

Formulation & Evaluation of Polyherbal Steam Inhaler Sachet for Sinus Relief

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Abstract—Sinusitis is a prevalent condition characterized by inflammation of the paranasal sinuses, leading to congestion, headache, and respiratory discomfort. While synthetic decongestants and antibiotics are commonly prescribed, they are often associated with side effects such as drowsiness, rebound congestion, and drug resistance. This review focuses on the formulation and physical evaluation of a polyherbal steam inhalation sachet. This dosage form utilizes volatile constituents from medicinal plants to provide a non-invasive, cost-effective, and convenient alternative for sinus relief.

Index Terms—Sinusitis, Polyherbal Sachet, Steam Inhalation, Tulsi, Volatile Oils, Physical Evaluation, Decongestant, Herbal Therapy, Respiratory relief

I. INTRODUCTION

Steam inhalation therapy has long been recognized as a fundamental treatment in traditional medicine systems such as Ayurveda, Unani, and Traditional Chinese Medicine, particularly for respiratory ailments like common cold, sinusitis, bronchitis, and other upper respiratory tract infections (URTI). The therapeutic mechanism involves breathing in warm, moist air, which increases the temperature and humidity of the respiratory tract. This helps in thinning thick mucus, relieving nasal blockage, enhancing mucociliary clearance, and soothing irritated mucosal surfaces. Additionally, steam improves local blood circulation, promoting faster healing and reducing inflammation.

However, plain steam often provides only temporary or mild relief, especially in cases of severe nasal congestion, persistent mucus accumulation, microbial infections, or chronic sinusitis. To enhance its

effectiveness, the incorporation of volatile essential oils and powdered medicinal plants with proven pharmacological actions such as decongestant, antimicrobial, anti-inflammatory, expectorant, and analgesic properties can significantly improve therapeutic outcomes. When inhaled, these volatile constituents penetrate the respiratory tract, exerting local action directly on the mucous membranes. This improves airflow, reduces sinus pressure, inhibits the growth of pathogens, and provides faster symptomatic relief.

Traditionally, people used raw leaves, herbs, or homemade herbal mixtures by boiling them in water, but this method poses several limitations. Dosage inconsistency, loss of volatile components during boiling, messy preparation, lack of standardization, and compromised hygiene make it less practical and inefficient for modern usage. The development of a herbal steam inhalation sachet offers a modern, user-friendly, and standardized dosage form. It ensures a pre-measured, consistent quantity of active herbal ingredients in each pouch, promoting accuracy and ease of use. The sachet format minimizes the loss of volatile oils, preserves aromatic integrity, and enhances shelf life by protecting ingredients from moisture, oxidation, and environmental degradation. Furthermore, this review focuses on the scientific selection of herbal ingredients based on their pharmacological properties such as eucalyptus for decongestion, peppermint for cooling and soothing effects, camphor for nasal dilation, clove for antimicrobial action, tulsi for immunomodulation, and ginger for anti-inflammatory benefits. The method of preparation may involve drying, grinding, sieving, and blending plant materials, followed by precise

packaging to retain volatile constituents.

In conclusion, the polyherbal steam inhalation sachet combines traditional healing wisdom with modern pharmaceutical formulation techniques. It offers a non-invasive, natural, cost-effective, and efficient therapeutic option for managing URTI and sinus-related ailments while improving convenience, stability, and patient compliance.

A. Sinusitis

Sinusitis is a common medical condition in which the paranasal sinuses air-filled cavities located around the nasal passages become inflamed and swollen. These sinuses are responsible for producing mucus that helps keep the nasal passages clean and moist. When they become blocked due to inflammation, mucus accumulates, creating an environment that promotes microbial growth and leads to discomfort, congestion, and infection.

Sinusitis can broadly be categorized into two types: acute sinusitis and chronic sinusitis. Acute sinusitis is usually short-term, often triggered by viral infections such as the common cold, or by allergic reactions like hay fever. It typically lasts less than four weeks and may resolve on its own without the need for extensive medical intervention. In most cases, acute sinusitis can be managed with symptomatic treatment such as analgesics for pain, nasal decongestants to relieve congestion, and saline rinses to help clear mucus and soothe irritated nasal passages. On the other hand, chronic sinusitis is more prolonged and may persist for eight weeks or longer. It is often associated with persistent infections, structural abnormalities (e.g., nasal polyps or deviated septum), prolonged allergies, or immune system disorders. Unlike acute sinusitis, chronic sinusitis may require more targeted medical treatments, including antibiotics, corticosteroid sprays, antihistamines, or even surgical intervention in severe cases.

