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Review Article**An Overview of Asthma and its treatment****Dr. Manish Kumar Gupta¹, Dr. Rakesh Gupta², Dr. Alok Khunteta³, Mr. Surendra Kumar Swarnkar⁴**¹ Professor and Principal, Jaipur College of Pharmacy, Jaipur, Rajasthan, India² Professor and Principal, LBS. College of Pharmacy, Jaipur, Rajasthan, India³ Associate Professor, LBS. College of Pharmacy, Jaipur, Rajasthan, India⁴ Assistant Professor, LBS. College of Pharmacy, Jaipur, Rajasthan, India

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ABSTRACT

Asthma is a disorder characterized by chronic airway inflammation, airway hypersensitivity to a variety of stimuli, and airway obstruction. It is at least partially reversible, either spontaneously or with treatment. Asthma affects 3–5% of the U.S. population and is more common in children than in adults. Airway obstruction may be due to smooth muscle spasms in the walls of smaller bronchi and bronchioles, edema of the mucosa of the airways, increased mucus secretion, and/or damage to the epithelium of the airway. Now a day's so many marketed products are available to treat the asthma and major step to cure this disease patient should prevent the exposure to antigen, reduction of bronchial inflammation and hyperactivity, have to be used some medication to dilate the narrowed bronchi. This review article was discussed about the pathophysiological approaches towards the asthma management.

Keywords: Pathophysiological approaches, symptoms, causes and treatment of asthma.**1. INTRODUCTION**

Individuals with asthma typically react to concentrations of agents too low to cause symptoms in people without asthma. Sometimes the trigger is an allergen such as pollen, house dust mites, molds, or a particular food. Other common triggers of asthma attacks are emotional upset, aspirin, sulfiting agents (used in wine and beer and to keep greens fresh in salad bars), exercise, and breathing cold air or cigarette smoke. In the early phase (acute) response, smooth muscle spasm is accompanied by excessive secretion of mucus that may clog the bronchi and bronchioles and worsen the attack. The late phase (chronic) response is characterized by inflammation, fibrosis, edema, and necrosis (death) of bronchial epithelial cells. A host of mediator chemicals, including leukotrienes, prostaglandins, thromboxane, platelet activating factor, and histamine take part. Symptoms include difficult breathing, coughing, wheezing, chest tightness, tachycardia, fatigue, moist skin, and anxiety. An acute attack is treated by giving

an inhaled beta2-adrenergic agonist (albuterol) to help relax smooth muscle in the bronchioles and open up the airways. However, long-term therapy of asthma strives to suppress the underlying inflammation. The anti-inflammatory drugs that are used most often are inhaled corticosteroids (glucocorticoids), cromolyn sodium, and leukotriene blockers[1-6].

Asthma is a chronic (long-term) lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing (a whistling sound when breathe), chest tightness, shortness of breath, and coughing. The coughing often occurs at night or early in the morning. Asthma affects people of all ages, but it most often starts during childhood. In the United States, more than 25 million people are known to have asthma. About 7 million of these people are children.

To understand asthma, it helps to know how the airways work. The airways are tubes that carry air into and out of lungs. People who have asthma have inflamed airways. This makes them swollen and very sensitive. They tend to react strongly to

certain inhaled substances. When the airways react, the muscles around them tighten. This narrows the airways, causing less air to flow into the lungs. The swelling also can worsen, making the airways even narrower. Cells in the airways might make more mucus than usual. Mucus is a sticky, thick liquid that can further narrow the airways. This chain reaction can result in asthma symptoms. Symptoms can happen each time the airways are inflamed [1-6].

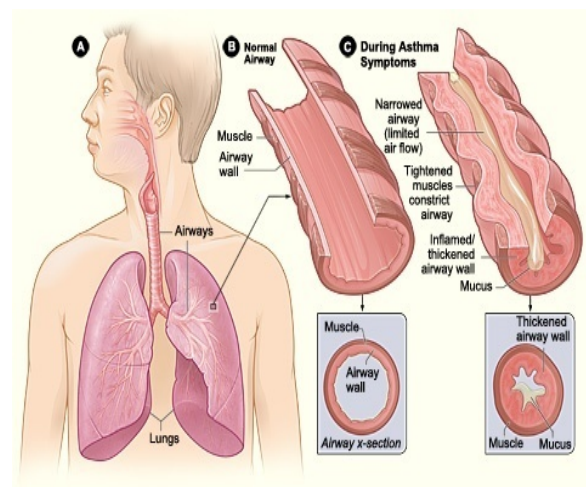


Figure1: Location of the lungs and airways in the body

Figure A shows the location of the lungs and airways in the body. Figure B shows a cross-section of a normal airway. Figure C shows a cross-section of an airway during asthma symptoms. Sometimes asthma symptoms are mild and go away on their own or after minimal treatment with asthma medicine. Other times, symptoms continue to get worse. When symptoms get more intense and/or more symptoms occur, person is having an asthma attack. Asthma attacks also are called flareups or exacerbations (eg-zas-er-BA-shuns). Treating symptoms when first notice them is important. This will help prevent the symptoms from worsening and causing a severe asthma attack. Severe asthma attacks may require emergency care, and they can be fatal [1-3].

