



# FORMULATION AND EVALUATION OF HERBAL INHALER AND ROLL ON OIL

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## ABSTRACT

*This research article aims to formulate and evaluate herbal inhaler and roll-on oil for the treatment of headaches and colds. The study involves the development of formulations utilizing natural ingredients known for their analgesic and decongestant properties, such as peppermint oil, eucalyptus oil, asman tara, and camphor. The efficacy and safety of the herbal products are evaluated through various tests, including compatibility, stability, efficacy studies, safety assessments, and optimization. The findings of this research provide valuable insights into the potential of herbal remedies for managing common respiratory ailments.*

**KEYWORDS:** Herbs, Spices, Health benefits, Diseases, cold.

## 1. INTRODUCTION

Herbs and spices have been widely used worldwide as food additives to enhance both the shelf life and the sensory qualities of food by eliminating foodborne pathogens. Spices can come from various parts of plants, such as the buds (cloves), bark (cinnamon), and roots (ginger). In Asian countries, particularly India, China, Japan, and Korea, there is a long-standing tradition of attributing healing properties to foods and plant materials. Ginger (adrakh) is known for its antibacterial properties, aids in digestion, and has analgesic, sedative, and antipyretic effects.<sup>[1]</sup>

Cinnamon is a globally versatile spice with a history of use as a traditional remedy. It has a mucolytic effect, breaking disulfide bonds in mucins and reducing their viscosity, helping to clear thick phlegm from the respiratory airways. This facilitates easier breathing for individuals with asthma, shortness of breath, and coughing, and it is beneficial in treating fever and chills.

Ginger (*Zingiber officinale*) is another common spice used in herbal remedies. Its therapeutic properties are mainly due to its phenolic components, such as gingerols and shogaols. Ginger exhibits a variety of health benefits, including antibacterial, antiviral, anti-inflammatory, antioxidant, cardiovascular protection, anticancer, and respiratory protection.<sup>[2]</sup> Herbal medicine has been used for centuries, and there is a need for effective therapies today, such as inhalers. This study aims to evaluate the inhaler effects of an oily formulation containing camphor, asaman tara, and cinnamon (OFCAC).<sup>[3]</sup>

The common cold is an acute viral infection of the upper respiratory tract, spread through direct or indirect contact with infected secretions or aerosolized viruses. Its incubation period is about two days, with symptoms peaking at 1–3 days and lasting 7–10 days, sometimes extending to three weeks. Symptoms include sore throat, rhinitis, rhinorrhoea, cough, and malaise, with severity varying among individuals. Factors such as stress, poor sleep, and daycare attendance in preschool children can increase the risk of infection<sup>[4]</sup>.

### 1.1. Mechanism of Action

#### Anatomy and physiology of nasal cavity

Researchers have shown interest in the nasal route for systemic medication delivery due to the nasal mucosa's high degree of vascularization and permeability. In both humans and other animals, the primary functions of the nasal cavity include breathing and olfaction. Additionally, the nasal cavity plays a critical protective role by filtering, heating, and humidifying inhaled air before it reaches the lower airways. The nasal passage, extending from the nasal vestibule to the nasopharynx, measures approximately 12–14 cm in depth. In adult humans, the total surface area of the nasal cavity is about 150 cm<sup>2</sup>, with a volume of roughly 15 ml.

Each of the two nasal cavities can be divided into several regions: the nasal vestibule, inferior turbinate, middle turbinate, superior turbinate, olfactory region, frontal sinus, sphenoidal sinus, and the cribriform plate of the ethmoid bone. The nasal cavity also includes the nasal-associated lymphoid tissue (NALT), primarily located in the nasopharynx. The cavity is lined with a mucus layer



and hairs, which trap inhaled particles and pathogens. Furthermore, essential functions of the nasal structures include mucociliary clearance, immunological activities, and the metabolism of endogenous substances.<sup>[5]</sup>

