International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Review on: Medicinal Plants is Used in the Treatment of Cough

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Abstract
Cough is one of the most common respiratory symptoms leading to outpatient consultations. While synthetic drugs like codeine and dextromethorphan are effective, they are often associated with side effects such as sedation, constipation, and dependency. Medicinal plants offer a natural alternative with demulcent, expectorant, bronchodilator, and anti-inflammatory properties. This review highlights key medicinal plants traditionally and scientifically validated for their antitussive activity

INTRODUCTION

Cough is the strong explosive exhalation, which exits the secretions and foreign bodies from tracheobronchial tract. If coughing becomes intense and persistent, it causes discomfort and increases the likelihood of cancer incidence . Cough could be intentional or reflexive, and afferent and efferent are involved in its development. Efferent is a recurrent, laryngeal and spinal nerve and afferent is a sensory trigeminal, glossopharyngeal, superior laryngeal and vagus nerve .Cough is a common reason for children's referring physicians, and description of previous coughing, the time of exacerbation, and its quality help greatly to diagnosis. Any children on acquire respiratory infection on average 5-8 times a year, each lasting for 6-9 days. Therefore, a healthy child experiences coughing at a variety of intensities on average for 50 days a year . Cough is a very important defensive mechanism of upper tract.In fact, cough is a very common symptom of pulmonary diseases and the most common symptom which physicians deal with and patients request for healthcare and medical practices for, particularly if cough is chronic (lasts for more than eight weeks].Based on the affected location of nervous system, anti-cough drugs are generally divided into two classes, peripheral and central. Peripheral anti cough drugs cause suppression of responding in one or more sensory receptors of vagus nerve that produce, Central anti cough drugs act in central nervous system at brainstem surface where basal neural cough [responsible for creating cough reflex are location.[1]

However the chemical drugs of use lead consistently to unpleasant side effects which make their use somehow limited. This encourages researchers and healthcare community to identify the naturally derived drugs with no side effects and also with higher efficiency. In this regard, medicinal plants are valuable natural resources which have long been used to treat different diseases. Further, their therapeutic effects have been studied and confirmed for fungal and diseases, respiratory hyperlipidemia and], children's], liver diseases [, cardiovascular diseases and other disorders and However, many of their specific therapeutic effects have been addressed only in traditional medicine and have not yet been investigated and confirmed in clinical trials. Therefore, since the prevalence of cough incidence in both

children and adults and the significant role of medicinal plants in preventing and treating various diseases, this study is aimed to identify and report the plants that are used to relive and treat cough in traditional culture and ethnobotany of Iran's different regions.[2]

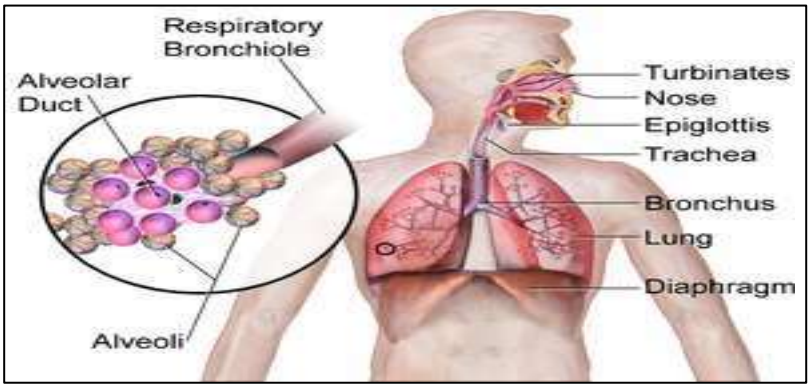

Fig.1: Cough

A Brief History of Cough: From Antiquity to Modern Times

1. Ancient Observations: Hippocrates and Early Descriptions

Hippocrates (circa 460–370 BC), often called the **Father of Medicine**, offered one of 2associated these with an imbalance of bodily humors like phlegm and bile He also recorded a recurring outbreak in **Perinthos**, noting cough, fever, pneumonia, and lingering complications such as fatigue and limb paralysis—an early narrative of respiratory epidemics.[3]

2. Medieval & Renaissance Developments

- Medieval Islamic physicians, such as **Sabur ibn Sahl**, compiled detailed pharmacopoeias (e.g., *The Small Dispensatory*), offering herbal formulations for treating cough and chest ailments—like decoctions made from licorice, raisins, figs, and sebestent.
- The clinical understanding progressed in Europe thanks to **Guillaume de Baillou** (1538–1616), who provided the first modern documented description of **pertussis** (whooping cough) after observing a notable epidemic in Paris in 1578, naming it *Quintana.[4]*

3. Early Modern Remedies and Terminology

- In the early 18th century, **paregoric**—a soothing elixir containing licorice, honey, opium, camphor, and other ingredients—was widely used as a treatment for cough, manufactured according to contemporary humoral theories.
- In 1679, **Thomas Sydenham** popularized the term **"pertussis"** to describe whooping cough, giving the disease its lasting medical name 4. 19th Century to Present: Commercial Remedies and Evolving Views
- **By 1855,** Father John's Medicine**, a cod**-liver-oil–based tonic with licorice flavor, became a popular over-the-counter cough remedy in the U.S., still available today (now containing dextromethorphan).
- Modern perspectives have expanded: while cough remains a key symptom across multiple diseases, it's also being viewed increasingly as a potential primary condition. The concept of **cough hypersensitivity syndrome** describes it as a hypersensitive airway reflex, not just a symptom of another illness.[5]

Period	Key Developments

Antiquity (Hippocrates)	Clinical descriptions of cough and pneumonia
Medieval Islamic Era	Herbal cough remedies, systematic pharmacology
Renaissance Europe	Epidemiological observations of whooping cough
17th–18th Century	Naming of pertussis; humoral-based elixirs
19th Century	Mass-produced cough tonics (e.g., Father John's)
Modern Era	Cough as disease entity; refined understanding

