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Review Article

“HERBAL COUGH CANDIES: REVIEW ON POLYHERBAL FORMULATIONS FOR SAFE COUGH RELIEF”Amol R. Khandare¹, Miss. Priya M. Dandekar², Dr. Ashutosh Kumar Dash³¹Gawande College of Pharmacy, Sakharkherda, Tq. Sindakhed Raja, Dist. Buldana – 443202, Maharashtra, India²Assistant Professor, Department of Pharmaceutics Gawande College of Pharmacy, Sakharkherda, Tq. Sindakhed Raja, Dist. Buldana – 443202, Maharashtra, India³Principal & Professor, Department of Pharmacology Gawande College of Pharmacy, Sakharkherda, Tq. Sindakhed Raja, Dist. Buldana – 443202, Maharashtra, India**Abstract:**

Cough candies prepared from herbal ingredients offer a safe and natural way to relieve cough and throat irritation. This review focuses on medicinal plants like Tulsi, Vasaka, Liquorice, Ginger, and Clove that show strong antitussive and expectorant properties. These herbs soothe the throat, reduce inflammation, and help in clearing mucus naturally. Herbal cough candies are easy to use, pleasant in taste, and suitable for all age groups. The paper also highlights the formulation methods, active phytochemicals, and advantages of herbal cough candies over synthetic medicines.

Keywords: Herbal cough candy, Antitussive, Expectorant, Medicinal plants, Phytochemicals, Tulsi, Vasaka.

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INTRODUCTION:**Anatomy of the Respiratory System**

The human respiratory system plays a vital role in maintaining life by ensuring the exchange of oxygen and carbon dioxide. It is made up of the nose, pharynx, larynx, trachea, bronchi, bronchioles, and lungs. Air enters through the nose, where it is filtered, warmed, and moistened before passing through the pharynx and larynx into the trachea. The trachea then divides into two bronchi, which further branch into smaller bronchioles ending in the alveoli. The alveoli are small air sacs that serve as the main site of gas exchange where oxygen passes into the blood and carbon dioxide is expelled.[1] The inner lining of the respiratory tract is covered with cilia and mucus-producing glands which trap dust, smoke, and microorganisms. When this lining becomes irritated due to infection or pollutants, the body initiates a cough reflex to expel the irritants. Understanding this anatomy is important for developing effective herbal cough remedies, such as herbal candies, that act locally to soothe the throat and provide relief.[2]

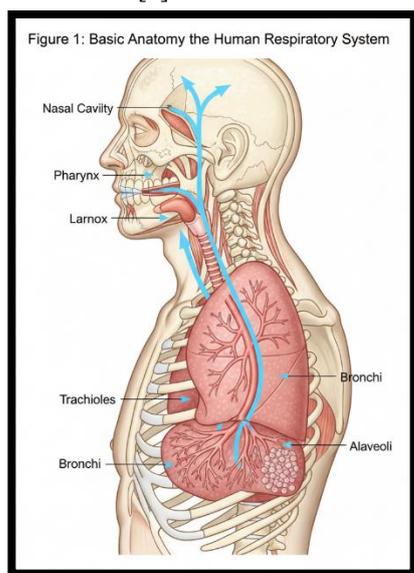


Figure 1: Basic Anatomy of the Human Respiratory System

Overview of Cough and Its Mechanism

Cough is one of the most common protective reflexes of the respiratory system. It helps to clear mucus, dust, and harmful substances from the airways. The cough reflex involves three main components: the cough receptors located in the mucosa of the larynx, trachea, and bronchi; the cough center located in the medulla oblongata of the brain; and the effector muscles of the respiratory system. When any irritant such as smoke, dust, or infection stimulates the receptors, sensory signals are transmitted to the brain through the vagus nerve. The brain then sends motor signals to the chest and

diaphragm muscles, causing a rapid expulsion of air that removes irritants.[3] Cough is generally classified into two types: productive cough, which expels mucus from the airways, and non-productive or dry cough, which does not produce mucus and is usually caused by throat irritation or inflammation. Both types can cause discomfort if they persist for long durations. Herbal cough candies are designed to act directly on the throat, soothing irritation and reducing the frequency of coughing.[4]

