



RESPIRATORY SYSTEM

Phytotherapy



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The Respiratory System

- Minor common respiratory disorders can often be treated successfully with Phytotherapy, and it can be helpful as a supportive measure in more serious diseases, such as bronchitis, emphysema and pneumonia.
- For infections, antibiotics are used. Although, most of them are of natural origin, they will not be discussed here.
- However, for colds and flu-like virus infections, decongestants (e.g. eucalyptus and menthol), broncholytics and expectorants (ipecacuanha and thyme), demulcents (mallow = *Malva*), antibacterials and antivirals (linden زيزفون and elderflowers = *Sambucus* خمان and pelargonium), immune system modulators (e.g. Echinacea and andrographis) are popular and effective.
- Allergic conditions such as hay fever can be treated with butterbur and traditionally, a compound of garlic and echinacea is used for allergic and infective rhinitis.



Butterbur

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- Asthma is best treated with steroids and bronchodilators. These are either of natural origin, or have been developed from natural products.
- Although, isolated ephedrine and pseudoephedrine are contraindicated in asthma owing to the ability to precipitate an attack, the whole plant *ephedra* has a long-use history without apparent ill-effects. This is presumably due to the effects of other components in the whole extract.
- Antimastarinic drugs such as atropine superseded ipratropium derivatives (bronchodilator).
- Sodium cromoglycate , which is derived from khellin and acts by stabilizing mast cells., is used in form of inhaler to treat asthma.
- Cough suppressant are very popular such as codeine and other derivatives from opium poppy.

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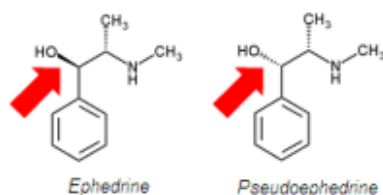
Bronchodilators and decongestants

Ephedra spp.

- *Ephedra sinica* and other spp. of the family Ephedraceae is an ancient Chinese medicine which is now used worldwide.
- It is the original source of ephedrine, a useful decongestant and bronchodilator.
- Traditionally, it is used to treat asthma in form of nasal drops.
- Pseudoephedrine is now used more widely for respiratory congestion as it has fewer CNS stimulatory effects.

Constituents:

Alkaloids 3% such as ephedrine pseudo-ephedrine (stereoisomers), norephedrine, norpseudoephedrine, ephedroxane, *N*-Methylephedrine. It also contains catechin derivatives and diterpenes.



Uses:

- Asthma and hay fever as a bronchodilator and sympathomimetic, CNS and cardiac stimulant.

Toxicological risks:

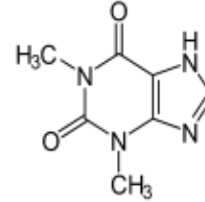
- The herb is abused by some people as a slimming agent, and as ergogenic مولد طاقة in sports and athletics. It can result in serious problems such as hypertension and other cardiovascular problems. Also, exacerbation of hepatitis.

Theophylline:

- Is used invariably and fixedly.
- Obtained from *Theobroma cacao*, *Coffee* spp. and tea (*Camellia sinensis*).

- Is indicated in airway obstruction particularly in acute asthma.
- Care should be taken as it is a drug with a narrow therapeutic window, and its half-life is highly variable especially in smokers, patients with heart failure and when administered concomitantly with other drugs.
- Usual dose is 150 – 250 mg 3 times a day.

Side effects: tachycardia, palpitations, nausea and other GIT disturbances.



Inhalations:

- Essential oil-containing preparations are often used with aromatic compounds (especially camphor) as chest rubs, steam inhalations, or nasal sprays, for their decongestant properties.
- They are particularly useful for infants, asthmatics and pregnant women for whom systemic decongestants may not be appropriate.
- They may also be used in form of pastilles اقراص محلاة, lozenges, cough sweets



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- Oils distilled from aerial part of members of pine family (e.g. pine, European larch الارز الشوح, fir tree).



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Camphor:

- A pure natural product derived from *Cinnamomum camphora*, Lauraceae.
- It is often combined with essential oils as an aromatic stimulant and decongestant.
- It has an antiseptic, secretolytic and decongestant effect.



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Eucalyptus oil (*Eucalyptus* spp.):

- Used as a decongestant and as a solvent.

Constituents:

- 1,8-cineole (eucalyptol), terpineole, α -pinene, *p*-cymene, aldehydes, ketones and alcohols.

Therapeutic uses:

- Antiseptic, antispasmodic, expectorant, stimulant and insect repellent.



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- Can be taken internally in small doses (0.05-0.2ml).
- It is a frequent ingredient in cough mixtures, pastilles. It can be taken by inhalation or applied as an ointment or a vapor rub.
- The leaf extract has anti bacterial and anti-yeast effects.
- It is insect repellent and larvicidal.
- It is irritant yet it is generally safe, and hence, caution should be taken.

