity are found in underrepresented minorities and those who are impoverished.

According to the 2003 Canadian Community Health Survey, 8.4% of Canadians aged 12 and older had an asthma diagnosis, with teens having the highest frequency (>12%) [6]. Nearly 80,000 Canadians were hospitalized for asthma

between 1998 and 2001; the highest hospitalization rates were seen in elderly patients and small children. The survey did discover, however, that the death rate from asthma has dramatically decreased since 1985. 299 deaths in all were attributed to asthma in 2001. Sixteen of these deaths involved people under the age of 19, and the bulk (62%) were people over the age of 70. Recent epidemiological data indicates that asthma is becoming more common in Canada, especially among young people.

History:

A summary of suspected asthmatic patients is provided in Patients who experience persistent coughing, wheezing, tightness in the chest, and/or dyspnea may have asthma. Strong indicators of asthma include varying symptoms that worsen at night, happen when exposed to triggers such allergens or irritants, and react to the right asthma medication . Other potential reasons for symptoms that seem like asthma should.

When gathering a patient's medical history, medical practitioners ought to ask about specific triggers that aggravate symptoms. Rat and cockroach infestations, dust, and animals are common household triggers. Some people may have sporadic symptoms of asthma because of their job schedules. Patients presenting suggestive symptoms may have asthma if they have a strong family history of allergies and asthma, or if they have a personal history of atopic disorders and childhood asthma symptoms. Physical Inspection.

III. BACKGROUND

Asthma is a multifaceted illness that impacts a multitude of people. Around 235 million individuals worldwide suffer from asthma¹, and about 383,000 people died from asthma-related causes in 2015.¹ The annual cost of asthma in the USA alone is estimated to be \$56 billion, with a large chunk of this amount coming from indirect expenditures like missed work or school days.² The majority of people can achieve asthma control with the right inhaler-based treatment. A lot of the more severe asthma patients now enjoy lower exacerbations and higher quality of life thanks to important medical advancements. Correct diagnosis, identification of various phenotypes, and comprehension.

It is believed that asthma involves both remodelling and inflammation . While the inflammation is only eosinophilic, remodelling is characterised by damage, thickening of the reticular basement membrane (RBM), airway smooth muscle (ASM), goblet cell hypertrophy and hyperplasia, and angiogenesis. During childhood, the thickness of RBM normally grows. The cartilaginous bronchi's RBM thickness increases quickly until the age of six, and then gradually until the age of seventeen . Children with moderate to severe asthma in schools were shown to have thickened RBM.



TYPES OF ASTHMA:

1. Allergic asthma
2. Nonallergic asthma
3. Occupational asthma

4. Exercise-induced bronchoconstriction
5. Aspirin-induced asthma
6. Nocturnal asthma
7. Cough-variant asthma(CVA)

1. Allergic asthma

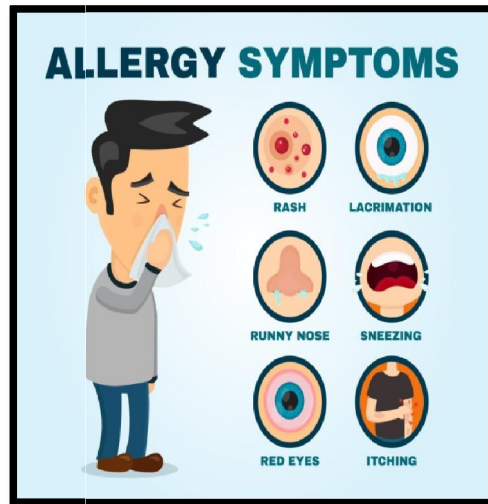


Fig. Allergic asthma

Allergic asthma is a type of asthma that's triggered by inhaling allergens, such as dust, pollen, mold, or animal dander. When someone with allergic asthma inhales an allergen, their immune system reacts, causing the airways to tighten and making it difficult to breathe.