Need for Herbal Cough Candies

Cough is a very frequent health problem that affects people of all age groups, especially during seasonal changes or respiratory infections. Most of the commonly available cough remedies are in the form of syrups or tablets that may cause unwanted effects like drowsiness, constipation, or dependency. Herbal cough candies are an innovative and natural approach for relieving cough and throat irritation. They are small, sweet-tasting medicated lozenges made from herbal extracts and natural flavoring agents. When these candies are slowly dissolved in the mouth, the active ingredients coat the throat, providing a soothing and lubricating effect. These herbal candies are easy to carry, pleasant in taste, and suitable for children, adults, and elderly people. They are convenient to use anytime and anywhere without water and are also more stable compared to liquid syrups. The use of natural ingredients makes them safe and effective for long-term use without major side effects.[5]

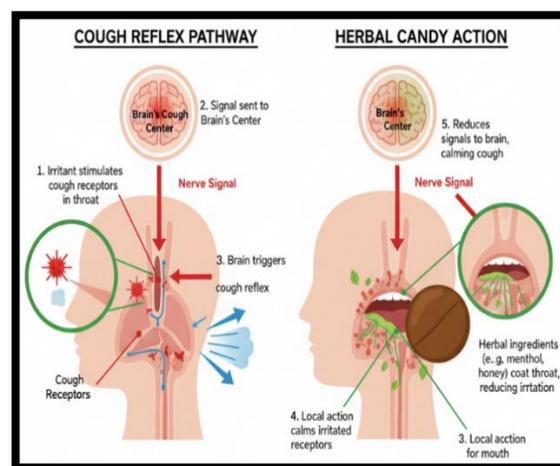


Figure 2: Basic Mechanism of Cough Reflex and Site of Action of Herbal Cough Candy

Advantages of Herbal Cough Candies
Herbal cough candies have many advantages compared to synthetic cough suppressants. They are made from natural plant extracts and are free from harmful chemicals, making them safe for long-term use. The candies act locally on the throat, providing quick soothing and cooling action, which reduces dryness and irritation. Since they are non-narcotic and non-sedative, they do not cause drowsiness or

dependency, making them suitable for use during work or travel. Herbal candies are also economical, easy to store, and do not require a spoon or dosage measurement like syrups.[6]

The combination of herbs like Tulsi, Vasaka, Liquorice, Ginger, and Clove offers multiple therapeutic benefits such as expectorant, bronchodilator, and anti-inflammatory actions. The slow dissolution of candy in the mouth ensures prolonged contact of herbal actives with the throat, resulting in better symptom relief. Additionally, the pleasant flavor of natural ingredients such as honey and menthol increases acceptability among children and adults alike.[7]

Disadvantages of Herbal Cough Candies

Although herbal cough candies are generally safe and effective, they also have a few limitations. One of the major challenges is maintaining uniformity and consistency in herbal extracts, as the quality of raw materials may vary due to seasonal or environmental factors. Another limitation is the stability of active constituents during manufacturing and storage, as heat or moisture can degrade certain herbal components. Many products available in the market are not standardized according to pharmacopoeial norms, which may result in variable potency.

Additionally, herbal candies containing sugar are not suitable for diabetic patients unless sugar substitutes are used. The absence of large-scale clinical trials also limits their scientific validation. Despite these limitations, herbal cough candies remain a safe and popular option for mild to moderate cough and throat irritation, especially in comparison to chemical-based formulations.[8]

MEDICINAL PLANTS USED IN HERBAL COUGH CANDIES

Medicinal plants have been used since ancient times in traditional systems of medicine such as Ayurveda, Siddha, and Unani to treat cough, cold, and respiratory infections. The increasing side effects and dependency associated with synthetic cough suppressants have encouraged the development of herbal-based alternatives such as herbal cough candies. These candies combine the therapeutic potential of medicinal plants with the convenience and palatability of confectionery dosage forms. The plants used in these formulations contain various bioactive compounds that possess antitussive, expectorant, bronchodilator, antioxidant, and anti-inflammatory properties. The selection of herbs for cough candies depends on their safety, availability, and proven effectiveness in soothing the throat and reducing cough.[9]