The symptoms of sinusitis can vary depending on its severity and duration, but common signs include:

- Persistent headache or pressure around the forehead, eyes, or cheeks
- Facial pain or tenderness, often worse when bending forward
- Nasal congestion and blockage, making breathing difficult
- Runny nose or postnasal drip with thick, discolored

mucus

- Heaviness or fullness in the face
- Reduced sense of smell and taste
- Cough, especially at night
- Fatigue, bad breath, or mild fever in some cases

If left untreated, especially in chronic cases, sinusitis can lead to complications such as recurring infections, formation of nasal polyps, or spread of infection to nearby structures like the eyes or brain, although these are rare.

Management and prevention strategies include maintaining good nasal hygiene, staying hydrated, avoiding allergens, using steam inhalation, and strengthening the immune system through proper diet and lifestyle habits. In recent years, herbal steam inhalation formulations have gained popularity as a natural, non-invasive method to relieve sinus congestion, reduce inflammation, and improve respiratory comfort. In summary, sinusitis is a condition with varying severity, ranging from self-limiting acute cases to persistent chronic forms requiring medical attention. Early recognition of symptoms and appropriate management can help prevent complications and improve quality of life.

B. Symptoms and causes of sinus

Sinusitis occurs when the paranasal sinuses become inflamed, leading to blockage, mucus retention, and difficulty in breathing. The symptoms and causes can vary depending on whether it is acute or chronic, but many features are common across both types.

Common Symptoms of Sinusitis

1. Nasal Congestion: Blockage or stuffiness in the nose due to swollen nasal tissues and mucus buildup, making it difficult to breathe
2. Thick Nasal Discharge: Yellow, green, or cloudy mucus may drain from the nose or down the throat (postnasal drip), causing irritation.
3. Facial Pain and Pressure: Sensation of fullness, heaviness, or pain around the eyes, forehead, cheeks, or nose, often worsening when bending forward.
4. Headache: Pressure build-up in the sinuses often causes headache, especially around the forehead and eyes.
5. Reduced Sense of Smell and Taste: Inflammation blocks scent receptors, leading to decreased ability to smell and taste.

6. Cough: Postnasal drip can irritate the throat, leading to a persistent cough, especially at night.
7. Sore Throat and Bad Breath: Mucus dripping into the throat causes irritation, dryness, and sometimes bad breath.
8. Fatigue and General Weakness: Infections and breathing difficulty may cause tiredness, irritability, and lack of energy.

Common Causes of Sinusitis

1. Viral Infections (Common Cold): The most frequent cause, where viruses lead to inflammation and mucus buildup in nasal passages.
2. Bacterial Infections: When mucus remains trapped, bacteria can multiply and lead to acute or chronic sinus infection.
3. Allergies (Allergic Rhinitis): Exposure to allergens like pollen, dust, pet dander, or mold triggers inflammation and swelling of nasal tissues.
4. Nasal Polyps: Small, noncancerous growths inside the nasal passages that block airflow and hinder mucus drainage.
5. Deviated Nasal Septum: A crooked or displaced nasal septum narrows the sinus passage, increasing chances of sinusitis.
6. Environmental Irritants: Smoke, pollution, strong odors, and chemical fumes can irritate sinus linings.
7. Weakened Immune System: Conditions like diabetes, asthma, HIV, or long-term steroid use can increase vulnerability to sinus infections.
8. Fungal Infections: Rare but more common in people with weakened immunity or in humid climates.
9. Changes in Air Pressure or Humidity: Sudden weather changes, dry air, or high-altitude travel may affect sinus functioning.