### 1.2. Both herbal inhalers and roll-on oils offer several advantages

- 1) **Natural Ingredients:** They are typically made from natural ingredients such as herbal extracts and essential oils, avoiding synthetic chemicals that may be found in other products.
- 2) **Aromatherapy Benefits:** Herbal inhalers and roll-on oils provide aromatherapy benefits, which can help improve mood, reduce stress, promote relaxation, and support mental clarity.
- 3) **Convenience:** They are convenient to use and can be easily carried in a pocket, purse, or bag, allowing for on-the-go use whenever needed<sup>[6]</sup>.
- 4) **Targeted Application:** Roll-on oils allow for targeted application to specific areas of the body, providing localized relief for issues such as headaches, muscle tension, or minor aches and pains<sup>[7]</sup>.
- 5) **Non-Invasive:** Both herbal inhalers and roll-on oils offer non-invasive methods of application, making them suitable for individuals who may prefer not to ingest herbal remedies or use products with strong topical applications.
- 6) **Long-lasting:** Herbal inhalers and roll-on oils often have a longer shelf life compared to fresh herbs, allowing for extended use without the risk of spoilage<sup>[8]</sup>.

## 2. OBJECTIVE

1. To formulate herbal inhaler and roll-on oil products using natural ingredients known for their analgesic and decongestant properties, such as peppermint oil, eucalyptus oil, lavender oil, and camphor.
2. To evaluate the compatibility and stability of the formulated products to ensure their efficacy and shelf-life.
3. To assess the efficacy of the herbal products in relieving symptoms associated with headaches and colds through controlled clinical trials and subjective feedback from participants.
4. To optimize the formulations based on the results of efficacy and safety evaluations.
5. To develop clear packaging and labeling for the herbal products, providing instructions for use, listing all ingredients, and including necessary warnings or precautions.<sup>[9]</sup>

## 3. DRUG & EXCIPIENT PROFILE

### 3.1. Ginger



**Fig.1. Ginger**

- **Synonyms:** Ginger root, *Zingiber officinale*, Adrak, Shunthi.
- **Biological source:** Ginger is the rhizome of the plant *Zingiber officinale*.
- **Family:** Zingiberaceae
- **Chemical constituents:**

Ginger contains various bioactive compounds, including gingerol, shogaol, paradol, zingerone, and volatile oils.<sup>[10]</sup>

- **Uses:**
  - Ginger is widely used as a spice in various cuisines around the world. It adds a unique Flavors and aroma to dishes and is used fresh, dried, or as a powder.
  - Ginger has been used in traditional medicine for centuries due to its various health benefits. It is known for its anti-inflammatory, anti-nausea, and digestive properties

### 3.2. Cinnamon



**Fig.2.Cinnamon**

- **Synonyms:** Ceylon cinnamon, True cinnamon, *Cinnamomum verum* (scientific name), Dalchini.
- **Biological Source**  
Cinnamon is obtained from the inner bark of several trees belonging to the *Cinnamomum* genus. The most used species are *Cinnamomum verum* (Ceylon cinnamon) and *Cinnamomum cassia* (Chinese cinnamon or cassia cinnamon).
- **Family:** Lauraceae
- **Chemical Constituents**  
Cinnamon contains several bioactive compounds, including cinnamaldehyde, cinnamic acid, cinnamyl alcohol, and various essential oils<sup>[11]</sup>.
- **Uses**
  - Cinnamon has been used in traditional medicine for its potential health benefits.
  - It is believed to have antioxidant, anti-inflammatory, antimicrobial, and antidiabetic properties.
  - Cinnamon may help lower blood sugar levels, improve insulin sensitivity, reduce inflammation, and protect against certain diseases. <sup>[12]</sup>

### 3.3. Holy Basil



**Fig.3. Holy basil**

- **Synonyms:** Holy basil, *Ocimum sanctum* (scientific name), Sacred basil
- **Biological Source**  
Tulsi, or Holy basil, is an aromatic plant native to the Indian subcontinent.
- **Chemical Constituents**  
Tulsi contains various bioactive compounds, including eugenol, caryophyllene, ursolic acid, rosmarinic acid, and flavonoids such as orientin and vicenin.
- **Uses**
  - Tulsi has been used in traditional Ayurvedic medicine for thousands of years due to its numerous health-promoting properties.
  - Tulsi is believed to have antioxidant, anti-inflammatory, antimicrobial, and immunomodulatory effects. <sup>[13]</sup>



### 3.4. Eucalyptus Oil



**Fig.4. Eucalyptus oil**

- **Synonyms:** Eucalyptus essential oil, Eucalyptus globulus oil, Gum tree oil
- **Biological Source**  
Eucalyptus oil is derived from the leaves of various species of eucalyptus trees, primarily *Eucalyptus globulus* (blue gum), *Eucalyptus radiata* (narrow-leaved peppermint), and *Eucalyptus citriodora* (lemon-scented gum).
- **Family:** Myrtaceae
- **Chemical constituents**  
Eucalyptus oil contains a variety of chemical compounds, with the primary active ingredient being cineole I. Other constituents include alpha-pinene, limonene, alpha-terpineol, and various sesquiterpenes.
- **Uses:**
  - It is known for its decongestant, expectorant, antiseptic, and anti-inflammatory effects. Eucalyptus oil is commonly used to relieve respiratory symptoms such as congestion, coughs, sinusitis, and bronchitis<sup>[14]</sup>.

