

AN OVERVIEW ON ANTI-ASTHMATIC DRUGS**Zaseem Khan^{*1}, Imtiyaz Ansari², Dr. Vanita Kanase³ and Diptesh Patil⁴**¹M. Pharm Student, Department of Pharmacology, Oriental College of Pharmacy.²Assistant Professor, Department of Pharmacology, Oriental College of Pharmacy.³Head of Department of Pharmacology, Oriental College of Pharmacy.⁴M. Pharm Student, Department of Pharmacology, Oriental College of Pharmacy.Article Received on
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Corresponding Author*Zaseem Khan**M. Pharm Student,
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Pharmacology, Oriental
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Asthma are chronic inflammatory diseases of the airway. Asthma is a clinical syndrome that increased hyperresponsiveness with subsequent remodelling. Asthma is classified according to the frequency of symptoms such as peak flow rate, forced expiratory volume in one second, In severe cases intravenous Corticosteroids, anti-IgE Humanized monoclonal Antibodies, mast cell stabilizers. In long term medicines prevent attack as cromolyn sodium, Methylxanthines. The immunotherapies are available in the allergy shots and sublingual tablets.

KEYWORDS: Asthma, Hyper responsive, chronic inflammatory, peak flow rate, immunotherapy.

INTRODUCTION

Asthma may be defined as an inflammatory condition with recurrent reversible obstruction of the airflow in the airways in response to stimuli which are not in themselves noxious and which do not affect non asthmatic subjects.^[1]

Asthma is widely known as a chronic inflammatory lung-disease characterized by reversible bronchoconstriction, elevated basal airway tone, eosinophils and lymphocyte accumulation and activation, epithelial cell dysfunction and damage, smooth muscle and submucosal gland hypertrophy, submucosal fibrosis, airway wall edema, mucus overproduction and episodes of non-specific airway hyper responsiveness to spasmogens.^[2]

Symptoms^[8]

- Wheezing
- Breathlessness
- Difficulty in speaking
- Sputum Production
- Dyspnoea
- Tightness of Neck Muscle
- Coughing after physical activity
- Whistling Sound while breathing
- Frequent coughing
- Grayish or bluish colouring of lips
- Chest Tightness
- Feeling Frightened, exhaustion

Treatment^[3]**Asthma triggers frequently include**

- Allergens such as pollen, dust mites, cockroaches, molds and animal danders
- Irritants in the air, such as smoke, air pollution, chemical fumes and strong odors
- Medications, such as aspirin and acetaminophen
- Extreme weather conditions
- Exercise
- Stress
- Allergies are just one of the factors that can trigger asthma attacks. Not all people with asthma have allergies and there are many people who have allergies but do not have asthma.

Asthma Medication

There are many effective medicines to treat asthma. Most people with asthma need two kinds: quick-relief medicines and long-term control medicines. Immunotherapy (allergy shots) can also be helpful.

Quick-relief medicines are taken at the first sign of symptoms for immediate relief

- Short-acting inhaled beta2-agonists
- Anticholinergics

Both types of drugs are bronchodilators, meaning that they expand the passageways into the lungs (the bronchi), allowing more air in and out and improving breathing. They also help to clear mucus from the lungs by enabling the mucus to move more freely and get coughed out more easily.

Long-term control medicines are taken every day to prevent symptoms and attacks:

- Antileukotrienes or leukotriene modifiers
- Cromolyn sodium
- Inhaled corticosteroids
- Long-acting inhaled beta2-agonists (always administered with another asthma-related drug)
- Methylxanthines
- Oral corticosteroids
- Immunomodulators

IMMUNOTHERAPY

Two types of immunotherapy are available: allergy shots and sublingual (under the tongue) tablets.

Allergy shots: If your asthma is triggered by an allergy, you should consider allergy shots, which are very effective in relieving allergy symptoms and in some cases can actually cure your allergy. The treatment, which can take several years, builds up immunity to your offending allergens (pollens, dust mite, pets, mold). It works by injecting small amounts of the allergen in gradually increasing amounts over time. As the shots help the body build up a tolerance to the effects of the allergen, they eventually reduce and can even eliminate your allergy symptoms.

Sublingual tablets: This type of immunotherapy was approved by the Food and Drug Administration in 2014. Starting several months before allergy season begins, patients dissolve a tablet under the tongue daily. Treatment can continue for as long as three years. These medications should not be used in patients with severe or uncontrolled asthma. Only a few allergens (certain grass and ragweed pollens) can be treated now with this method, but it is a promising therapy for the future.