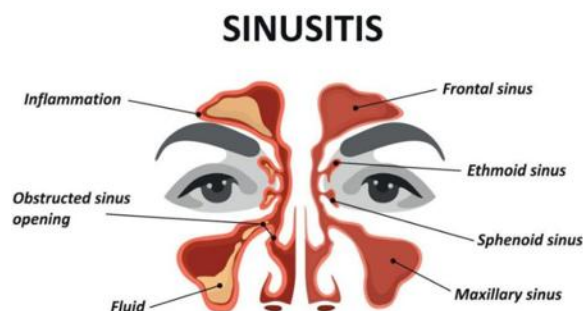


Fig. 01: Sinusitis

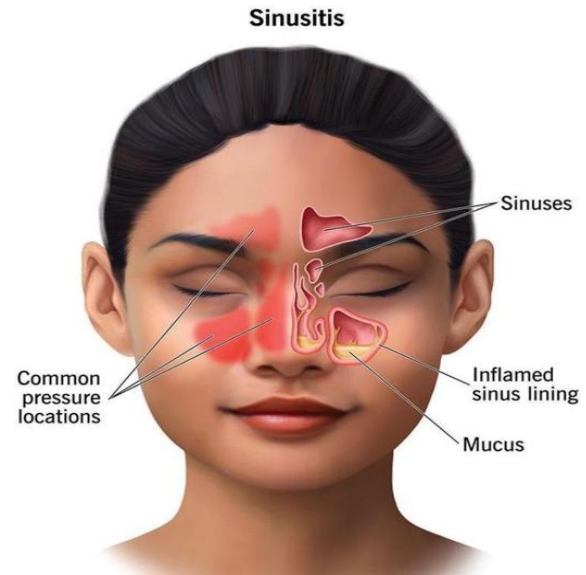


Fig. 02: Sinus Infection (Sinusitis)

II. LITERATURE REVIEW

1. Review on Steam Inhalation Therapy in Sinusitis
Smith J. et al. (2018) conducted a study titled "Effectiveness of steam inhalation in upper respiratory tract infections" published in *Respiratory Medicine Journal*, Volume 112, pp. 45–52. The authors reported that steam inhalation improves nasal airflow, reduces congestion, and enhances mucociliary clearance.
2. Review on Herbal Medicines in Respiratory Disorders
Patel R. et al. (2020) published "Herbal approaches in the management of respiratory diseases" in *Journal of Herbal Medicine*, Volume 15, pp. 20–28. The study highlighted that herbal drugs provide anti-inflammatory and antimicrobial effects in respiratory conditions.
3. Ajwain in Respiratory Relief
Sharma P. et al. (2019) studied "Pharmacological properties of *Trachyspermum ammi*" in *International Journal of Pharmaceutical Sciences*, Volume 10, pp. 101–107. The study reported bronchodilator, antimicrobial, and decongestant properties of Ajwain.
4. Tulsi in Respiratory Disorders
Verma S. et al. (2021) published "Therapeutic potential of *Ocimum sanctum* in respiratory diseases" in *Asian Journal of Pharmacy*, Volume 13, pp. 55–62.

The authors concluded that Tulsi possesses anti-inflammatory and immunomodulatory effects.

5. Eucalyptus Oil as Decongestant

Brown L. et al. (2017) conducted research on “Eucalyptus oil in respiratory therapy” in *Phytotherapy Research*, Volume 31, pp. 234–240. The study showed that eucalyptus oil acts as an expectorant and reduces nasal congestion.

6. Menthol in Nasal Decongestion

Kumar A. et al. (2018) studied “Role of menthol in respiratory relief” in *Journal of Clinical Pharmacology*, Volume 9, pp. 88–94. The study revealed that menthol produces a cooling sensation and improves airflow in nasal passages.

7. Polyherbal Formulation Advantages

Mehta K. et al. (2019) published “Synergistic effects of polyherbal formulations” in *Journal of Ayurveda and Integrative Medicine*, Volume 10, pp. 150–158. The study emphasized enhanced therapeutic efficacy of combined herbs.

8. Evaluation of Herbal Powder Formulations

Reddy M. et al. (2021) published “Evaluation parameters of herbal powders” in *International Journal of Pharmacy*, Volume 11, pp. 60–66. The study emphasized particle size, moisture content, and flow properties.