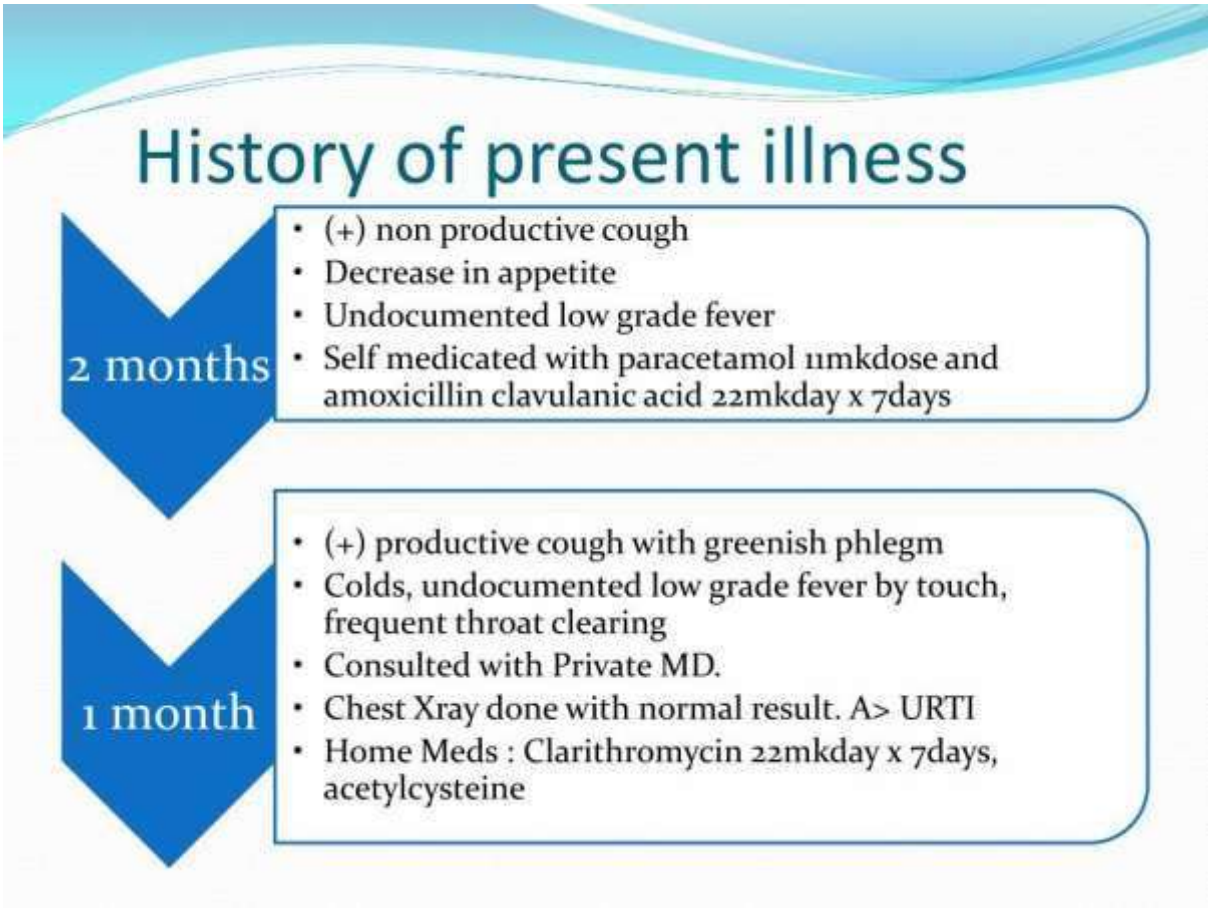

Fig.2: History of cough

Type of cough

1. Productive Cough 2.Non-productive Cough

Productive Cough (Wet Cough)

Definition

A **productive cough** is one that produces **sputum or phlegm** (mucus, pus, or blood- stainedsecretions). It is often a **protective reflex**, helping to clear the airways of excessive or abnormal secretions.

Pathophysiology

- Airway irritation (by infection, inflammation, allergens, or toxins) → stimulates cough receptors in pharynx, larynx, trachea, bronchi.
- Excess mucus production occurs due to:
  - Goblet cell hyperplasia

- Submucosal gland hypertrophy
- Increased vascular permeability → exudate in airway
- Cough reflex expels mucus to maintain airway patency and gas exchange.

Causes

1. **Infections**
   - Acute bronchitis, pneumonia, tuberculosis
   - Viral infections (influenza, RSV, adenovirus)
2. **Chronic airway diseases**
   - Chronic bronchitis (smoking-related)
   - Bronchiectasis (irreversible airway dilation)
   - COPD
   - Cystic fibrosis
3. **Other conditions**
   - Lung abscess
   - Heart failure (cardiac asthma → frothy sputum) Pharmacological Management

Goal: Facilitate clearance of secretions, reduce viscosity, and relieve obstruction.

1. **Expectorants (Mucokinetics)**

- Increase secretion volume → makes mucus easier to cough out.
- Examples:
  - Guaifenesin (most common OTC expectorant)
  - Potassium iodide (rarely used due to side effects)

2. **Mucolytics**

- Break down mucus structure → reduce viscosity.
- Examples:
  - Bromhexine (enhances mucus clearance)
  - Ambroxol (active metabolite of bromhexine) N-acetylcysteine (NAC): breaks disulfide bonds in mucus; also antidote for paracetamol poisoning.[6]

Non-Productive Cough (Dry Cough)

Definition

A non-productive cough is a cough without sputum or phlegm production. It is often due to irritation of the airways or activation of the cough reflex in the absence of excessive mucus.Unlike productive cough, it is usually not useful and can be distressing**.**

Pathophysiology

- Airway irritation / inflammation activates cough receptors in the pharynx, larynx, trachea, or bronchi.
- No significant mucus is produced → the cough serves little clearance function.
- May involve heightened cough reflex sensitivity (seen in cough hypersensitivity syndrome).

Causes

1. **Respiratory Tract Infections (early or post-viral stage)**
   - Common cold, influenza, COVID-19 (initial stages).
2. **Allergic & Inflammatory Disorders**
   - Asthma (especially cough-variant asthma)
   - Allergic rhinitis / post-nasal drip

- Eosinophilic bronchitis

3. Drugs

ACE inhibitors (e.g., enalapril, lisinopril) cause dry cough in 5–20% of patients due to bradykinin accumulation.

4. Gastroesophageal Reflux Disease (GERD)

- Reflux irritates larynx and pharynx → chronic dry cough.

5. Environmental / Lifestyle Pharmacological Management

Goal: Suppress cough reflex and relieve irritation.

