Herbs for Respiratory Disorder

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Bronchial Asthma

• Bronchial asthma or asthma is a condition characterized by difficulty in breathing.

• Asthma is a chronic disease of the respiratory system in which the airway occasionally constricts, becomes inflamed, and is lined with excessive amounts of mucus, often in response to one or more triggers.
Anatomy of an Asthma Attack

- Inspired air
- Expired air
- Larynx (voice box)
- Trachea (windpipe)
- Right lung
- Left lung
- Bronchi
- Bronchioles
- Bronchial tube
- Alveoli (air pockets)
- Smooth muscle
- Blood vessels
- Lumen
- Mucous lining

Blood vessels infiltrated by immune cells
Decreased lumen diameter
Inflammation and swelling
Contracted smooth muscle
Excess mucus
Normal airway
Obstructed airway

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The risk factors for asthma include:

a. family history of asthma
b. living in urban area
c. exposure to secondhand smoke
d. low birth weight
e. other health problem
f. exposure to irritants on job
• The episode of asthma occurs when extrinsic factor or intrinsic factors cause various mediator, including histamine and leukotrienes, to be released from mast cells and circulating basophils.

• This results in relatively rapid contraction of the smooth muscle that surrounds the airways accompanied by a slower secretion of thick, tenacious mucus and edema of respiratory mucosa.
Extrinsic factors:
- environmental stimulant (allergens)
- cold, warm, moist air
- exercise
- upper respiratory infection

Intrinsic factors:
- emotional stress

Characterization of bronchial asthma:
- wheezing, coughing, shortness of breath and tightness in the chest
- bronchial asthma is reversible
TRIGGERS

inflammatory factors
- respiratory infections
- allergens

irritants
- temperature change
- strong odors
- exercise

others
- work
- medication
- stress and emotions

- food additives
- tobacco
- gastric reflux
- pollutants
Signs and Symptoms

• Signs of an asthmatic episode include wheezing, rapid breathing (tachypnea), prolonged expiration, a rapid heart rate (tachycardia), rhonchous lung sounds (audible through a stethoscope), and over-inflation of the chest.

• During very severe attacks, an asthma sufferer can turn blue from lack of oxygen, and can experience chest pain or even loss of consciousness. Just before loss of consciousness, there is a chance that the patient will feel numbness in the limbs and palms may start to sweat. Feet may become icy cold.
Treatment

• The most effective treatment for asthma is identifying triggers, such as pets or aspirin, and limiting or eliminating exposure to them.

• The specific medical treatment recommended to patients with asthma depends on the severity of their illness and the frequency of their symptoms. Specific treatments for asthma are broadly classified as relievers and preventers.
1. Relief Medication
Symptomatic control of episodes of wheezing and shortness of breath is generally achieved with fast-acting bronchodilators. These are typically provided in pocket-sized, metered-dose inhalers (MDIs).
2. Prevention medication
Current treatment protocols recommend prevention medication such as an inhaled corticosteroid, which helps to suppress inflammation and reduces the swelling of the lining of the airways, in anyone who has frequent (greater than twice a week) need of relievers or who has severe symptoms.
Preventive agents include the following:

a. Inhaled glucocorticoids are the most widely used of the prevention medications and normally come as inhaler devices (ciclesonide, beclomethasone, budesonide, flunisolide, fluticasone, mometasone, and triamcinolone).

b. Leukotriene modifiers (montelukast, zafirlukast, pranlukast, and zileuton).
c. Mast cell stabilizers (cromoglicate (cromolyn), and nedocromil).

d. Antimuscarinics/anticholinergics (ipratropium, oxtropium, and tiotropium), which have a mixed reliever and preventer effect.

e. Methylxanthines (theophylline and aminophylline).

f. Antihistamines

g. IgE blocker (Omalizumab)
Herbs for Bronchial Asthma

1. Xanthine derivatives

Theophylline occurs with the related derivatives caffeine and theobromine in several different plant products including coffee, tea, cocoa, and cola. The highest concentration occurs in tea, *Camellia sinensis*. Black and green tea are both derived from this tea shrub.
The leaves are harvested and dried to yield the crude drug. The quality and action of a tea depend on the provenance and age of the tea leaves (young shoots > younger leaves > older leaves).

**Constituents:**
theophylline derivatives (aminophylline, oxtriphylline and theophylline monoethanolamine), (-)-epigallocatechin-3-gallate (EGCG), caffeine, saponins

**Pharmacological action:**
Bronchodilators
Theophylline derivatives act directly on the bronchial muscle to relieve obstruction, increase coronary blood flow and stimulate respiration centrally.
Bronchodilation (including small airways)

Theophylline

- Plasma exudation
- Mucociliary clearance
- Neutrophil function
- T-cell function
- Macrophage function
- Respiratory muscle strength
2. **Ephedra** (Adrenergic herbs)

The green stems of various ephedra species, particularly *E. sinica* Stapf., *E. equisetina* Bunge and other of the family Ephedraceae.