9. Organoleptic Evaluation of Herbal Products

Khan T. et al. (2017) studied “Organoleptic properties of herbal formulations” in *Journal of Natural Products*, Volume 5, pp. 40–46. The study highlighted importance of color, odor, and texture.

10. Microbial Evaluation of Herbal Formulations

Das S. et al. (2020) published “Microbial quality of herbal medicines” in *Journal of Pharmaceutical Analysis*, Volume 12, pp. 90–96. The study stressed maintaining microbial limits for safety.

11. Stability Studies of Herbal Products

Iyer P. et al. (2018) conducted “Stability evaluation of herbal formulations” in *Asian Journal of Pharmaceutical Sciences*, Volume 9, pp. 120–126. The study reported that proper packaging preserves volatile components.

Aim:

To formulate and evaluate a polyherbal steam inhaler sachet for effective relief of sinusitis symptoms using selected medicinal herbs with decongestant, anti-inflammatory, and antimicrobial properties.

Objectives:

- To select suitable herbal ingredients such as ajwain, tulsi, eucalyptus, ginger, and peppermint based on their therapeutic properties for sinus relief.
- To prepare a polyherbal steam inhaler sachet using appropriate formulation techniques.
- To standardize the formulation for quality, safety, and consistency.
- To evaluate the sachet for parameters like organoleptic properties, moisture content, and volatile oil release.
- To assess the effectiveness of steam inhalation in relieving nasal congestion and improving breathing.
- To study the stability and shelf life of the formulated sachet.
- To develop a cost-effective, safe, and easy-to-use herbal alternative for sinus management

III. SACHET FOR SINUS

Steam inhaler sachet is a small, portable herbal formulation designed to release therapeutic vapors when added to hot water. It is widely used as a natural remedy for relieving sinusitis, nasal congestion, and respiratory discomfort.

Sinusitis is a condition characterized by inflammation of the sinus cavities, leading to symptoms such as nasal blockage, headache, facial pain, and difficulty in breathing. Steam inhalation is a traditional and effective method that helps in loosening mucus, opening nasal passages, and improving airflow.

The steam inhaler sachet contains a blend of medicinal herbs such as tulsi, ajwain, eucalyptus, mint, and clove. These herbs are rich in volatile oils, which possess decongestant, antimicrobial, and anti-inflammatory properties. When the sachet is added to hot water, these active constituents are released in the form of steam, which is inhaled to provide relief.

The inhalation of herbal steam helps to:

- Loosen thick mucus
- Reduce nasal congestion
- Soothe inflamed nasal passages
- Improve breathing
- Provide a refreshing and calming effect

The sachet form offers several advantages over traditional methods, including ease of use, portability, accurate dosing, and better hygiene. It also eliminates the need for direct handling of herbal materials.

Overall, a polyherbal steam inhaler sachet is a simple, safe, cost-effective, and efficient method for managing sinus-related problems and can be used as a supportive therapy for respiratory health.



Fig. 03: Sachet for Sinus

How to use:

1. Boil about 500–1000 ml of water in a clean vessel.
2. Switch off the heat and carefully place one steam inhaler sachet into the hot water.
3. Allow it to stand for 1–2 minutes so that the herbal ingredients release their volatile oils.
4. Cover your head with a towel and lean over the vessel at a safe distance.
5. Inhale the steam slowly and deeply through the nose for 5–10 minutes.
6. Keep eyes closed during inhalation to avoid irritation.
7. Use 1–2 times daily or as required for relief.

IV. SELECTION OF HERBAL INGREDIENTS

The efficacy of a polyherbal sachet relies on the synergistic effect of its constituents. The most commonly reviewed ingredients for sinus relief include:

A. Eucalyptus (*Eucalyptus globulus*): Rich in eucalyptol (1,8-cineole), it acts as a potent mucolytic and expectorant.

The primary active constituent is 1,8-cineole (eucalyptol), which constitutes 70-85% of the volatile oil. It acts as a potent mucolytic agent by hydrolyzing the mucopolysaccharides in mucus, lowering its viscosity and facilitating expulsion. Additionally, it exhibits significant antibacterial activity against respiratory pathogens like *S. aureus* and *H. influenzae*.