Phytochemical Basis of Medicinal Plants

The antitussive and expectorant properties of medicinal plants are mainly due to the presence of phytoconstituents such as alkaloids, glycosides, flavonoids, saponins, and essential oils. These natural compounds act synergistically to relieve cough by reducing inflammation, promoting mucus secretion, relaxing the airway muscles, and soothing the throat lining. For instance, vasicine from *Adhatoda vasica* acts as a bronchodilator, glycyrrhizin from *Glycyrrhiza glabra* has demulcent action, and eugenol from *Syzygium aromaticum* acts as a local anesthetic and antimicrobial agent. Such phytochemicals form the pharmacological backbone of herbal cough candy formulations.[10]

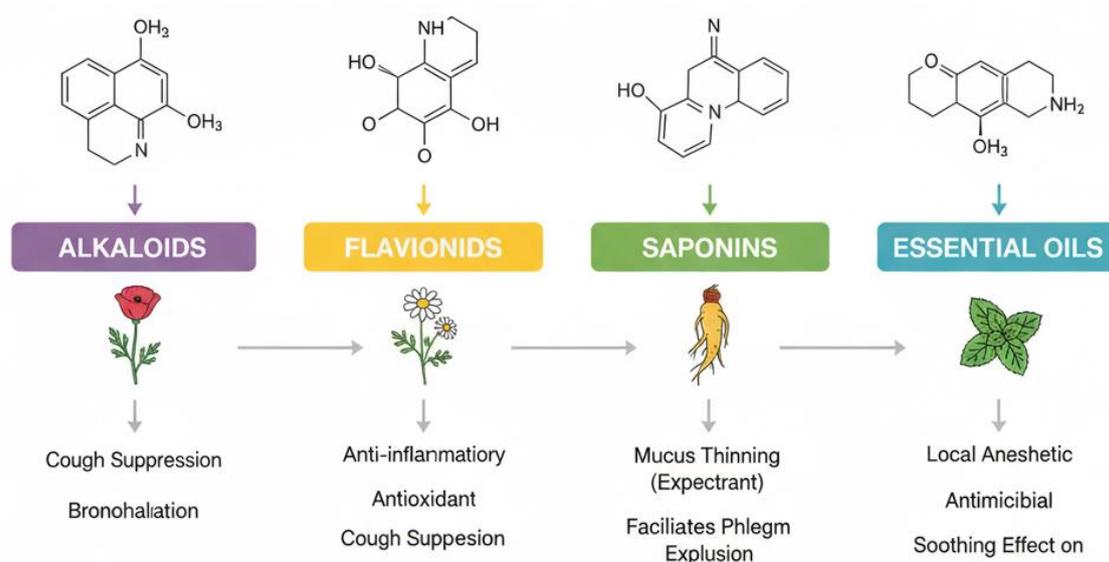


Figure 3: Major Phytochemical Groups Responsible for Antitussive and Expectorant Activity in Medicinal Plants

Adhatoda vasica (Vasaka)

Adhatoda vasica, commonly known as Vasaka or Malabar nut, is one of the most well-known medicinal plants used in respiratory therapy. It contains alkaloids such as vasicine and vasicinone, which exhibit strong bronchodilator and expectorant activities. These compounds help in dilating the bronchi, loosening thick mucus, and clearing the airways. Vasaka also possesses anti-inflammatory and antimicrobial properties, making it effective in treating bronchitis, asthma, and productive cough. In herbal cough candies, Vasaka extract provides soothing relief and helps reduce chest congestion naturally.[11]

Ocimum sanctum (Tulsi or Holy Basil)

Tulsi, also called Holy Basil, is a sacred plant in India known for its wide range of therapeutic effects. It contains essential oils like eugenol, camphene, and methyl eugenol that have anti-inflammatory, antimicrobial, and antioxidant properties. Tulsi acts as an effective antitussive and immunomodulatory agent. It helps in reducing throat irritation, improving mucus clearance, and enhancing the body's resistance against respiratory infections. The pleasant flavor and aroma of Tulsi make it an ideal ingredient for cough candies, providing both medicinal and sensory benefits.[12]