1. **Antitussives (Cough Suppressants)**

- Central Acting (medullary cough center inhibition):
  - Opioids:
    - *Codeine, Pholcodine, Hydrocodone*
    - Effective but risk of dependence, constipation, respiratory depression.
  - Non-opioids:
    - *Dextromethorphan* (widely used OTC, safe, no analgesia/addiction)
    - *Noscapine* (opium alkaloid, non-addictive).
- Peripheral Acting:
  - Reduce sensory nerve activation in airways.
  - *Benzonatate* (anesthetizes stretch receptors).
  - *Local anesthetics* (lidocaine nebulization in severe cases).
  - *Demulcents* (soothing action): honey, glycerin, lozenges.

2. **Antihistamines (H1 blockers)**

- Helpful in **allergic cough, post-nasal drip**.
- Examples: *Diphenhydramine, Chlorpheniramine*.[7]

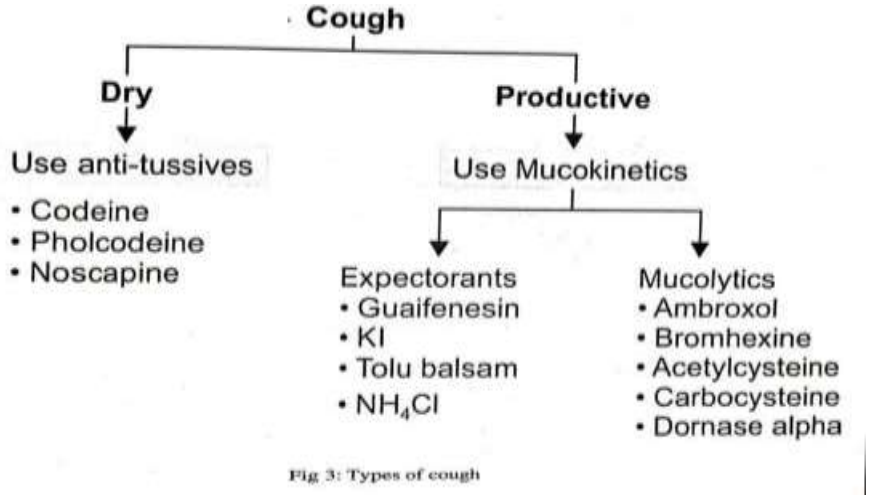

Fig 3 : Types of cough

Pathophysiology of cough

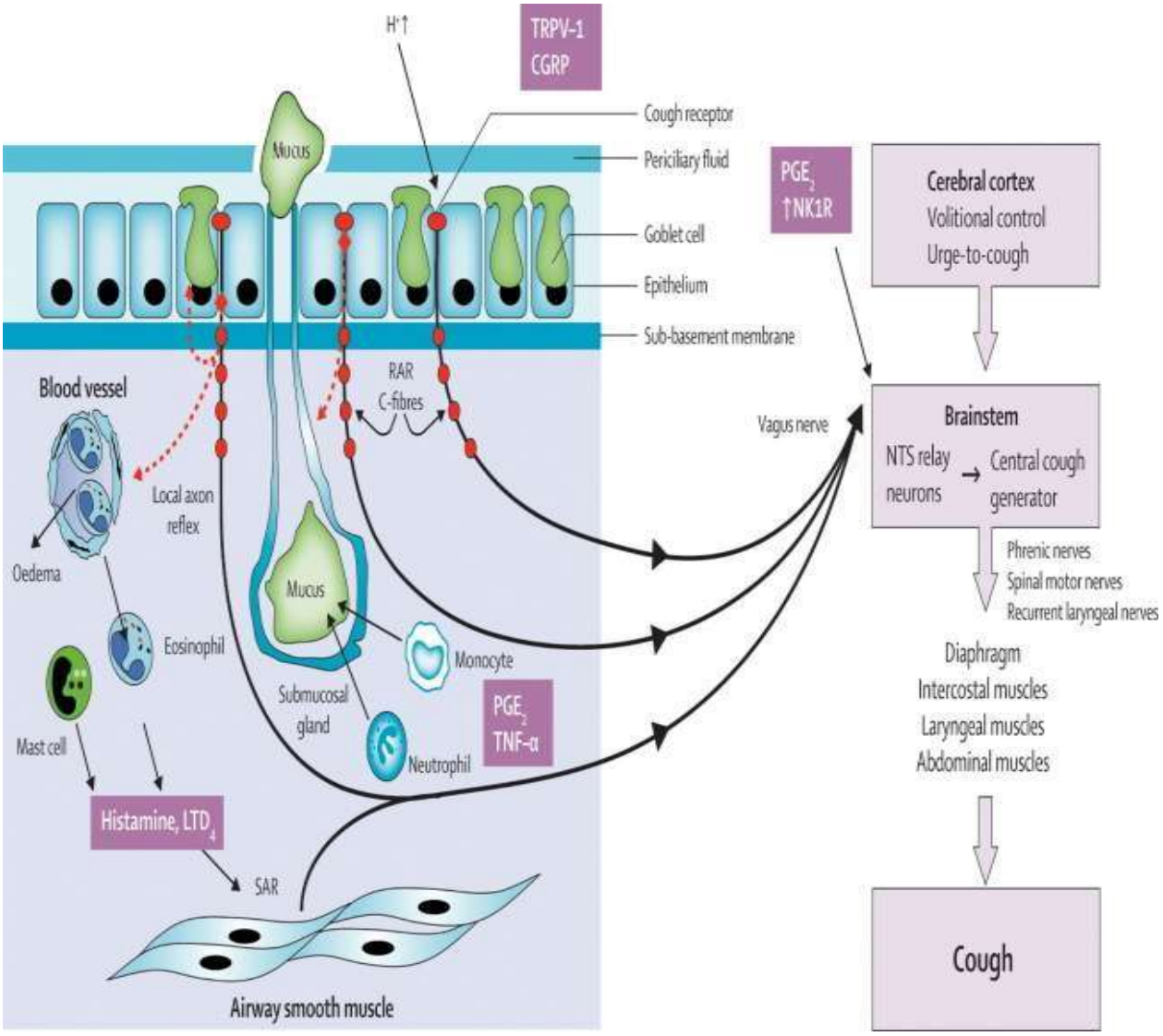

Fig 4 : Pathophysiology of cough

➢ **Pathophysiology of cough**

1. **Definition**

Cough is a protective reflex that clears the airways of mucus, foreign particles, and irritants.