Drug Used In Asthama Treatment^[6]**1. Bronchodilators/Relievers****i. Sympathomimetics**

Moa: The mechanisms of sympathomimetic drugs can be direct-acting (direct interaction between drug and receptor), such as α -adrenergic agonists, β -adrenergic agonists, and dopaminergic agonists; or indirect-acting (interaction not between drug and receptor), such as MAOIs, COMT inhibitors, release stimulants, and reuptake inhibitors that increase the levels of endogenous catecholamine.^[10]

- Salbutamol
- Albuterol
- Terbutaline
- Bambuterol
- Salmeterol
- Formoterol

ii. Methylxanthines^[11]

Moa: It inhibits cyclic nucleotides phosphodiesterase (PDE), thereby preventing cAMP and cGMP to 5'-AMP and 5'-GMP, respectively. Inhibition of PDEs will to an accumulation of intracellular cAMP and cGMP.

- Theophylline
- Aminophylline

iii. Anticholinergics^[12]

Moa: These drugs act by occupying receptor sites at parasympathetic nerve endings, thereby leaving fewer receptor sites free to respond to acetylcholine. Parasympathetic response is absent or decreased, depending on the number of receptors blocked by anticholinergic drugs and the underlying degree of parasympathetic activity. Since cholinergic muscarinic receptors are widely distributed in the body, anticholinergic drugs produce effects in a variety of locations, including the central nervous system, heart, smooth muscle, glands, and the eye.

- Ipratropium bromide
- Tiotropium bromide

2. Anti Inflammatory Agents/Controllers**iv. Leukotriene Receptor Antagonists^[13]**

Moa: blocks LTD₄ action on cys-LT₁ receptors on bronchi/mast cell/eosinophils/basophils.

- Montelukast
- Zafirlukast

v. Mast Cell Stabilizers^[14]

Moa: Mast cell stabilizers are cromone medications used to prevent or control certain allergic disorders. They block mast cell degranulation, stabilizing the cell and thereby preventing the release of histamine^[1] and related mediators. One suspected pharmacodynamic mechanism is the blocking of IgE-regulated calcium channels. Without intracellular calcium, the histamine vesicles cannot fuse to the cell membrane and degranulate.

- Sodium cromoglycate
- Nedocromil
- Ketotifen (5HT action)

3. Corticosteroid

vi. Systemic^[15]

Moa: On binding, the corticoreceptor-ligand complex translocates itself into the cell nucleus, where it binds to many glucocorticoid response elements (GRE) in the promoter region of the target genes. The DNA bound receptor then interacts with basic transcription factors, causing an increase or decrease in expression of specific target genes, including suppression of IL2 (interleukin 2) expression.

- Hydrocortisone
- Prednisolone

vii. Inhalational^[16]

Moa: It suppress airway inflammation by activating anti-inflammatory genes, switching off inflammatory gene expression, and inhibiting inflammatory cells. In addition, they enhance beta 2 adrenergic signaling by increasing beta 2-receptor expression and function. The net effect is control of the symptoms and signs of asthma in most patients.

- Beclomethasone dipropionate
- Budesonide
- Fluticasone- propionate
- Flunisolide

4. Anti –IgE Humanized Monoclonal Antibodies^[17]

Moa: It inhibits the binding of IgE to FcεRI on mast cells and basophils by binding to an antigenic epitope on IgE that overlaps with the site to which FcεRI binds. This feature is critical to its pharmacological effects because a typical anti-IgE antibody can cross-link cell surface FcεRI-bound IgE, thereby aggregate FcεRI, and activate mast cells and basophils to discharge the horde of chemical mediators stored in the densely packed sacs inside the cells.

- Omalizumab

New Bronchodilators^[4]

Bronchodilators are important for preventing and relieving bronchoconstriction, and the major advance has been the introduction of the LABAs salmeterol and formoterol, which last for over 12 hours. These drugs have complementary actions to corticosteroids, and fixed combination inhalers with a corticosteroid are now the most effective available therapy for asthma. There are now several even longer acting β_2 -agonists ("ultra-LABAs") in development, including indacaterol, carmoterol, vilanterol, and olodaterol, which have a duration of action > 24 hours and are suitable for once-daily dosing.

New Corticosteroids^[5]

ICSs are by far the most effective antiinflammatory therapy for asthma and work in almost every patient. However, all currently available ICSs are absorbed from the lungs and thus have the potential for systemic side effects. This has led to a concerted effort to find safer ICSs, with reduced oral bioavailability, reduced absorption from the lungs, or inactivation in the circulation.

Classification of Anti Asthmatic Herbs Based on Mechanism of Action^[7]

Some herbal alternatives employed in asthma are proven to provide symptomatic relief and assist in the inhibition of disease development as well. These herbs therefore have multifaceted roles to play in the management of asthma suggesting different sites of action within the body. Based on the possible mechanism of action reported, plant anti-asthmatics may be classified as shown in tables.

Table 1: Bronchodilators.