**Constituents:**

Alkaloids: Mainly (-)-ephedrine, pseudoephedrine, norephedrine, norpseudoephedrine. These possess physiological properties similar to those of ephedrine.
Pharmacological action:

relieving the bronchoconstriction and mucosal congestion associated with bronchial asthma. Its predominate active constituent, ephedrine, mainly acts indirectly through the release of norepinephrine from sympathetic nerve endings.
Nonselective adrenergic agonist activity of ephedra in the human body

Relieves bronchospasm in asthma

Nervousness, insomnia, hyperactivity, irritability

Stimulation

α- and β-receptors central nervous system

Ephedra (ephedrine)

β2-receptors bronchial smooth muscle

Increased heart rate

Increased contractile force

Increased blood pressure

β1-receptors heart

α2- and β2-receptors gastrointestinal tract

Decreases tone, motility, and secretory activity

α1-receptors trigone sphincter muscle urinary bladder

Constriction

Impedes urine flow

Decreased nasal secretion

Increased blood pressure

Decreased blood pressure

Vasoconstriction

Nausea, vomiting
Ephedra is recommended for treating only mild forms of seasonal or chronic asthma. Due to its particular chemistry and more lipophilic properties compared to norepinephrine, ephedrine is effective when administered orally with its peak effect in one hour after administration and a half-life of six hours.
• Its duration of action is more prolonged than for norepinephrine, which is not effective upon oral administration, because ephedrine is resistant to metabolism by both monoamine oxidase (MAO) and catechol-O-methyltransferase (COMT).

• **Adverse effect:** (in large doses)
nervousness, insomnia, hyperactive, nausea, vomiting

• **Contra indication:**
coronary thrombosis, diabetes, glaucoma, heart disease, thyroid disease.
COLD AND FLU
<table>
<thead>
<tr>
<th>Cold</th>
<th>Symptoms</th>
<th>Flu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rare</td>
<td>Fever</td>
<td>Characteristic, high (100 degrees to 103 degrees F); lasts 3-4 days.</td>
</tr>
<tr>
<td>Rare</td>
<td>Headache</td>
<td>Prominent</td>
</tr>
<tr>
<td>Slight</td>
<td>General aches, Pains</td>
<td>Usual; often severe</td>
</tr>
<tr>
<td>Quite mild</td>
<td>Fatigue, Weakness</td>
<td>Can last up to 2-3 weeks</td>
</tr>
<tr>
<td>Never</td>
<td>Extreme Exhaustion</td>
<td>Early and prominent</td>
</tr>
<tr>
<td>Common</td>
<td>Stuffy Nose</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Usual</td>
<td>Sneezing</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Common</td>
<td>Sore Throat</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Mild to Moderate; Hacking Cough</td>
<td>Chest Discomfort, Cough</td>
<td>Common; can become severe</td>
</tr>
<tr>
<td>Sinus congestion or earache</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Complications</td>
<td>Bronchitis, pneumonia; can be life-threatening</td>
</tr>
<tr>
<td>Only temporary relief of symptoms</td>
<td>Prevention</td>
<td>Annual vaccination; anti-viral drug</td>
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<tr>
<td>Treatment</td>
<td></td>
<td>Anti-viral drug within 24-48 hours after onset of symptoms</td>
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Common cold (acute rhinitis, catarrh)

Acute viral infections of the upper respiratory tract produce a mixture of various symptoms.

Symptoms: nasal congestion and discharge accompany by sneezing, irritation or “trickling” sensation in the dry or sore throat that gives rise to cough, laryngitis, bronchial congestion, headache and fever.
If the infection is particularly severe and results in significant malaise, including joint and muscle pain and possibly, gastrointestinal disturbance, this condition is called influenza or flu.

Causes:

bird and mammals caused by a RNA virus of the family Orthomyxoviridae (the influenza viruses).
Type of influenza virus

- Type A: infect people, birds, pigs, horses; wild birds natural hosts; classified by subtype (based on HA and NA proteins) and strain
- Type B: usually only found in human, classified by strain (not subtype); associated with less severe epidemic than A, never with pandemic
- Type C: mild illness in human, do not cause epidemic or pandemic
WAYS OF INTRODUCTION OF A NEW HA SUBTYPE INTO THE HUMAN POPULATION

- **A)** Direct infection
- **B)** Passage in an intermediate host without reassortment
- **C)** Reassortment in an intermediate host

**Birds**

**Humans**

**Avian influenza A virus**

**Human influenza A virus**

*Source: Subbarao, CDC*
Diagnosis:

In humans, influenza's effects are much more severe than those of the common cold, and last longer. Recovery takes about one to two weeks. Influenza, however, can be deadly, especially for the weak, old or chronically ill.
Symptoms:

- Body aches, especially joints and throat
- Coughing and sneezing
- Extreme coldness and fever
- Fatigue
- Headache
- Irritated watering eyes
- Nasal congestion
- Nausea and vomiting
- Reddened eyes, skin (especially face), mouth, throat and nose
Treatment

People with the flu are advised to get plenty of rest, drink a lot of liquids, avoid using alcohol and tobacco and, if necessary, take medications such as paracetamol (acetaminophen) to relieve the fever and muscle aches associated with the flu.