1.2 Outlook

Asthma has no cure. Even when one feels fine, he/she still have the disease and it can flare up at any time. However, with today's knowledge and treatments, most people who have asthma are

able to manage the disease. They have few, if any, symptoms. They can live normal, active lives and sleep through the night without interruption from asthma. If one has asthma, he/she can take an active role in managing the disease. For successful, thorough, and ongoing treatment, build strong partnerships with doctor and other health care providers [2, 3-6].

1.3 Causes

Asthma Is In One's Lungs Whether He/she Feel It or Not. Asthma is a chronic disease of the airways of the lungs. Unfortunately, asthma never goes away, but the right treatment can help keep it under control.

Asthma symptoms have two main causes [4-6], and both occur within the airways of lungs:

Airway Constriction

This is the cause of asthma symptoms that one may feel as a tightening in chest. The muscles around the airways of lungs squeeze together or tighten. This tightening is often called "bronchoconstriction," and it can make it hard for one to breathe.

Inflammation

This is the cause of asthma symptoms one probably does not notice. If someone have asthma, the airways of lungs are always inflamed, and they become more swollen and irritated when asthma symptoms worsen. Inflammation can reduce the amount of air that one can take in or breathe out. In some cases, too much thick mucus is produced, which further obstructs the airways. Together, airway constriction and inflammation narrow airways, which can result in wheezing, coughing, chest tightness, or shortness of breath—likely familiar feelings to him. And in people with asthma, the airways may be inflamed even when they are not having symptoms.

1.4 Types

There are a number of types of asthma [1-6].

Allergic Asthma

Allergic asthma is triggered by an allergic reaction to allergens such as pollen or pet dander. If one has allergic asthma, he probably have a personal

and/or family history of allergies, such as allergic rhinitis or hay fever, and/or eczema (a skin problem resulting in itching, a red rash, and sometimes small blisters). Keep in mind that one form of allergic asthma is seasonal asthma, which usually affects people in the spring or early autumn. For example, one may find that asthma is worse in the spring when there is an increase in flowering plants, while others find their asthma is worse in the late summer or early fall due to ragweed or mold from leaves on trees.

Other triggers for allergic asthma include respiratory infections such as the common cold, the flu, or a sinus infection, as well as exercise, cold air, sudden changes in air temperature, and even gastro esophageal reflux (heartburn).

Find out more about allergies and asthma.

Nonallergic Asthma

Asthma may be triggered or made worse by one or more nonallergic asthma triggers, including substances (irritants) in the air, such as tobacco smoke, wood smoke, room deodorizers, pine odors, fresh paint, household cleaning products, cooking odors, perfumes, and outdoor air pollution. People with nonallergic asthma may have the same symptoms as those with allergic asthma, but they are not bothered by allergens from the natural world like pollen or mold.

Other triggers for nonallergic asthma include respiratory infections, such as the common cold, the flu, or a sinus infection, as well as exercise, cold air, sudden changes in air temperature, and even gastro esophageal reflux (heartburn).

Nocturnal Asthma

Nocturnal asthma refers to asthma symptoms that seem worse in the middle of the night, typically between 2AM and 4AM. Interestingly, nocturnal asthma can affect someone with any type of asthma. Factors that can cause asthma symptoms to worsen at night may include sinus infections or postnasal drip caused by allergens such as dust mites or pet dander. Body clock may also play some role. The body makes adrenaline and corticosteroids, which protect against asthma. Levels of these two substances are lowest between midnight and 4AM, making it

more likely he will experience symptoms during these times.

Asthma in Pregnancy

Among pregnant patients who have asthma, one-third will experience improvement in their asthma, one-third will remain stable, and one-third will experience worsening of their asthma. Improved asthma control during pregnancy is associated with lower rates of pregnancy-related complications.

Occupational Asthma

Occupational asthma refers to asthma that is newly diagnosed and caused by exposure to a substance (chemicals or animal proteins, for example) in the workplace. If one can reduce exposure to these triggers, he may be able to reduce asthma symptoms. Keep in mind that occupational asthma does not refer to people already diagnosed with asthma who are more prone to flare-ups when exposed to irritant dusts or fumes in their work environment.