2. Nonallergic asthma

Nonallergic asthma, also known as intrinsic or non-atopic asthma, is a type of asthma that isn't triggered by allergens like dust mites or pollen. It's less common than allergic asthma, affecting about 10-40% of people with asthma.

3. Occupational asthma

Occupational asthma is a lung condition that occurs when people are exposed to substances in the workplace that cause their airways to narrow and swell. This can lead to symptoms like wheezing, coughing, chest tightness, and shortness of breath.

4. Exercise-induced bronchoconstriction:-

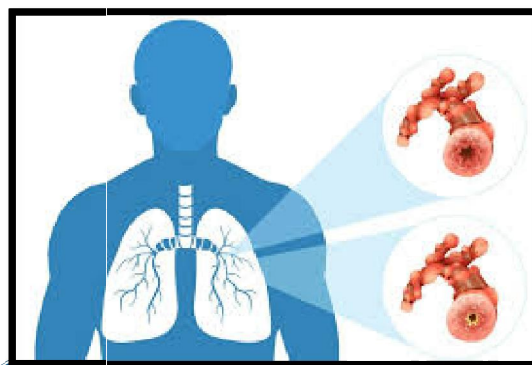


Fig. Exercise-induced bronchoconstriction

DOI: 10.48175/568



Exercise-induced bronchoconstriction (EIB) is a condition where airways narrow during physical activity, causing symptoms like coughing, wheezing, chest tightness, and shortness of breath. It was previously known as exercise-induced asthma, but the preferred term is EIB because exercise doesn't cause asthma, it's often a trigger.

5. Aspirin-induced asthma

Aspirin-induced asthma (AIA) is a clinical syndrome that occurs when someone experiences an asthmatic attack after taking aspirin or other non-steroidal anti-inflammatory drugs (NSAIDs). It's characterized by: A typical sequence of symptoms, Intense inflammation of nasal and bronchial tissues, Overproduction of cysteinyl-leukotrienes (Cys-LTs), Eosinophilic rhinosinusitis, and Nasal polyposis.

6. Nocturnal asthma

Physiological changes that occur during sleep contribute to nocturnal asthma. But there are other nighttime asthma triggers, including: Mucus and postnasal drip. At night, people often experience increased mucus production, sinus drainage and acid production.

7. Cough-variant asthma (CVA)

Cough-variant asthma (CVA) is a type of asthma where a chronic or recurring dry cough is the only symptom. It's a common cause of chronic cough, accounting for 25–42% of cases. CVA is relatively milder than classic asthma, but shares some of its pathophysiological features.

IV. TREATMENT

Treatment options for asthma are increasing and improving. The goal of treatment is to:

- help a person breathe better
- reduce the number of attacks
- increase the number of activities they can engage in

A person should work with a healthcare professional to develop the most suitable treatment plan for them. Some current options for treatment include quick-relief medication and long-term control medications.

Quick-relief medications help alleviate symptoms, while long-term control medication reduces the number of attacks if a person takes it daily.

Asthma medications currently include:

- long- and short-term bronchodilators that relax muscles around the airways
- antibiotics for a bacterial pneumonia or bronchitis
- anti-inflammatory medications, such as inhaled corticosteroids, for long-term maintenance, or oral steroids for an acute attack
- a combination of bronchodilators and corticosteroids

V. ACKNOWLEDGMENT

The Honourable Principal Dr. Sanjay Ingle Sir Dharmaraj Shaikshanaik Pratishthan College of the Pharmacy, Walki, Ahilyanagr is greatly appreciated for granting us the opportunity to conduct the preview paper. We also introduce Prof. Avhad R. Praful sir his leadership as well as assistance during study process.

VI. CONCLUSION

The development of bronchodilator medications was initially motivated by the idea that asthma was predominantly a disease of the smooth muscle of the airways. However, controller therapies like inhaled corticosteroids and cromones were developed after it was discovered that airway inflammation was the root cause of the disturbed airway function. With differing degrees of success, the development of biologics has been accelerated more recently by the identification of intricate interconnected cytokine and chemokine networks.

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