Sr. No	Name of plant	Part used/extract/fraction	Major chemical constituent(s)	Reference
1.	Adhatoda vasica Nees	Leaves, Roots	Alkaloids	Paliwa et al.2000
2.	Albizzia lebbeck (Sareesha_ rakat)	Stem bark/Aqueous	Saponins	Tripathi and Das 1977
3.	Alstonia scholaris	Leaves/Ethanol	Ditamine, Echitamine and Echitenines	Channa et al. 2003
4.	Artemisia caerulescens	Aerial parts/Butanol	Quercetin, isorhamnetin	Moran etal. 1989

Table 2: Mast cell stabilizers.

Sr. No.	Name of plant	Part used/extract/fraction	Major chemical constituent(s)	Reference
1.	Achyranthes aspera	Aerial parts/Aqueous	Oleanolic acid	Agrawal and Mehta <u>2005</u>
2.	Albizzia lebbeck	Stem bark/Aqueous	Saponins	Tripathi et al. <u>1979</u>
3.	Allium cepa	Bulbs/Juice	α and β unsaturated Thiosulphinates	Johri et al. <u>1985</u>
4.	Aquillaria agallocha	Stem/Aqueous extract	Triterpenoids	Kim et al. <u>1997</u>

Table 3: Anti-allergics.

Sr. No.	Name of plant	Part used/extract/fraction	Major chemical constituent(s)	Reference
1.	Adhatoda vasica	Leaves/Methanol	Vasicinol, vasicine	Muller et al. <u>1993</u> ; Kumar Suresh <u>1979</u>
2.	Albizzia lebbeck	Stem bark/Aqueous	Saponins	Baruah et al. <u>1997</u> ; Suresh et al. <u>1981</u>
3.	Alisma orientale	Rhizomes/Aqueous, Methanol	Alisol B monoacetate, Alismaketones-B 23-acetate and -C 23-acetate	Kubo et al. <u>1997</u>
4.	Aquillaria agallocha	Stem/Aqueous extract	Triterpenoids	Kim et al. <u>1997</u>

Table 4: Anti-inflammatory agents.

Sr. No.	Name of plant	Part used/extract/fraction	Major chemical constituent(s)	Reference
1.	Asystasia gangetica	Leaves/Methanol, Ethyl Acetate	Isoflavone glycoside, dalhorinin	Akah et al. <u>2003</u>
2.	Aloe vera Tourn.ex Linn. (Liliaceae)	Leaves/Aqueous, Chloroform and ethanol	Anthraquinones, sterols, saponins and carbohydrate	Vazquez et al. <u>1996</u>
3.	Bryonia laciniosa	Leaves/chloroform extract	Flavonoids	Gupta et al. <u>2003</u>
4.	Calotropis procera	Latex	α -amyrin, β -amyrin calotropin (Triterpenoid)	Kumar and Basu <u>1994</u>

Table 5: Anti-spasmodic agents.

Sr. No.	Name of plant	Part used/extract/fraction	Major chemical constituent(s)	Reference
1.	Aegle marmelos	Leaves/Ethanol	Aegelin, Aegelamine, Aegeline	Arul et al. <u>2004</u>
2.	Asiasarum sieboldi	Roots/Methanol	Methyleugenol, gamma-asarone, Elemicin, Asarinin	Hashimoto et al. <u>1994</u>
3.	Asystasia gangetica	Leaves/Methanol, Ethyl acetate	Isoflavone glycoside, dalhorinin	Akah et al. <u>2003</u>
4.	Bacopa monniera	Leaves/Ethanol	Bacosides, Alkaloids, Glycosides	Dar and Channa <u>1997</u> ; Channa et al. <u>2003</u>

General Advice on Taking Anti-Asthmatic Drugs^[9]

- Follow doctors' instructions, and learn how to use the inhalers correctly. Do not stop or change the regimens by yourself, unless there is a self management plan agreed with your doctor. Discuss your difficulty if any with your doctor or pharmacist.
- You should use the reliever inhaler (used to relief acute asthma) followed by the preventer inhaler (used as a prophylactic measure) if you need to use both.
- You should carry your short-acting reliever inhaler with you at all times for acute asthma attack. If you need it more often than usual, you should see your doctor.
- Severe asthma patients should not take aspirin and anti-inflammatory painkillers without consulting doctors.
- Wash inhalers with lukewarm water and let it dry if nozzle is blocked.
- Rinse mouth after use of corticosteroid inhalers.
- Take the medications before bed to avoid asthma attack during sleep.

CONCLUSION

Controller drug are important for the treatment of persistent asthma to control and maintain symptoms. Immunotherapy are the development of allergy as long term therapy. Asthma medication with quick relief medicines for anticholinergic, short acting inhaled beta2 agonist. In this articles drug used in asthma with their mechanism are described, and herbs classification and advice for taking asthmatic drug.

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