Glycyrrhiza glabra (Liquorice or Mulethi)

Liquorice is another key herb used in the formulation of herbal cough candies. The root contains the compound glycyrrhizin, which has demulcent and anti-inflammatory properties. It soothes the mucous membranes of the throat, reducing irritation and inflammation caused by constant coughing. Liquorice also acts as a mild expectorant and helps to thin mucus, making it easier to expel. Its naturally sweet taste improves the palatability of herbal candies, making them more acceptable to children and adults.[13]

Zingiber officinale (Ginger)

Ginger is one of the most widely used herbal ingredients for treating respiratory problems. It contains active compounds such as gingerols and shogaols, which show strong anti-inflammatory, antioxidant, and mucolytic actions. Ginger helps in

relaxing airway muscles, promoting mucus secretion, and reducing coughing. It also improves blood circulation in the respiratory tract, which aids in healing inflammation. Ginger's warm, spicy flavor provides a comforting effect and enhances the overall sensory appeal of cough candies.[14]

Syzygium aromaticum (Clove)

Clove is a common spice with significant medicinal value. It contains eugenol, an essential oil known for its antiseptic, anesthetic, and antitussive properties. Clove reduces throat pain and irritation while also acting as a mild disinfectant against bacterial and fungal infections. Its strong aroma and soothing action make it a suitable component in herbal cough candies. Additionally, clove enhances the flavor and shelf stability of the product due to its natural preservative properties.[15]

Mentha piperita (Peppermint)

Peppermint is rich in menthol, which provides a cooling and soothing effect on the throat. It acts as a mild local anesthetic that calms the irritated mucous membranes and reduces the urge to cough. Menthol also acts as a decongestant by relaxing the muscles of the respiratory tract and improving airflow. The refreshing taste and aroma of peppermint make it a key flavoring agent in cough candies, providing quick relief from throat dryness and discomfort.[16]

Piper longum (Long Pepper or Pippali)

Piper longum is traditionally used in Ayurveda for treating cough, cold, and asthma. It contains the alkaloid piperine, which enhances the bioavailability of other herbal constituents and acts as a mild expectorant. Long pepper stimulates the respiratory system, promotes mucus clearance, and reduces inflammation. It also acts as a synergistic agent when combined with other herbs like Vasaka and Tulsi, resulting in improved therapeutic outcomes in herbal cough candy formulations.[17]

Eucalyptus globulus (Nilgiri Oil)

Eucalyptus oil is obtained from the leaves of the Eucalyptus tree and is widely used for respiratory ailments. The major active compound, eucalyptol (1,8-cineole), acts as an expectorant, mucolytic, and decongestant. It helps in breaking down thick mucus and clearing nasal passages. The strong aroma of eucalyptus also gives a pleasant flavor to herbal cough candies and provides instant freshness. Its antibacterial and antiviral properties further enhance its usefulness in treating sore throat and cough.[18]

Table 1: Medicinal Plants Commonly Used in Herbal Cough Candies

Sr. No.	Botanical Name	Common Name	Major Phytoconstituents	Pharmacological Actions	Role in Cough Candy
1	Adhatoda vasica	Vasaka	Vasicine, Vasicinone	Bronchodilator, Expectorant	Clears mucus, relieves congestion
2	Ocimum sanctum	Tulsi	Eugenol, Camphene	Antitussive, Immunomodulator	Reduces throat irritation, improves immunity
3	Glycyrrhiza glabra	Liquorice	Glycyrrhizin	Demulcent, Anti-inflammatory	Soothes throat, reduces dryness
4	Zingiber officinale	Ginger	Gingerols, Shogaols	Expectorant, Anti-inflammatory	Promotes mucus clearance, improves flavor
5	Syzygium aromaticum	Clove	Eugenol	Antiseptic, Local anesthetic	Relieves pain, provides aroma
6	Mentha piperita	Peppermint	Menthol	Decongestant, Cooling agent	Soothes throat, provides freshness
7	Piper longum	Long Pepper	Piperine	Expectorant, Bioenhancer	Enhances absorption, clears mucus
8	Eucalyptus globulus	Eucalyptus	Eucalyptol	Antiseptic, Mucolytic	Clears nasal passages, relieves cough

