**Pharmacology**

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 **L.9 نظري**

**Drugs acting on Respiratory system**

**Overview**

Respiratory system is subjected to a lot of injurers and harms because it is nearly the only system which is in continuous contact with the external environment during the whole life of human being.

 As a result respiratory system is subjected to pollution smoke, chemicals dust, & microorganism which means it is subjected to everything in the environment.

Asthma, chronic obstructive pulmonary disease (COPD), and allergic rhinitis are commonly encountered respiratory diseases.

Each of these conditions may be associated with a troublesome cough, which may be the patient's only presenting complaint.

Asthma is a chronic disease characterized by hyperresponsive airways,

COPD, also called emphysema or chronic bronchitis,

Allergic rhinitis, characterized by itchy, watery eyes, runny nose, and a nonproductive cough, is an extremely common condition that significantly decreases patient-reported quality of life.

Coughing is an important defensive respiratory response to irritants and has been cited as the number-one reason why patients seek medical care

A troublesome cough may represent several etiologies, such as the common cold, sinusitis, and/or an underlying chronic respiratory disease.

**Respiratory agents**

Respiratory agents are drugs or a combination of drugs used to prevent, relieve or treat respiratory diseases.

 They can be taken as pills or liquid, for the drugs to work systemically.

 Or they can be available as inhalers or other forms or inhalation devices, where the medicine is delivered directly into the lungs.

**Drugs Used to Treat Asthma ----------------------------------------------------------**

**Bronchodilators**

Bronchodilators are agents that widen the air passages by relaxing the bronchial smooth muscle.

 Bronchodilators are either short-acting or long-acting beta2-agonists,

 **anticholinergic agents** or

 **theophylline.**

They are used to control symptoms of asthma and chronic obstructive pulmonary diseases.

Short acting bronchodilators are used when needed for quick relief of asthma symptoms and long acting bronchodilators are used regularly to control symptoms of asthma.

**Adrenergic bronchodilators ……………..**

Adrenergic bronchodilators (specifically beta2-adrenoreceptor agonists) dilate the bronchi by a direct action on the beta2-adrenoreceptors on the bronchial smooth muscle and relax the muscle.

Ex

 **Salbutamol inhaler** (Ventolin)

is a short-acting β2-adrenergic receptor agonist used for the relief of bronchospasm in conditions such as asthma and chronic obstructive pulmonary disease.

The most common side effects are fine tremor, anxiety, headache, muscle cramps, dry mouth, and palpitation.

the usual dosage for adults and children is 2 inhalations repeated every 4 to 6 hours; in some patients, 1 inhalation every 4 hours may be sufficient

**Anticholinergic bronchodilators …………….**

Anticholinergic bronchodilators (or muscarinic receptor antagonists) block the parasympathetic nerve reflexes that cause the airways to constrict, so allow the air passages to remain open.

Anticholinergic bronchodilators are used more to treat chronic obstructive pulmonary disease than to treat asthma.

Ex

**Ipratropium inhalation** Atrovent

side effects resembling those of other anticholinergics are minimal. However, dry mouth and sedation have been reported.

**Methylxanthines**

Methylxanthines act as bronchodilators by relaxing bronchial smooth muscle and helps the constricted airways to dilate.

Methylxanthines are bronchodilators used in the treatment of asthma and chronic obstructive pulmonary disease (COPD).

Ex **Theophylline**

The use of theophylline is complicated by its interaction with various drugs, chiefly cimetidine and phenytoin, and that it has a narrow therapeutic index,

 It can also cause nausea, diarrhea, increase in heart rate, arrhythmias, and CNS excitation (headaches, insomnia, irritability, dizziness and lightheadedness).

Seizures can also occur in severe cases of toxicity and is considered to be a neurological emergency

Its toxicity is increased by erythromycin, cimetidine, and fluoroquinolones, such as ciprofloxacin.