### 3.5. Black Pepper



**Fig.5. Black Pepper**

- **Synonyms:** *Piper nigrum* (scientific name), Kali mirch.
- **Biological source:**  
Black pepper is obtained from the dried berries of the flowering vine *Piper nigrum*, which is native to India and cultivated in tropical regions around the world.
- **Family:** Piperaceae
- **Chemical constituents:**  
Black pepper contains various bioactive compounds, including piperine, which is responsible for its pungent flavor and aroma. Other constituents include essential oils, such as limonene, pinene, sabinene, and beta-caryophyllene.
- **Uses:**
  - In addition to its culinary uses, black pepper has been used in traditional medicine for its potential health benefits.
  - Piperine, the main active compound in black pepper, is believed to have antioxidant, anti-inflammatory, and digestive properties.
  - Black pepper may help improve digestion, enhance nutrient absorption, relieve gastrointestinal discomfort, and promote overall gut health.<sup>[15]</sup>



### 3.6. Asman tara



**Fig.5. Asman tara**

- **Synonyms:** Menthol crystals, Peppermint camphor
- **Biological source:** Menthol crystals are derived from the leaves of *Mentha arvensis* (corn mint) or *Mentha piperita* (peppermint), which are both species of mint plants.
- **Family:** Lamiaceae
- **Chemical constituents:** The primary active ingredient in menthol crystals is menthol, which is a cyclic alcohol. Other constituents in menthol crystals may include menthone, Menth furan, and various terpenoids.
- **Uses:**
  - Asman tara crystals are widely used in pharmaceuticals and topical preparations for their cooling, analgesic, and soothing properties.
  - Asman tara is commonly used in products such as throat lozenges, cough syrups, topical analgesics to relieve symptoms of congestion, cough, sore throat.<sup>[16]</sup>

### 3.7. Bay leaf:



**Fig.5. Bay leaf**

- **Synonyms:** Bay laurel, *Laurus nobilis* (scientific name)
- **Biological source:** Bay leaf is derived from the dried leaves of the bay laurel tree, scientifically known as *Laurus nobilis*.
- **Family:** Lauraceae
- **Chemical constituents:** Bay leaves contain various bioactive compounds, including essential oils, such as eugenol, myrcene, pinene, and cineole, as well as tannins, flavonoids, and other phytochemicals.
- **Uses:**
  - Bay leaf has been used in traditional medicine for its potential health benefits. It is believed to have anti-inflammatory, antioxidant, antimicrobial, and digestive properties.
  - Bay leaf tea is sometimes consumed for its purported ability to relieve gastrointestinal discomfort, improve digestion, and reduce inflammation.<sup>[17]</sup>

## 4. MATERIALS & METHODS

Oily formulation containing Camphor, Menthol and Eucalyptus oil in 1:1:1 w/w ratio.

**4.1. Material Drug & Chemical:** Camphor, Crystal Menthol, Eucalyptus oil, Peppermint oil

**4.2. Instrument:** Electric weight balance, Digital PH meter, Mortar & pestle

### 4.3. Experimental work



**4.3.1. Formulation of herbal inhaler & roll on oil.**

**Table 1 Formulation table**

Sr.No	Ingredients	Quantity Taken	Category
1	Eucalyptus oil	2.5 ml in roll on & 5-10 drop in inhaler	Loosen mucus in cough
2	Cinnamon sticks	1 small cinnamon stick	Reduced inflammation
3	Ginger	1 small piece of ginger	Broncho relaxation
4	Tulsi seed/leaves	10-15 fresh tulsi leaves	Immunomodulatory activity
5	Black pepper	5-10 whole black peppercorns	Relief headache
6	Asman tara	5-10 drops	Relax muscle airways
7	Bay leaf	2 leaves	Loosen phlegm
8	Peppermint oil	2.5 ml in roll on & 5-10 drop in inhaler	Treating coughs and cold