Menthol:

- Is a monoterpene (10 carbons) extract from *Mentha* spp., or it can be made synthetically.
- Used to treat influenza and colds in form of inhalations and sprays as it is decongestant. Also, used for colic.

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ANTI-ALLERGICS:

- Most antihistamines are synthetic.
- However, recently and an extract of a herbal drug of **butterbur** was found to be equivalent to cetirizine, but, it should be used by an expert and after the **alkaloids** have been removed or else **ولا**, they will cause toxic effects.
- Smooth muscle relaxing drugs have been used to treat asthma, and one of these is khellin.
- Khellin is taken from *Ammi visnaga* (the Mediterranean region).
- Khellin has been employed as a lead compound to discover new muscle relaxing drugs to be used in asthma. In fact, **sodium cromoglycate** was discovered to have anti-allergic effects.

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Ammi visnaga



***Ammi visnaga* = Khella (Apiaceae = Umbelliferae):**

- The drug is the fruit which is very small.
- Traditionally, in the Middle East and particularly in Egypt, the drug has been used antispasmodic for renal colic, asthma and as a coronary vasodilator for angina.

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Constituents:

The principal constituents are furanocoumarins mainly: khellin, visnagin, visnadin and khellol glycoside.

Therapeutic effects:

- Khellin, visnagin and visnadin are vasodilators with calcium channel and spasmolytic activity.
- Khellin was the basis of discovery of **1. sodium cromoglycate** which is used as a prophylactic treatment for asthma, hay fever in form of inhalers and eye drops, **2. nifedipine** = a calcium channel antagonist and vasodilator, and **3. amiodarone** = an antiarrhythmic drug.

Butterbur (*Petasites hybridus*) Fam. Compositae:

- Is common in damp places throughout Europe.

Constituents:

- Sesquiterpene lactones such as petasin, isopetasin, neopetasin, petasalbin, flavonoids: such as isoquercetin – and toxic pyrrolizidine alkaloids may be present

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in higher concentrations especially in the root.

Therapeutic uses:

- A traditional remedy for asthma, colds, headaches, and urinary tract disorders.
- An antihistamine for seasonal allergic rhinitis.
- A recent study (clinical, randomized and double-blinded) on 125 persons, the plant gave comparable results as cetirizine.
- This activity was deduced to be mainly to **petasin** content.
- Extracts inhibit leukotriene synthesis and are spasmolytic and reduce allergic airway inflammation.
- Prophylactic treatment for migraine.
- Usual dose: 5-7 g of herb or root.
- Internal intake is not recommended unless alkaloids exist in negligible amounts or after they have been removed.



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EXPECTORANTS AND MUCOLYTICS:

- ❖ The purpose of these drugs is to reduce to the viscosity of mucus in the respiratory tract in cases of chest and throat infection.
- ❖ Frequently, essential oils are used to offer expectoration such as camphor.

Balm of Gilead (Poplar buds of *Populus* spp. - Salicaceae):

- Poplar buds are collected in spring before they open. They are small and their inner scales are sticky and resinous.

Constituents:

- Phenolic glycosides: salicin (salicyl alcohol glucoside), populin (benzoyl salicin), volatile oil, flavonoids.



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Therapeutic effects:

- Expectorant, stimulant analgesic and antipyretic.
- The bark of the poplar spp. can be used similar to that of willow spp. as antirheumatic.
- Generally, the balm is not toxic except for those patients who are allergic to salicylates, where adverse effects such as stomach upset and tinnitus are possible owing to salicylate content.

Thyme

Thyme and wild thyme (*Thymus vulgaris* and *T. serpyllum*) Lamiaceae:

- Thyme = garden or common thyme (*T. vulgaris*), and *T. serpyllum* is the mother of thyme or the white thyme, are indigenous to Europe especially in the Mediterranean region.

Constituents:

- Thymol, lesser amounts of carvacrol, borneol, 1,8-cineole and α -pinene.
- Flavonoids such as apigenin, luteolin and thymonine contribute to the anti-inflammatory effect.



White thyme



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Therapeutic uses:

- Thyme and oil of thyme are carminative, antiseptic, antitussive, expectorant, spasmolytic.

Sage (*Salvia officinalis* and *S. spp.*) – Lamiaceae:

- As thyme, it is indigenous to Europe especially the Mediterranean region.

Constituents:

- α - and β -thujone as the main constituents up to 50 %, and cineole, borneol, camphor. {{{Spanish sage does NOT contain thujone, while Greek sage contains only small amounts}}}.
• Picrosalvin (a diterpene), flavonoids (salvigenin and luteolin), rosmarinic acid and caffeic acid.

Therapeutic effects:

- An infusion of sage is used as a gargle or mouthwash for pharyngitis, tonsillitis, sore gums and mouth ulcers.
- Antimicrobial.