Smoking

Cigarette smoke makes asthma worse by irritating airways and causing them to narrow.

Dust Mites

Dust mites are tiny bugs one cannot see that live in cloth and carpet..

Pets

Some people are allergic to the dander (the flakes of skin) or dried saliva that come from animals with fur or feathers

Cockroaches

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

Indoor Mold

Moisture causes mold, so getting rid of excess water in house or workplace may help get rid of mold.

Trong Odors, Sprays, and Wood Smoke

If one have asthma, he may be very sensitive to strong odors or chemicals in the air.

Pollen or Outdoor Mold

Allergy season can be hard if one has asthma and allergies.

Exercise

Molds and Infections

Weather

Sensitive to very cold or very hot temperatures \

Others

Many people find that their allergies to food or medicines trigger their asthma symptoms. If one has been suffering from flare-ups, take a look at what he is eating and drinking, as well as any medication he may be taking. Some common culprits are:

Beer, Wine, Shrimp, Dried fruit, some medicines, including over-the-counter medications such as aspirin, cold medicines, nonsteroidal pain relievers (e.g., ibuprofen, naproxen), and even eye drops

1.5 Asthma Symptoms

Wheezing: A whistling sound usually heard when breathing out.

Coughing: A cough or hack that may not go away and often occurs or worsens at night.

Chest Tightness: Feeling as if a rope is being pulled tighter and tighter around chest.

Shortness of Breath: Feeling as though someone is trying to breathe through a straw and can't catch breath at all. Breathing out is especially tough [3-5].

1.6 Allergic reaction

Allergens → stimulates B-lymphocytes → converted into plasma cells → produces antibody IgE → fixed with the mast cell and mast cell becomes sensitive → when allergens comes again degranulation of the mast cell occurs → formation of the chemical mediators (Histamine, Interleukin, Bradykinin, Leukotriens C & D, PAF) → some directly act on the bronchial smooth muscle cells and causes bronchospasm, other are responsible for inflammation. The inflammation results in hyper-reactivity of the bronchial tree, oedema, exudation and narrowing of the lumen [1. 2-5].

1.7 Classification of the anti-asthma drugs [2-4]

1. β_2 receptor agonists: Salbutamol, Terbutalin, Femoterol
2. Anti-muscarinic drugs: Ipratropium bromide, Oxitropium
3. Xanthine derivatives: Theophylline, Aminophylline
4. Corticosteroids: Beclomethasone, Betamethasone, Prednisolone
5. Mast cell stabilizer: Sodium chromoglycate, Nedocromil sodium
6. Leukotrien pathway inhibitor: Zafirleukast, Zileuton, **Montelukast**

1.8 Approach to Treatment [2-5]

- Prevention of the exposure to antigen
- Reduction of bronchial inflammation and hyperactivity
- Dilatation of the narrowed bronchi

Bronchodilators: Sympathomimetics (β_2 receptor agonist), Xanthine derivatives, Anti-cholinergics / muscarinics.

Sympathomimetic drugs: Adrenalin is an agonist for the α_1 , α_2 , β_1 , β_2 receptors. Binding with the β_2 receptor it causes bronchodilatation but binding on the β_1 receptors it causes \uparrow HR, \uparrow BP, \uparrow O₂ demand.

Non-selective: Epinephrine, Ephedrine, Isoproterenol {ephedrine causes tachyphylaxis / acute tolerance}.

β receptor selective drugs: Isopropanolol, Isoprenalin.

β_2 receptor selective: Salbutamol, Terbutaline, Femoterol

* β receptors are also present in the peripheral vasculature, so long term use may cause hypotension.

The selective β_2 agonists:

- Can be given orally or inhalation
- Act selectively on β_2 receptors
- Long duration of action

- bronchodilatation is maximal in 30 min when given by inhalation and persists for 2-3 hours
- Produce less cardio-vascular side effects
- Orally they are given in doses of 4mg 3-4 times

CONCLUSION

Many people find that their allergies to food or medicines trigger their asthma symptoms. If one has been suffering from flare-ups, take a look at what he is eating and drinking, as well as any medication he may be taking. Asthma affects 3–5% of the U.S. population and is more common in children than in adults. Airway obstruction may be due to smooth muscle spasms in the walls of smaller bronchi and bronchioles, edema of the mucosa of the airways, increased mucus secretion, and/or damage to the epithelium of the airway. Now a day's so many marketed products are available to treat the asthma and major step to cure this disease patient should prevent the exposure to antigen, reduction of bronchial inflammation and hyperactivity, have to be used some medication to dilate the narrowed bronchi.

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