Since influenza is caused by a virus, antibiotics have no effect on the infection; unless prescribed for secondary infections such as bacterial pneumonia, they may lead to resistant bacteria. Antiviral medication is sometimes effective, but viruses can develop resistance to the standard antiviral drugs.
Herbs for Cold and Flu

- Treatment of the common cold and flu is largely symptomatic, curative remedies do not exist. The most effective herbal remedies used for treat cough. These fall into 2 categories, antitussives (cough suppressants) and expectorants.
• Two natural herbal products, camphor and menthol, are used topically as antitussives. Ointments containing these drugs are rubbed on the throat and chest and also these drugs may be used in steam inhalers. The aromatic vapor that is inhaled from these applications has a local anesthetic action on the lungs and throat, which suppresses the cough reflex. Menthol is used in cough drops for this same purpose.
The antitussive effect of many herbs results from the content of mucilages, which exerts a demulcent or protective action. Mucilages in the presence of water, tend to form viscous solution which form a protective layer over the mucous membrane of the pharynx, larynx and trachea, thereby preventing mechanical irritation of the receptors there and preventing the cough reflex.
1. **Iceland Moss**

   a lichen, that is an alga and a fungus growing in symbiotic association. Iceland moss consist of the dried thallus of *Cetraria islandica* (L.) Ach. of the family Parmeliaceae.

   **Constituents:**

   50% of mixture of mucilaginous polysaccharides, principally lichenin and isolichenin
Uses:
  a. Irritation of the oral and pharyngeal mucous membranes and accompanying dry cough.
  b. Loss of appetite

Contraindications: none known

Side effect: none known

Interactions with other drugs: none known

Dosage: Total daily dose is 4 – 6 g.
2. **Marshmallow Root**

This herb consists of the dried root, unpeeled or peeled of *Althea officinalis* L. (Fam. Malvaceae)

**Constituents:**

5-10% mucilage

**Uses:**

a. Irritation of the oral and pharyngeal mucosa and associated dry cough

b. Mild inflammation of the gastric mucosa
Contraindication: none known
Side effects: none known
Interactions with other drugs: none known
Note: The absorption of other drug taken simultaneously may be delayed
Dosage:
  Daily dosage 6 g of root
  Marshmallow syrup: single dose- 10 g
3. **Mullein Flowers**

Consists of the dried petals of *Verbascum densiflorum* and/or *V. phlomoides* (Fam. Scorphulariaceae)

**Constituents:**

3% mucilage (mucopolysaccharides) and saponin

**Uses:**

catarrhs of the respiratory tract.
Contraindication, side effect and interaction with other drugs: none known

Dosage:
- Daily dosage 3 – 4 g of herbs

Mode of administration:
- Comminuted herb for teas and other galenical preparation for internal use.
4. **Plantain Leaf**

Consists of fresh or dried leaves of the English plantain, *Plantago lanceolata* L. (Fam. Plantaginaceae)

**Constituents:**

6% of mucilage, tannin, two iridoid glycoside (aucubin and catapol)

**Uses:**

a. Catarrhs of the respiratory tract, inflammatory alterations of the oral and pharyngeal mucosa
b. Inflammatory reaction of the skin

**Contraindication, side effect, interactions with other drugs:** none known

**Dosage:**

3 – 6 g of herb
5. Slippery Elm

consists of inner bark of *Ulmus rubra*  Muhl. (fam. Ulmaceae)

**Constituents:**
large quantities of a viscid mucilage

**Uses:**
treatment of cough and minor throat irritation because they provide a sustained release of the mucilage to the pharynx

**Contraindication, side effect, interactions with other drug:** none known
EXPECTORANTS
• Prolonged irritation of the bronchioles results in an increase in the mucoprotein and acidic mucopolysaccharide content of their secretion and a concomitant increase in the viscosity of the mucus and other fluids.

• Symptomatic therapy with expectorants has the objective of reducing the viscosity of these secretions so that the loosened material may be eliminated from the system, eventually by expectoration.
The action called as nauseant-expectorant.
Herbs that using as expectorant are classified on the basis of their mode of action:
1. nauseant-expectorant
2. local irritation
3. surface-tension modifier
Nauseant- Expectorant

1. **Ipecac**

   This consists of the rhizome and roots of *Cephaelis ipecacuanhae* or *C. acuminata* of the family Rubiaceae.