It involves a complex reflex arc with afferent (sensory), central (brainstem), and efferent (motor) pathways.

2. **Cough Reflex Arc**

A. Afferent Pathway (Sensory limb)

- Receptors (Cough receptors):Found in mucosa of pharynx, larynx, trachea, bronchi, ear canal, pleura, diaphragm,esophagus, stomach.
- Types of receptors: 1. Rapidly adapting irritant receptors (RARs): respond to mechanical & chemical stimuli.

2. C-fiber receptors (unmyelinated): respond to chemical irritants (e.g., bradykinin, capsaicin, prostaglandins).

3. Slowly adapting stretch receptors (SARs): regulate breathing, not major in cough.

➢ **Afferent nerves:**

- Mainly vagus nerve (CN X)
- Also trigeminal, glossopharyngeal, phrenic (in ear canal, diaphragm, pleura).

B. **Central Pathway (Integration)**

- Cough center in the medulla oblongata (brainstem).
- Input from vagus, glossopharyngeal, trigeminal nerves.
- Modulated by higher brain centers → explains voluntary suppression or initiation of cough.

C. **Efferent Pathway (Motor limb)**

- Nerves:
- Vagus nerve → larynx & trachea (closure of glottis).
- Phrenic nerve → diaphragm contraction.
- Spinal motor nerves → intercostal & abdominal muscles.
- These coordinate the mechanical act of cough.[8]

➢ **Causes of cough**

1. Based on Duration

A. Acute Cough (< 3 weeks Infectious causes

- Viral URTI (common cold, influenza, RSV, adenovirus, COVID-19)
- Acute bronchitis
- Pneumonia
- Pertussis (whooping cough)

Non-infectious causes

- Aspiration of foreign body (esp. in children)
- Inhalation of irritants (smoke, dust, chemicals)
- Pulmonary embolism (may mimic pneumonia)
- Acute exacerbation of asthma or COPD

B. Subacute Cough (3–8 weeks)

- Post-infectious cough (common, after viral illness)
- Pertussis (classic paroxysmal cough)
- Asthma (cough-variant asthma)
- Post-nasal drip syndrome (following sinusitis, rhinitis)

C. Chronic Cough (> 8 weeks)

Most common causes in adults = **"**BIG 3**"**:

1. Asthma (and eosinophilic bronchitis)
2. Gastroesophageal reflux disease (GERD)
3. Upper airway cough syndrome (UACS, post-nasal drip)

Other important causes:

- Respiratory diseases:
- COPD, chronic bronchitis, bronchiectasis, interstitial lung disease, lung cancer, TB, sarcoidosis.
- Cardiac causes:
- Left ventricular failure, pulmonary edema (—cardiac asthma‖).
- Drugs:
- ACE inhibitors (e.g., enalapril, lisinopril) → dry persistent cough.
- Other systemic causes:

- Aspiration (neurological disorders, swallowing dysfunction)
- Psychogenic/habit cough (especially in children)

2. Based on Mechanism / Origin

A. Respiratory Causes

- Upper airway:
- Pharyngitis, tonsillitis, sinusitis, post-nasal drip
- Lower airway:

Asthma, bronchitis, COPD, bronchiectasis, pneumonia, lung abscess, TB, interstitial lung disease, cancer

- Pleural/mediastinal involvement:
- Pleural effusion, mediastinal masses pressing on trachea/bronchi

B. Non-Respiratory Causes

- Cardiac: heart failure, pulmonary edema
- Gastrointestinal: GERD, aspiration
- Ear: Foreign body or wax in external auditory canal (Arnold's reflex → via vagus nerve)

C. Drug-Induced

- ACE inhibitors (most important, 5–20% incidence)
- Beta-blockers (can worsen asthma-related cough)
- Amiodarone, methotrexate (pulmonary toxicity)

3. Special Types

- Paroxysmal cough: Pertussis, asthma, foreign body.
- Nocturnal cough: Asthma, GERD, heart failure.
- Psychogenic/habit cough: Disappears during sleep, often in children/adolescents.[9]

➢ **Symptoms of cough**

Category	Examples
Acute	Viral URTI, bronchitis, pneumonia, foreign body, PE
Subacute	Post-infectious, pertussis, asthma, post-nasal drip
Chronic	Asthma, GERD, UACS, COPD, bronchiectasis, TB, lung cancer, ILD, heart failure, ACE inhibitors
Non- respiratory	GERD, heart failure, ear canal stimulation, psychogenic
Drugs	ACE inhibitors, beta-blockers (in asthmatics), amiodarone, methotrexate

1. Core Symptom

- Coughing sound & effort**:** sudden, forceful expulsion of air from lungs, may be dry (no sputum) or productive (with sputum).

2. Characteristics of the Cough

When taking history, doctors ask about:

- Duration
- *Acute* (<3 weeks)
- *Subacute* (3–8 weeks)
- *Chronic* (>8 weeks)

Nature/Quality

- Dry (non-productive): tickling, irritating, hacking.
- Productive (wet): brings up sputum.

- Brassy/metallic: tracheal compression (tumor, mediastinal mass).
- Barking/seal-like: croup, laryngotracheitis.
- Whooping cough: paroxysms followed by "whoop" (

Timing

- Nocturnal: asthma, GERD, heart failure.
- Daytime only: habit cough (psychogenic).
- Post-exercise: asthma.
- After meals / lying down: GERD, aspiration
- Trigger **:** Cold air, dust, smoke, allergens.

3. Associated Sputum Symptoms

Quantity: scanty, moderate, copious (e.g., bronchiectasis, lung abscess). Color**:**

- Clear/white → viral, asthma.
- Yellow/green → bacterial infection.
- Rusty → pneumococcal pneumonia.
- Pink/frothy → pulmonary edema.

Consistency: mucoid, purulent, frothy.

Blood-stained (hemoptysis): TB, lung cancer, bronchiectasis, PE. Foul smell: anaerobic infection, lung abscess.

Respiratory System

- Fever, chills → infection (pneumonia, TB).
- Wheeze, shortness of breath → asthma, COPD.
- Chest pain (pleuritic) → pneumonia, PE.
- Weight loss, night sweats → TB, malignancy.