Synergistic Role of Polyherbal Combination

The effectiveness of herbal cough candies is often due to the synergistic action of multiple herbs. The combination of different plant extracts provides a broader range of therapeutic effects. For example, Vasaka acts as a bronchodilator, Liquorice provides soothing relief, Tulsi boosts immunity, and Ginger promotes expectoration. Together, they help relieve both dry and productive cough. The concept of polyherbal formulation ensures that each ingredient supports the other, leading to enhanced efficacy and reduced chances of side effects.[19]

Safety and Acceptability

Medicinal plants used in herbal cough candies are generally safe and well-tolerated when used in recommended amounts. Since the ingredients are natural and consumed in small quantities, they rarely cause adverse effects. The pleasant taste and aroma of these herbal extracts make the candies highly acceptable to patients, especially children and elderly people. However, proper standardization, quality testing, and labeling are essential to ensure consistent quality and safety in every batch.[20]

FORMULATION AND EVALUATION ASPECTS OF HERBAL COUGH CANDIES

The formulation of herbal cough candies involves combining medicinal plant extracts with suitable excipients and base materials to produce a palatable, stable, and effective dosage form. The aim is to deliver natural antitussive and expectorant agents through a convenient, pleasant-tasting confectionery system that provides local relief to the throat and suppresses cough. Herbal candies act by slowly releasing herbal actives in the mouth, allowing direct contact with the throat and mucous membranes for soothing and healing action.[21]

Formulation Ingredients

The main ingredients of herbal cough candies include herbal extracts, sweeteners, flavoring agents, coloring agents, and bases such as sucrose or sugar substitutes. The choice of ingredients depends on the desired therapeutic and sensory qualities. Natural herbs like Tulsi, Vasaka, Liquorice, and Ginger serve as the active components, while honey, glucose syrup, or sorbitol is used as the base. Menthol, clove oil, and peppermint oil are added for their cooling and soothing effects. Coloring agents like caramel or herbal color enhance visual appeal.[22]

Table 1: Common Ingredients in Herbal Cough Candy Formulation[23,24,25]

Ingredient Type	Examples	Function
Active ingredients	Tulsi, Vasaka, Liquorice, Ginger extracts	Provide antitussive and expectorant action
Base	Sucrose, Sorbitol, Glucose syrup	Provides structure and sweetness
Sweetening agents	Honey, Stevia	Improves palatability
Flavoring agents	Menthol, Peppermint oil, Clove oil	Provides soothing and cooling effect
Coloring agents	Caramel, Herbal pigments	Enhances product appearance
Lubricants	Ghee or natural oil	Prevents sticking during molding

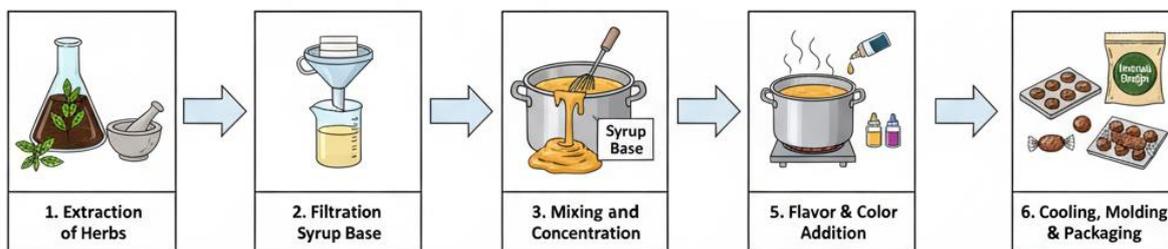


Figure 4: General Process Flow for Preparation of Herbal Cough Candies

Formulation Process

The process starts with the extraction of active ingredients from selected medicinal plants using water, alcohol, or hydroalcoholic solvents. The extracts are filtered and concentrated under reduced temperature to retain active phytochemicals. In a separate vessel, sugar or glucose syrup is heated to form a thick base. The concentrated herbal extract is then added to the syrup base with continuous stirring to ensure uniform distribution. Flavoring and coloring agents are added when the mixture cools slightly to prevent degradation. Finally, the mixture is poured into molds and allowed to set into solid candies.[26]