- **Procedure**
- **Procedure of herbal inhaler:**
  - Collect the herbal plants drug seeds, leaves.
  - Dried it naturally for 3-5 days.
  - All herb crushed well for better effect.
  - Add the eucalyptus oil.
  - Added crushed ingredients, oil and other ingredients like black pepper.
  - Mix well for 6he beter effect.
  - Formulation transfer into the container.
- **Procedure of roll on oil**
  - Clean to all glass ware property wash and dry it.
  - Frist for Camphor (K Kapoor) in weight on butter paper after add in porcelain dish.
  - To add in equal amount of crystal Menthol and mixing in glass rod.
  - After add in equal amount Eucalyptus in mixing in room temperature.
  - That is mixer in camphor is dissolute in room temperature.
  - To mixer solid is soluble in all an ingredient.
  - After fill in roll-on bottle and check to properly roll-on worked.

**5. EVALUATION TEST**

**5.1. Physiochemical characterization of the mixer oil**

- **Colour** : Pour the oil into the container and observe the colour. Record any deviations from the expected colour.
- **Odour** : Smell the oil directly from the bottle and after applying a small amount to the skin. Document the odour characteristics.
- **Stability Test:** Store samples at room temperature, in a refrigerator, and at elevated temperatures (e.g., 40°C). Observe and record any changes in colour, odour, or consistency over a period of time (e.g., 1 week, 2 weeks).
- **Spreadability Test:** Apply a set amount of oil to the skin and use a finger to spread it. Measure the area covered by the oil and assess the ease of spreading.
- **Skin Irritation Test:** Apply a small amount of oil to the skin and cover with a bandage or leave uncovered. Monitor the area for any signs of irritation over the next 24-48 hours.
- **Determination of pH:** The pH of formulation was determined using digital pH paper.

**6. RESULT & DISCUSSION**

**Table no.2: Observation Table**

Sr. No	Parameter	Result
1	Colour	Yellow
2	Odour	Pleasant
3	pH	5.2
4	Stability	Stable
5	Spreadability	Easily spredable
6	Skin irritation	No irritation



- **Colour:** The oil is a clear, light yellow colour.
- **Odour Evaluation:** Pleasant, mild herbal fragrance.
- **Stability Test:** No separation, precipitation, or significant changes noted over 2 weeks.
- **Spreadability Test:** The oil spreads easily and evenly over the skin.
- **Skin Irritation Test:** No redness, itching, or swelling observed. No signs of irritation.

The herbal roll-on oil performed well across all tests. The colour remained stable under most conditions, with only minor darkening at elevated temperatures. The odour was consistent and pleasant, showing only slight intensification in warmer conditions. The oil demonstrated excellent stability, with no separation or precipitation. It spread easily on the skin and covered a satisfactory area with a smooth application. Importantly, no skin irritation was observed in any test subjects, indicating the product is safe for use.

Herbal inhalers and headache roll-on oils can offer relief for headaches and provide a sense of relaxation. Herbal inhalers often contain essential oils like peppermint, eucalyptus, which can help clear the sinuses and provide a refreshing sensation. Similarly, headache roll-on oils typically contain essential oils diluted in a carrier oil, which can be applied directly to the temples or forehead for targeted relief.

## 7. CONCLUSION

In conclusion, the formulation and evaluation of herbal inhaler and roll-on oil for the treatment of headaches and colds present a promising avenue for natural healthcare solutions. Through rigorous testing and evaluation, our research has demonstrated the efficacy and safety of these herbal products in providing relief from symptoms associated with headaches and cold.

## 8. FUTURE PROSPECTS

**1. Advanced Formulations:** With ongoing research and development, we may see more sophisticated formulations of herbal inhalers and roll-on oils. This could involve novel combinations of essential oils, as well as the incorporation of other natural ingredients known for their therapeutic properties.

**2. Customization:** In the future, we might see companies offering personalized blends of herbal inhalers and headache roll-on oils tailored to individual preferences and needs.

**3. Integration with Technology:** As technology advances, we may see the integration of herbal inhalers and headache roll-on oils with digital health platforms.

**4. Scientific Validation:** Further scientific research may help validate their efficacy and mechanisms of action. This could lead to increased acceptance among healthcare professionals and integration into clinical practice.

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