ENT / Upper Airway :Nasal congestion, post-nasal drip, sore throat → rhinitis, sinusitis, allergies.

Cardiac **:**Orthopnea, paroxysmal nocturnal dyspnea, frothy sputum → left heart failure. GI **:**Heartburn, regurgitation → GERD-related cough.

Drug-related **:** Persistent dry cough after starting ACE inhibitors (e.g., enalapril). Systemic **:**Fatigue, rib pain, urinary leakage → due to repeated severe coughing.[10]

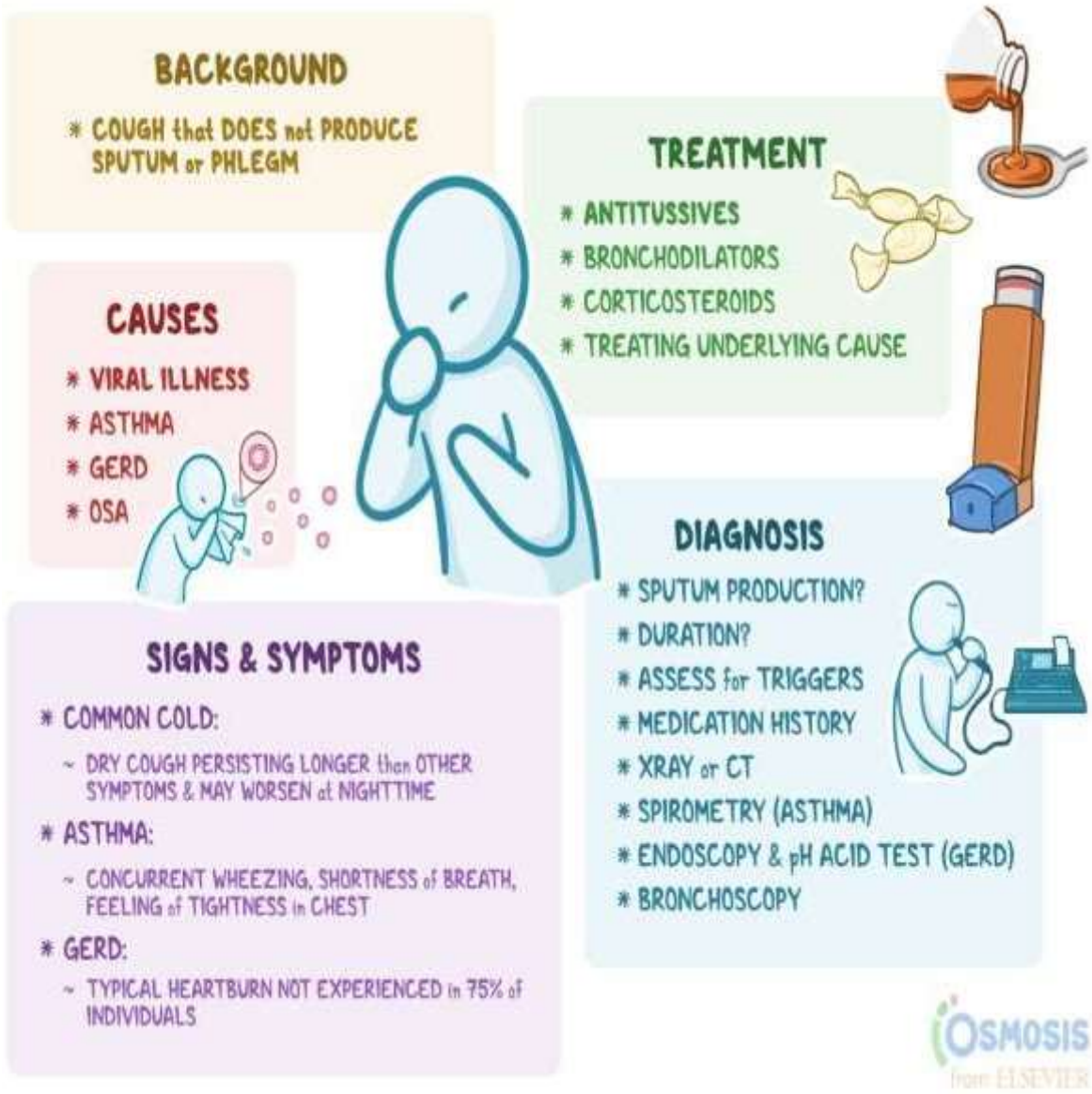

Fig.5: Causes and symptoms of cough

➢ **Diagnosis of cough**

Physical Examination

- General inspection**:** distress, clubbing, cyanosis, cachexia.
- ENT exam: nasal congestion, post-nasal drip, tonsillitis, sinus tenderness.
- Chest examination:
  - Wheezing → asthma/COPD
  - Crackles → pneumonia, fibrosis, bronchiectasis
  - Dullness, absent breath sounds → pleural effusion
  - Coarse bubbling → bronchiectasis
- Cardiac exam: murmurs, gallop rhythm (heart failure).
- Abdominal exam: GERD signs, liver congestion.

Basic Investigations

A. **Laboratory Tests**

- CBC: leukocytosis (infection), eosinophilia (allergy, asthma).

- Sputum analysis:
  - Gram stain & culture → bacterial infections
  - AFB smear, culture, PCR → tuberculosis
  - Cytology → malignant cells

B. **Imaging**

- Chest X-ray (first-line): pneumonia, TB, cancer, bronchiectasis, heart failure.
- HRCT chest: interstitial lung disease, bronchiectasis, occult malignancy.
- Sinus X-ray/CT: chronic sinusitis, post-nasal drip.
- Barium swallow / Endoscopy: suspected GERD or aspiration.

C. **Pulmonary Function Tests**

- Spirometry: asthma, COPD (obstructive pattern).
- Methacholine challenge test: cough-variant asthma.

D. **Other Special Tests**

- Bronchoscopy: foreign body, endobronchial tumor, chronic unexplained cough.
- Allergy testing: suspected allergic rhinitis/asthma.
- 24-hr esophageal pH monitoring: GERD-related cough.
- Echocardiography: if heart failure suspected.[11]

➢ **Treatment of cough**

Pharmacological Treatment

A. **Productive (Wet) Cough**

Goal = facilitate clearance of secretions (NOT suppress).