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- Anti-inflammatory (flavonoid and phenolic acid derivatives e.g. rosmarinic acid).
- Memory enhancer.
- Anti-cholinesterase activity.

Senega (*Polygala senega*) = snakeroot / rattlesnake root:

- Native to USA.
- Taken orally or as an infusion.
- The dose is 0.5 – 1g of powdered root.

Constituents:

❖ **Senegin**, which is a mixture of triterpenoid saponins.

Therapeutic effects:

- Used for chronic bronchitis, asthma, catarrh and croup الخناق.
- Immunopotentiating effect against viruses.
- Anti-inflammatory, anti-cancer, hypoglycemic in rodents and antiseptic.



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Demulcents and Emollients:

Elderflower and elderberry (fruit) (*Sambucus nigra*) البيلسان -الخمّان الأسود:

- Black or European elder (berry) is a common European hedge (fence) brush, with small white flowers that appear in May.
- Most parts of the plant are utilized, but most commonly, the flowers and berries are used to make refreshing drinks and country-style wines.
- Berries should not be eaten raw as they contain lectins {class of proteins that bind to certain sugars} that can cause GI disturbances.
- Related species of elder are toxic.



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Constituents:

- Triterpenes, flavonoids (quercetin, rutin, ...), phenolic acids and essential oils.

Therapeutic uses and effects:

- Elderflowers are used as an infusion or a herbal tea or mixed with peppermint to treat colds and influenza.
- Anti-viral and antioxidant.

☐ **Dose:** 3 g of flowers infused in 150 ml hot water.

- Elderflowers are non-toxic with no side effects.

Mallow flowers and leaves (*Malva sylvestris*) = common mallow الخبيزة:

Constituents:

- Mucilages, flavonol glycosides (e.g. gossypin) and anthocyanidins (malvin and delphinidin).



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Therapeutic uses and effects:

- Mallow is demulcent and pectoral (useful for respiratory system). An infusion is used for coughs and colds.
- The mucilage from the leaves is anti-inflammatory.

Pelargonium (*Pelargonium sidoides*, *P. reniforme* – Geraniaceae):

Constituents:

- Hydrolysable tannins, catechin, gallic acid, flavonoids (myricetin, quercetin), coumarins (scopoletin) and pelargoniins (type of ellagitannins).

Therapeutic uses and effects:

- In Germany, a standardized extract of *P. sidoides* is indicated for acute bronchitis, and several randomized, placebo, double-blinded clinical trials supported this in adults and children. The extract proved to have **anti-viral**, **antibacterial**, **immunomodulatory** and **cytoprotective** effects. **It also, helps remove pathogens from the upper respiratory tract by increasing the frequency of the ciliary beats, and inhibits the interaction between the bacteria and the host cells.** **A recent study has found that the extract interferes with the replication numerous viruses.**

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- A study in athletes suggested that the extract increases the production of Immunoglobulin A in saliva, and decreases levels of both interleukin 15 and interleukin 6 in serum suggesting a strong modulating influence on the immune response associated with upper respiratory mucosa.



*P.
reniforme*



*P.
sidoides*

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Immunostimulants:

- Those that increase certain parameters associated with pathogen fight such as circulating immune cells, or increase in phagocytosis.

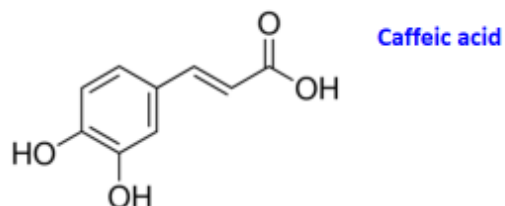
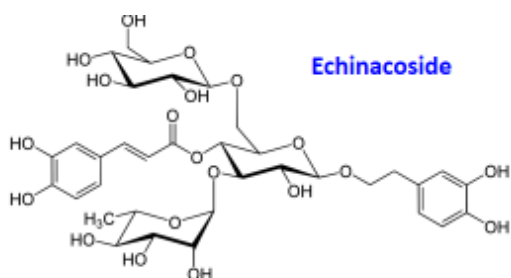
Echinacea spp. (*E. pallida*, *E. purpurea moenich*, *E. angustifolia*) = Coneflower القنفذية -
Fam. Asteraceae:

- Widely distributed in North America.
- Both aerial and roots are utilized.
- Is often combined with garlic for the treatment of colds and allergic rhinitis.

Constituents:

- The various species contain similar components, most important of these is a caffeic acid derivatives, including **echinacoside**. Also, it contains unsaturated fatty acid derivatives.

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Therapeutic effects:

- To relieve symptoms of colds and influenza. Some evidence is available for its use to treat and prevent respiratory infections.
- Clinical evidence of its **immunostimulant** effect is available.
- Meta analyses (statistical analysis to combine data from numerous trials) proved its **therapeutic and prophylactic effect** in colds.
- It is safe with very limited interactions. Only possible allergy conditions.

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