Evaluation Parameters

After formulation, the candies are evaluated for their physical and chemical properties to ensure quality, safety, and efficacy. Organoleptic evaluation includes checking color, taste, and aroma. Physicochemical parameters such as weight variation, hardness, and moisture content are measured to confirm consistency. The microbial load test ensures that the candies are free from harmful microorganisms. pH and stability tests are performed to assess storage quality. The release rate of herbal actives can also be evaluated in simulated saliva to study their effectiveness during sucking.

Advantages of Herbal Cough Candies

Herbal cough candies are simple to administer, pleasant in taste, and well-accepted by all age groups. They are portable, stable, and do not require dosing measurements like syrups. The candies provide localized throat relief and reduce irritation without causing sedation or dependency. They also offer a safer and natural alternative to synthetic cough suppressants.[27]

Challenges in Formulation

The major challenges in developing herbal cough candies include maintaining uniformity in herbal extracts, ensuring stability of heat-sensitive phytoconstituents, and preventing moisture absorption during storage. Standardization of herbal ingredients and maintaining consistency between batches are important for ensuring therapeutic effectiveness.[28]

PHARMACOLOGICAL AND MECHANISTIC INSIGHTS OF HERBAL COUGH CANDIES

The effectiveness of herbal cough candies depends on the pharmacological actions of the medicinal

plants and their active compounds. These actions include antitussive, expectorant, anti-inflammatory, antioxidant, antimicrobial, and soothing effects. The mechanism involves both central and peripheral pathways that help in reducing the cough reflex, clearing mucus, and relieving throat irritation. Herbal cough candies act locally on the throat and indirectly on the respiratory tract through the systemic absorption of phytochemicals.[29]

Central and Peripheral Mechanisms of Action

The cough reflex is controlled by the cough center located in the medulla oblongata. Some herbal constituents act centrally by calming the cough center and reducing the frequency of cough impulses. Others act peripherally by soothing the irritated mucous membranes of the throat and reducing inflammation. For example, glycyrrhizin from Licorice and eugenol from Clove act peripherally by coating the throat lining and reducing pain, while vasicine from Vasaka acts peripherally by promoting mucus clearance. The combined action of these components ensures both suppression of dry cough and clearance of phlegm in productive cough.

Antitussive and Expectorant Effects

Herbal cough candies contain active compounds that either suppress the cough reflex (antitussive effect) or facilitate the removal of mucus from the airways (expectorant effect). Tulsi, Vasaka, and Licorice primarily reduce the sensitivity of cough receptors and inflammation in the throat, thus minimizing irritation. Ginger and Peppermint help in loosening and thinning the mucus, making it easier to expel during coughing. Menthol from peppermint also provides a cooling and soothing sensation that gives quick symptomatic relief.[30]

Anti-Inflammatory and Antimicrobial Action

Most medicinal plants used in cough candies possess anti-inflammatory and antimicrobial properties. Gingerols from Ginger and eugenol from Clove reduce inflammation in the respiratory tract and prevent secondary bacterial infection. Tulsi and Eucalyptus exhibit antimicrobial activity that helps in eliminating infection-causing microorganisms. This combined action prevents further irritation and promotes faster healing of the mucous membranes.[31]

Antioxidant Activity

Oxidative stress plays a significant role in aggravating inflammation of the respiratory tract. Phytochemicals like flavonoids and phenolic compounds present in herbs such as Tulsi, Vasaka, and Liquorice exhibit strong antioxidant properties. They neutralize free radicals and protect the respiratory tissues from oxidative damage. Regular use of herbal cough candies can therefore help in maintaining healthy mucosal lining and improving overall respiratory function.