- Expectorants (increase volume/expulsion of sputum):
  - Guaifenesin (common OTC).
- Mucolytics (reduce viscosity):
  - Bromhexine, Ambroxol.
  - N-acetylcysteine (NAC).
  - Dornase alfa (DNAse; used in cystic fibrosis).
- Hydrating agents**:** nebulized saline, mannitol, steam inhalation.
- Bronchodilators**:** (if bronchospasm present) salbutamol, terbutaline, theophylline.
- Antibiotics**:** only if bacterial infection is confirmed (pneumonia, pertussis, TB, bronchiectasis exacerbation).

B. **Non-productive (Dry) Cough**

Goal = suppress cough reflex if useless/irritating.

- Central antitussives (act on medullary cough center):
  - Opioids: Codeine, Pholcodine, Hydrocodone.
  - Non-opioids: Dextromethorphan (widely used OTC), Noscapine.
- Peripheral antitussives (reduce airway receptor sensitivity):
  - Benzonatate (anesthetizes stretch receptors).
  - Local anesthetics: Lidocaine (nebulized, severe cases).
  - Demulcents: Honey, glycerin, lozenges.[12]

Type of Cough	Goal	Main Treatment
		Expectorants (guaifenesin), Mucolytics

Productive	Aid secretion clearance	(ambroxol, NAC), Hydration, Antibiotics if infection
Non-productive	Suppress reflex	Antitussives (codeine, dextromethorphan), Benzonatate, Demulcents, Antihistamines
Asthma/COPD	Relieve bronchospasm/inflammation	Bronchodilators, Inhaled corticosteroids
GERD		
Post-nasal drip	Treat allergy/rhinitis	Antihistamines, nasal steroids
Heart failure	Reduce congestion	Diuretics, ACEI withdrawal if culprit
Drug-induced	Remove offending drug	Replace ACEI with ARB

Fig.6 : Treatment of cough

➢ **Medicinal plants is used as anti-tussive agent**

1. Definition

Medicinal plants are plants that contain bioactive compounds used for prevention, treatment, or cure of diseases.

They can be used in their raw form (leaves, roots, bark, seeds, flowers) or processed into herbal medicines, extracts, or pharmaceuticals**.**

2. Importance

- Primary source of medicine**:** WHO estimates ~80% of the world's population relies on herbal medicine for primary healthcare.
- Pharmaceutical foundation: Many modern drugs originated from plants (e.g., morphine from *Papaver somniferum*, quinine from *Cinchona*, aspirin from willow bark).
- Accessible & affordable: Widely available in rural/low-resource settings.
- Cultural significance: Integral to traditional systems (Ayurveda, Unani, Traditional Chinese Medicine, African herbal medicine).
- Research potential: Rich source of new drug discovery (antimicrobial, anticancer, anti-inflammatory agents).

3. Examples of Common Medicinal Plants

- Aloe vera – wound healing, burns, skin care.
- Turmeric (*Curcuma longa***)** – anti-inflammatory (curcumin).
- Neem **(***Azadirachta indica***)** – antimicrobial, skin diseases.
- Tulsi **(***Ocimum sanctum***)** – adaptogen, cough remedy.
- Ashwagandha **(***Withania somnifera***)** – stress relief, immunomodulatory.
- Ginger (*Zingiber officinale*) – antitussive, antiemetic, anti-inflamatory[13].

Medicinal Plants with Antitussive Activity

1. Glycyrrhiza glabra – Licorice / Mulethi
2. Adhatoda vasica – Malabar Nut / Vasaka
3. Piper longum – Long Pepper / Pippali
4. Zingiber officinale – Ginger / Adrak
5. Ocimum sanctum – Holy Basil / Tulsi
6. Althaea officinalis – Marshmallow root

7. Plantago lanceolata / Plantago major – Plantain
8. Hedera helix – Ivy leaf
9. Onion (*Allium cepa*) – bulb (traditional remedy)
10. Viola odorata – Sweet violet

1. Glycyrrhiza glabra – Licorice / Mulethi

Fig6:Glycyrhiza glabra

Botanical Information

- Family: Fabaceae (Leguminosae)
- Common names: Licorice (English), Mulethi (Hindi/Urdu), Yashtimadhu (Sanskrit)
- Part used: Roots and stolons (underground stems)
- Geographical distribution:
  - Native to Southern Europe, Mediterranean, and parts of Asia (India, China, Iran).
  - Cultivated worldwide for medicinal and flavoring uses.

Pharmacological Actions

- Antitussive: Forms a protective coating on the throat, suppressing irritation and cough reflex.
- Expectorant: Loosens mucus secretions.
- Anti-inflammatory: Reduces airway inflammation (glycyrrhizin inhibits prostaglandin and leukotriene synthesis).
- Demulcent: Soothes mucous membranes of respiratory and digestive tracts.
- Endocrine effect: Glycyrrhizin inhibits 11β-hydroxysteroid dehydrogenase → increases cortisol activity.[14]

Medicinal Uses

- Respiratory system:
  - Cough (dry & irritating)
  - Bronchitis, asthma
  - Sore throat, laryngitis
- Digestive system:
  - Peptic ulcers, gastritis, GERD (due to mucosal protection).[15]

2. Adhatoda vasica – Malabar Nut / Vasaka

Fig 7 : Adhatoda vasica – Malabar Nut / Vasaka Botanical Information

- Scientific name: *Adhatoda vasica* (syn. *Justicia adhatoda*)
- Family: Acanthaceae
- Common names**:**
  - Vasaka (Sanskrit)
  - Malabar Nut (English)
  - Adulsa (Marathi), Arusa (Hindi/Urdu), Adhatodai (Tamil)
- Parts used**:** Leaves (most important), flowers, roots.
- Distribution**:** Grows throughout the Indian subcontinent, Sri Lanka, Nepal, and Southeast Asia.