It can reach toxic levels when taken with fatty meals, an effect called dose dumping.

Theophylline toxicity can be treated with beta blockers.

Inhaled corticosteroids act locally in the lungs to inhibit the inflammatory process, which causes asthma.

They are potent anti-inflammatory agents and effectively reduce asthma symptoms. Corticosteroids prevent asthma attacks and improve lung function.

Inhaled corticosteroids deliver the medicine directly into the lungs so a smaller dose of corticosteroid is sufficient to control the symptoms.

 This minimizes the amount of corticosteroid that is absorbed systemically, so reduces the occurrence of side effects which one would normally experience while on long-term oral corticosteroid use.

Ex

 **Beclomethasone**

Occasionally it may cause a cough upon inhalation. Deposition on the tongue and throat may promote oral candidiasis, which appears as a white coating, possibly with irritation

Leukotriene modifiers

Leukotriene modifiers prevent the action of leukotrienes in the body.

Leukotrienes are released from mast cells, basophils and eosinophils.

The release of leukotrienes causes airway constriction, increased mucus production, swelling and inflammation in the lungs. This presents as wheezing, shortness of breath in asthma.

Ex

 **Montelukast** Singulair

Drugs Used to Treat Allergic Rhinitis

**Antihistamines**

Antihistamines are drugs that inhibit the action of histamine in the body by blocking the receptors of histamine.

There are two types of histamine receptors H1 and H2. When H1 receptors are stimulated by histamine it may produce allergic reactions such as itching, hay fever and rash

Antihistamines treat the symptoms of allergic reactions. Some antihistamines are sedating and although some are classed as non-sedating antihistamines, they may still cause drowsiness in some people.

Ex

 **Dexchlorpheniramine** Polaramine

side effects have included dryness of mouth and throat,

Nervous system side effects have included sedation, sleepiness, dizziness, disturbed coordination, fatigue, confusion, restlessness, excitation, nervousness, tremor, irritability, insomnia, euphoria, paresthesias, hysteria, neuritis, and convulsions.

Respiratory side effects have included thickening of bronchial secretions, tightness of chest, wheezing, and nasal stiffness.

Ex  **Loratadine** Claritin

As a "nonsedating" antihistamine, loratadine causes less (but still significant, in some cases) sedation and psychomotor retardation than the older antihistamines because it penetrates the blood brain barrier to a smaller extent.

**Drugs Used to Treat Cough -------------------**

**Antitussives**

Antitussives are drugs that suppress coughing, possibly by reducing the activity of the cough center in the brain.

Antitussive agents are used to relieve dry cough.

Ex

 **Dextromethorphan**

Nervous system side effects have included drowsiness and dizziness. Other side effects such as excitation, mental confusion, and opioid like respiratory depression have been rare and occurred at higher dosages.

**Expectorants**

Expectorants are drugs that increase the bronchial secretion and enhance the expulsion of mucus by air passages of the lungs.

 This makes it is easier to cough up the sputum.

 Expectorants are used in cough mixtures for chesty coughs.

Ex

 **Guaifenesin**

 Gastrointestinal side effects have included stomach upset and vomiting with higher than recommended doses.

**Decongestants**

Decongestants are sympathomimetic drugs that act by stimulating the alpha-adrenergic receptors.

Decongestants are either taken orally or applied locally in the form of nasal sprays or drops.

The decongestant effect is due to vasoconstriction of the blood vessels in the nose, sinuses, etc.

The vasoconstriction effect reduces swelling or inflammation and mucus formation in the nasal passage and makes it easier to breath.

Ex  **Pseudoephedrine**

Cardiovascular side effects have included tachycardia. Some patients have developed hypertension and/or arrhythmias.

Nervous system side effects have included insomnia in up to 30% of patients.

Gastrointestinal side effects have included anorexia and gastric irritation in approximately 5% of patients. Dry mouth, nose, or throat have occurred in up to 15% of patients.

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