   Ipecac syrup (USP) is widely used as an **emetic** in the treatment of certain poisonings, but it is prepared from the powdered ipecac (USP), which standardized to contain from 1.9 to 2.1 % of the active ether-soluble alkaloids, primarily **emetine**, **caphaelin** and **psychotrine**

   A number of commercial expectorant mixture also contain precise amounts of standardized ipecac.
2. **Lobelia**

Commonly called Indian tobacco, it consists of the leaves and tops of *Lobelia inflata* L., fam. Campanulaceae. Lobelia as a result of its contained alkaloids, principally lobeline, is an effective nauseant-expectorant, but the ratio of risk to benefit is very high. Its use as a crude herbal product is not recommended.
Local Irritant

1. **Horehound**

   Consisting of the leaves and flowering tops of *Marrubium vulgare* L. (fam. Lamiaceae).

   **Constituents:**
   
   0.06 % volatile oil, diterpenoid lactone, marrubiin
   
   Marrubiin exerts a direct stimulatory effect on the secretions of the bronchial mucosa
Uses:
- treatment of bronchial catarrh, dyspepsia and loss appetite

Dosage:
- Daily dosage: 4.5 g of drug
  - 2 – 6 tbs. of pressed juiced

This herb is also available in the form of hard horehound candy that is widely used as a cough lozenge.
2. **Thyme**

Consist of the leaves of *Thymus vulgaris* or *T. zygis* (Fam. Lamiaceae)

Constituents:

- 0.4 to 3.4 % volatile oil (*T. vulgaris*)
- 0.7-1.38 % volatile oil (*T. zygis*)

thymol, carvacol, flavonoids, tannins and triterpenes.

The volatile oil has not only expectorant and antiseptic properties, but functions to relieve bronchospasm as well.
This spasmolytic effect is enhanced by flavonoids in the plant.

Uses:
   Treatment of the symptoms of bronchitis, pertussis and catharr

Dosage:
   1 – 2 g of herb
3. **Eucalyptus Leaf**

From the leaves of *Eucalyptus globulus* (Fam. Myrtaceae).

**Constituents:**

70-85% cineol

**Uses:**

expectorant and antiseptic

**Dosage:**

1.5 – 2 g of herb in 150 mL of hot water, drunk freshly prepared three times daily.
Surface-Tension Modifier

1. **Licorice**

   Also known as glycyrrhyza, is widely used and has very useful expectorant or antitussive properties.

   Consists of unpeeled, dried roots of *Glycyrrhiza glabra* (Fam. Fabaceae)

   **Uses:**

   For catarrh of the upper respiratory tract and gastric/duodenal ulcer
Contraindication:
liver disorder, hypokalemia, severe kidney insufficiency, pregnancy.

Side effect:
potassium loss, hypertension, edema, hypokalemia

Interactions with other drugs:
Potassium loss due to other drugs, e.g. thiazide diuretics.
2. **Senega Snakeroots**

Consists of the dried root with remains of aerial stems of *Polygala senega* or other closely species (Fam. Polygaceae).

**Constituent:** saponins

**Uses:**

Catarrh of the respiratory tract

**Side Effect:**

With prolonged use, gastrointestinal irritation

**Dosage:**

Daily dosage:

1.5 – 3 g root
Sore Throat
• Sore throat associated with cold and flu, also may be a symptom of many illness.
• These range from acute simple (catarrhal) pharyngitis, usually caused by bacterial or viral infection of the upper respiratory tract, to severe streptococcal infection.
• It also accompanies certain acute specific infections, such as measles and whooping cough.
• The kind of dry sore throat that attends colds and flu is usually self-limiting; treatment is symptomatic with emphasis on increasing the patient’s comfort.

• Gargling with warm infusion or decoction of various herbs is often recommended.

• The antiseptic and astringent botanicals commonly use as palliatives are essentially the same as those employed for lesions and infections of the oral mucosa.
1. **Goldenseal**

Consisting of the dried rhizome and roots of *Hydrastis canadensis* L. (Fam. Ranunculaceae).

**Constituents:**

isoquinoline alkaloids, including hydrastine, berberine, berberastine and canadine.

**Uses:**

Berberine is particularly active, having antibacterial and amoebicidal properties
Dosage
A strong tea prepared from 2 tbs of the herb and one cup of water as a mouthwash to alleviate pain and facilitate healing.

2. Sage
The fresh or dried leaves of Salvia officinalis L. (Fam. Lamiaceae).
Constituents:
volatile oil: thujone, cineol and other mono- and sesquiterpenes, tannins
Uses:
treatment of inflammation of the mouth and throat
Dosage:
3 g of herb with a cup of boiling water is widely used as mouthwash or gargle