Pharmacological Actions

- Antitussive**:** Suppresses cough reflex.
- Expectorant**:** Enhances bronchial secretions, loosens thick sputum.
- Bronchodilator**:** Relaxes smooth muscles of bronchi → relieves wheezing.
- Mucolytic**:** Reduces viscosity of mucus.
- Anti-inflammatory**:** Reduces airway inflammation.
- Antimicrobial**:** Active against bacteria and some fungi.
- Oxytocic**:** Uterine stimulant effect (□ avoid in pregnancy).[15]

Medicinal Uses

- Respiratory system:
  - Chronic bronchitis
  - Bronchial asthma
  - Productive cough, chest congestion
  - Tuberculosis (as supportive therapy in Ayurveda)
  - Common cold, sore throat[16]

3. Piper longum – Long Pepper / Pippali

Fig 8: Piper longum – Long Pepper / Pippali

Botanical Information

- Scientific name: *Piper longum*
- Family: Piperaceae
- Common names:
  - Pippali (Sanskrit/Hindi)
  - Long Pepper (English)
  - Tippali (Tamil), Hippali (Kannada), Pipul (Bengali)
- Parts used: Fruits (dried catkins) and roots.
- Distribution: Found in India, Sri Lanka, Indonesia, Malaysia; cultivated in tropical regions.

Pharmacological Actions

- Antitussive: Reduces irritation in throat, suppresses cough reflex.
- Expectorant: Promotes expulsion of mucus.
- Bioavailability enhancer: Piperine increases absorption of many drugs (e.g., curcumin, rifampicin, phenytoin).
- Carminative: Improves digestion, reduces flatulence.
- Hepatoprotective: Protects liver cells.
- Immunomodulatory: Enhances body's resistance.
- Antimicrobial: Active against bacteria and fungi.
- Antipyretic & analgesic: Reduces fever and mild pain.[17]

Medicinal Uses

- Respiratory system:
  - Chronic cough, bronchitis, asthma.
  - Cold, sore throat, pharyngitis.
  - Tuberculosis (as an adjunct in traditional medicine).
- Digestive system:
  - Indigestion, flatulence, anorexia.
  - Worm infestations.[18]

4. Zingiber officinale – Ginger / Adrak

Fig 9: Zingiber officinale – Ginger / Adrak Botanical Information

- Scientific name: *Zingiber officinale* Roscoe
- Family: Zingiberaceae
- Common names:
  - Ginger (English)

- Adrak (Hindi/Urdu)
- Shunthi (Sanskrit, for dried ginger)
- Inji (Tamil), Allam (Telugu)
- Parts used: Rhizomes (fresh or dried).
- Distribution**:** Cultivated widely in India, China, Southeast Asia, Africa, and the Caribbean.

Pharmacological Actions

- Antitussive**:** Soothes throat, reduces cough reflex.
- Expectorant**:** Helps expel mucus in productive cough.
- Anti-inflammatory: Inhibits prostaglandins & leukotrienes (useful in asthma, sore throat, arthritis).
- Antiemetic**:** Effective against nausea, vomiting (esp. motion sickness, pregnancy).
- Carminative & digestive: Stimulates saliva, gastric secretions, relieves indigestion, bloating.
- Antioxidant & immunomodulatory: Strengthens immunity.
- Antimicrobial: Inhibits bacterial, viral, and fungal growth.
- Circulatory stimulant: Improves blood circulation, reduces cholesterol.[19]

Medicinal Uses

- Respiratory system:
- Cough (dry & productive), sore throat, cold, flu.
- Asthma and bronchitis (reduces airway inflammation).
- Digestive system:
- Indigestion, dyspepsia, flatulence.
- Nausea and vomiting (pregnancy, chemotherapy, motion sickness).[20]

5. Ocimum sanctum – Holy Basil / Tulsi

Fig 10: Ocimum sanctum – Holy Basil / Tulsi

Botanical Information

- Scientific name: *Ocimum sanctum* (syn. *Ocimum tenuiflorum*)
- Family: Lamiaceae (Mint family)
- Common names:
- Tulsi (Hindi/Sanskrit)
- Holy Basil (English)
- Surasa (Sanskrit), Tulasi (Telugu/Tamil), Trittavu (Malayalam)
- Parts used: Leaves, seeds, roots, whole plant.
- Distribution: Widely grown in India, Nepal, Southeast Asia, and other tropical regions.

Pharmacological Actions

- Antitussive: Suppresses cough reflex, soothes throat.
- Expectorant**:** Promotes clearance of mucus.
- Bronchodilator**:** Relaxes airway smooth muscles (useful in asthma/bronchitis).
- Anti-inflammatory: Inhibits prostaglandins & cytokines → reduces airway and systemic

inflammation.

- Antimicrobial**:** Active against bacteria, viruses, and fungi (useful in respiratory & GI infections).
- Immunomodulatory**:** Boosts body's defense mechanisms.
- Adaptogenic / Anti-stress: Helps reduce stress, improves mental clarity.
- Antipyretic**:** Reduces fever.
- Antioxidant**:** Protects cells from oxidative stress.[21]

Medicinal Uses

- Respiratory system:
  - Cough (dry & productive), cold, sore throat.
  - Bronchitis, asthma, sinusitis.
  - Influenza, other viral infections.[22]

6. Althaea officinalis **– Marshmallow root**

Fig 11: Althaea officinalis – Marshmallow root

Botanical Information

- Scientific name: *Althaea officinalis*
- Family: Malvaceae
- Common names**:** Marshmallow, Marshmallow root, White mallow
- Parts used: Root (most important), leaves, flowers
- Distribution: Native to Europe, Western Asia, North Africa; cultivated in temperate regions worldwide

Pharmacological Actions

- Demulcent: Forms a soothing film over mucous membranes → reduces throat irritation & cough reflex
- Antitussive: Especially effective in dry**,** irritating cough
- Expectorant**:** Loosens and clears mucus from airways
- Anti-inflammatory**:** Reduces irritation in throat, stomach, urinary tract
- Emollient**:** Soothes skin and wounds externally
- Mild immunomodulatory & antioxidant effects[23]

Medicinal Uses

- Respiratory system:
  - Dry cough, sore throat, bronchitis, pharyngitis, laryngitis

- Asthma (as soothing adjunct)
- Digestive system:
- Gastritis, peptic ulcers, heartburn (forms protective coating on gastric mucosa)
- Inflammatory bowel disease (IBD)
- Urinary tract:
- Cystitis, painful urination (soothing effect)
- Topical uses:
- Skin inflammations, burns, wounds, eczema[24]

7. Plantago lanceolata / Plantago major – Plantain

Fig 12: Plantago lanceolata / Plantago major – Plantain Botanical Information

- Scientific names:
- *Plantago lanceolata* L. (Ribwort Plantain / Narrowleaf Plantain)
- *Plantago major* L. (Greater Plantain / Broadleaf Plantain)
- Family**:** Plantaginaceae
- Common names: Ribwort, Narrowleaf plantain, Greater plantain, Broadleaf plantain
- Parts used**:** Leaves (most important), seeds, roots
- Distribution**:** Native to Europe and Asia; now naturalized worldwide (roadsides, meadows, grasslands).