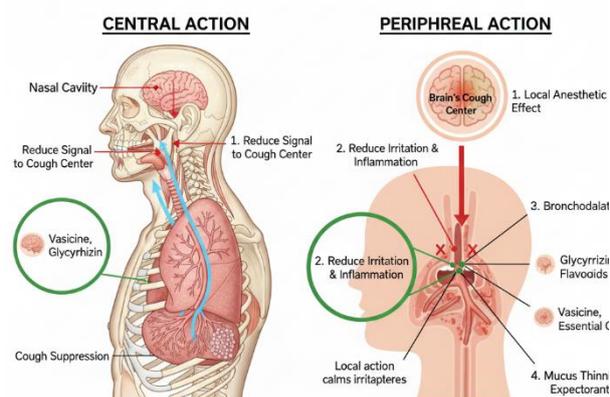


Figure 5: Mechanism of Action of Herbal Cough Candies

Pharmacokinetic Considerations

Although herbal cough candies mainly act locally, a portion of the active compounds may get absorbed through the oral mucosa and reach systemic circulation. This helps in providing prolonged relief even after the candy is dissolved. The slow dissolution ensures continuous release of herbal actives, maintaining therapeutic levels in the throat for an extended time. Piperine from Long Pepper may also enhance the bioavailability of other herbal constituents, making the overall formulation more effective.[32]

Safety Profile and Tolerability

Herbal cough candies are generally considered safe because they are made from natural plant extracts and essential oils. The doses of herbal actives used are mild and within safe limits for oral administration. Unlike synthetic cough syrups, they do not cause drowsiness, constipation, or dependency. However, proper standardization and quality control are essential to avoid contamination and ensure consistent potency.[33]

Herbal cough candies combine the benefits of traditional herbal medicine with modern formulation science. Their pharmacological effects include suppression of cough, mucus clearance, and throat soothing, achieved through both central and peripheral mechanisms. The combined action of bioactive compounds such as vasicine, glycyrrhizin, gingerols, menthol, and eugenol provides effective relief from cough and throat irritation. These candies

not only give symptomatic comfort but also promote healing and protection of respiratory tissues. With good safety and tolerability, herbal cough candies serve as a reliable, natural, and patient-friendly approach for managing cough and maintaining respiratory health.[34]

SUMMARY & CONCLUSION:

Herbal cough candies represent a natural and innovative approach for treating cough and throat irritation. They are prepared using medicinal plants such as Tulsi, Vasaka, Liquorice, Ginger, Clove, Peppermint, Long Pepper, and Eucalyptus, which possess strong antitussive, expectorant, and soothing actions. These candies act locally in the mouth and throat by coating the mucous membrane, reducing irritation, and loosening mucus. Their phytochemical components such as alkaloids, flavonoids, and essential oils provide multiple pharmacological effects like bronchodilation, anti-inflammatory, antimicrobial, and antioxidant activities. Unlike synthetic cough medicines, herbal candies are non-sedative, non-addictive, and well-tolerated by all age groups. They are easy to administer, pleasant in taste, and promote overall respiratory health. The combination of traditional herbal knowledge and modern confectionery technology has made herbal cough candies a convenient, safe, and effective dosage form for cough management.

The development of herbal cough candies is a step forward in merging natural medicine with modern pharmaceutical innovation. Medicinal plants like *Adhatoda vasica*, *Ocimum sanctum*, and *Glycyrrhiza glabra* play a major role in providing natural relief from cough through their antitussive and expectorant actions. These herbal actives act both centrally and peripherally to suppress cough and clear mucus while also soothing throat irritation. Herbal cough candies are an ideal alternative to syrups or tablets, especially for children and elderly patients. They ensure patient compliance through good taste, portability, and safety. However, proper standardization, quality control, and scientific validation through pharmacological and clinical studies are essential to ensure consistent efficacy. With growing global interest in herbal remedies, herbal cough candies have a strong potential for development into commercial, evidence-based natural therapies for respiratory health.

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