Pharmacological Actions

- Antitussive & Demulcent**:** Soothes throat irritation, reduces cough reflex
- Expectorant**:** Promotes clearance of mucus
- Anti-inflammatory**:** Reduces airway and mucosal inflammation
- Antimicrobial**:** Active against bacteria and some viruses
- Astringent & wound healing**:** Speeds up healing of cuts, ulcers, insect bites
- Antioxidant & immunomodulatory effects[25]

Medicinal Uses

- Respiratory system:
- Dry & irritating cough, bronchitis, sore throat, laryngitis
- Pharyngitis, tonsillitis
- Digestive system:
- Gastritis, diarrhea (mild astringent action)
- Urinary system:
- Cystitis, mild diuretic effect

- Topical applications**:**
  - Wound healing, burns, insect bites, eczema, skin infections[26]

8. Hedera helix – Ivy leaf

Fig 13: Hedera helix – Ivy leaf

Botanical Information

- Scientific name: *Hedera helix* L.
- Family: Araliaceae
- Common names: Common ivy, English ivy, European ivy
- Parts used: Leaves (fresh or dried), sometimes stem extracts
- Distribution: Native to Europe, Asia, North Africa; widely grown as an ornamental climbing plant

Pharmacological Actions

- Expectorant**:** Stimulates mucus secretion & clearance from airways
- Mucolytic**:** Breaks down thick mucus → easier expectoration
- Bronchodilator**:** Relaxes smooth muscles of bronchi → reduces wheezing
- Antitussive**:** Relieves cough reflex
- Anti-inflammatory**:** Reduces airway inflammation
- Antimicrobial & antioxidant effects[27]

Medicinal Uses

- Respiratory system (main use):
  - Productive cough (especially with thick mucus)
  - Bronchitis, asthma, chronic obstructive pulmonary disease (COPD)
  - Sore throat, chest congestion Other uses (traditional):
- External use for rheumatic pain, skin inflammation
- Folk use for lice, scabies (not common in modern practice)[28]

9. Onion (*Allium cepa*) – bulb (traditional remedy)

Fig 14: Onion (*Allium cepa*) – bulb (traditional remedy) Botanical Information

- Scientific name: *Allium cepa* L.

- Family**:** Amaryllidaceae (earlier Liliaceae)
- Common names**:** Onion (English), Pyaz (Hindi/Urdu), Kanda (Marathi), Vengayam (Tamil)
- Part used**:** Bulb (fresh or juice), seeds, leaves
- Distribution: Cultivated worldwide; native to Central Asia and Middle East

Pharmacological Actions

- Antitussive (traditional): Onion juice + honey soothes throat, suppresses cough reflex
- Expectorant: Promotes clearance of mucus in chest congestion
- Antimicrobial: Effective against bacteria, fungi, some viruses
- Anti-inflammatory: Reduces throat and airway irritation
- Antioxidant: Scavenges free radicals, protects respiratory mucosa
- Cardiovascular protective: Lowers cholesterol, BP, platelet aggregation
- Hypoglycemic: Lowers blood sugar (useful in diabetes adjunct)[29]

Medicinal Uses

- Respiratory system:
  - Dry cough, sore throat, common cold
  - Productive cough, bronchitis, asthma (as traditional home remedy)
- Digestive system:
  - Improves appetite, aids digestion
  - Relieves intestinal worms (folk medicine)
  - Diabetes (adjunct hypoglycemic)
  - Topical: wound healing, insect bites, hair growth (folk uses)[30]
  -

10. Viola odorata – Sweet violet

Fig 15: **Viola odorata – Sweet violet**

Botanical Information

- Scientific name: *Viola odorata* L.
- Family: Violaceae
- Common names: Sweet violet, Garden violet, Banafsha (Unani), Gul Banafsha (Persian/Urdu)
- Parts used: Flowers (most used), leaves, roots
- Distribution**:** Native to Europe and Asia; cultivated in Mediterranean regions, India, and Western Asia

Pharmacological Actions

- Antitussive: Relieves dry, irritating cough

- Demulcent: Soothes inflamed throat and bronchial mucosa
- Expectorant: Aids in loosening phlegm in productive cough
- Anti-inflammatory**:** Reduces airway & systemic inflammation (salicylates)
- Antipyretic: Lowers fever
- Analgesic: Relieves headache, sore throat pain
- Mild sedative: Calming effect (used in stress, insomnia in Unani medicine)[31]

Medicinal Uses

- Respiratory system:
  - Cough (dry & spasmodic), bronchitis, whooping cough
  - Sore throat, pharyngitis, laryngitis
  - Feverish colds, influenza
- Other uses:
  - Headache, migraine (herbal infusions)
  - Mild insomnia, stress (calming tea)
  - Skin conditions (eczema, wounds — external use)
  - Laxative effect (roots in traditional medicine)[32]

Conclusion

Medicinal plants have played a vital role in the management of cough since ancient times and continue to be widely used due to their safety, affordability, and multi-target therapeutic actions. Plants such as *Glycyrrhiza glabra* (licorice), *Adhatoda vasica* (vasaka), *Zingiber officinale* (ginger), *Ocimum sanctum* (tulsi), *Althaea officinalis* (marshmallow root), *Plantago spp.*, *Hedera helix* (ivy leaf), *Viola odorata* (sweet violet), and others demonstrate antitussive, expectorant, bronchodilatory, anti-inflammatory, antimicrobial, and demulcent properties, making them effective for both productive and non-productive cough**.**

Scientific evidence supports their efficacy in soothing airway irritation, reducing mucus viscosity, suppressing the cough reflex, and relieving respiratory discomfort. While several herbal formulations are already in clinical use, the lack of standardization, variability in active phytochemicals, and limited large-scale clinical trials remain challenges.

In conclusion, medicinal plants represent a valuable and natural therapeutic option for cough management. With further research, standardization, and integration into modern medicine, they hold strong potential to complement or even substitute conventional antitussive therapies, particularly in resource-limited settings.

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