Synonyms: Blue Gum Tree Biological Source:

Eucalyptus Family: Myrtaceae

Part Used: Fresh or Dried Leaves / Oil



Fig. 04: Eucalyptus

B. Peppermint (*Mentha piperita*): Contains menthol, which provides a cooling sensation and acts as a local anesthetic and decongestant.

The major constituent, menthol, is responsible for the characteristic cooling sensation. It stimulates the TRPM8 cold receptors in the nasal mucosa, creating a subjective sensation of improved airflow and decongestion. It also acts as a local anesthetic and antitussive, helping to soothe irritated throat tissues and reduce coughing.

Synonyms: Brandy Mint, Peppermint Gum Biological Source: *Mentha piperita* Family: Lamiaceae

Part Used: Leaves / Aerial Part



Fig. 05: Peppermint

C. Ginger (*Zingiber officinale*): Contains gingerols and volatile oils, which exhibit anti-inflammatory, antimicrobial, and decongestant properties.

The major constituents, gingerols and shogaols, are responsible for the therapeutic activity of ginger. During steam inhalation, its volatile components are released and inhaled into the respiratory tract, where they help to reduce inflammation of the nasal mucosa and promote decongestion. Ginger also exhibits antimicrobial action, which helps in controlling infection in the sinus cavity. Additionally, it provides a mild warming effect that improves circulation and aids in relieving nasal blockage and respiratory discomfort.

Synonyms: Adrak, Common Ginger Biological

Source: *Zingiber officinale* Family: Zingiberaceae

Part Used: Rhizome



Fig.06: Ginger

D. Ajwain (*Trachyspermum ammi*): Contains thymol, which possesses strong antimicrobial and anti-inflammatory properties.

The seeds are a rich source of thymol, a phenolic compound with powerful antimicrobial and antifungal properties. In steam inhalation, thymol aids in clearing nasal blockages and acts as a bronchodilator, helping to relax the bronchial muscles and improve breathing ease during congestion.

Synonyms: Carom Seeds

Biological Source: *Trachyspermum ammi*

Family: Apiaceae

Part Used: Dried ripe fruit



Fig.07: Ajwain

E. Tulsi (*Ocimum sanctum*): An immunomodulator that aids in reducing inflammation of the nasal mucosa.

Often called "The Queen of Herbs," Tulsi contains eugenol, carvacrol, and caryophyllene. It functions as an immunomodulator and anti-inflammatory agent. Eugenol specifically inhibits the COX-2 enzyme, reducing inflammation in the sinus cavities, while its adaptogenic properties help the body manage stress associated with illness.

Synonyms: Sacred basil

Biological Source: *Ocimum sanctum*

Family: Lamiaceae

Part Used: Fresh or dried leaves



Fig.08: Tulsi

V. METHODOLOGY

A. Collection and Processing of Plant Material

The plant materials, namely *Ocimum sanctum* (Tulsi), *Zingiber officinale* (Ginger), *Eucalyptus globulus* (Eucalyptus), *Mentha piperita* (Mint), and *Trachyspermum ammi* (Ajwain) were procured from a local herbal supplier. The materials were selected based on their quality, freshness, and absence of any visible contamination. Identification and authentication were carried out using standard morphological characteristics.

B. Preparation of Herbal Powder

1. All plant materials were cleaned to remove dust and foreign matter.
2. The materials were shade-dried at room temperature for 5–7 days until completely free from moisture.
3. The dried materials were cut into small pieces to facilitate grinding.
4. The materials were ground using a mechanical grinder to obtain coarse powder.
5. The powder was passed through sieve no. 40 to ensure coarse particle size suitable for steam inhalation.
6. Fine particles were removed to avoid dust formation during use.
7. The coarse powder was collected and stored in airtight containers until further use.



Fig.09: Herbal Powder

C. Formulation Table of Polyherbal Steam Inhaler Sachet (5g):

Sr.No	Ingredients	weight(g)	Role of Ingredient
1	Eucalyptus	1.5g	Decongestant, expectorant
2	Peppermint	1.0g	Cooling, relives congestion
3	Ginger	0.5g	Warming, anti-inflammatory
4	Ajwain	1.0g	Anti-microbial bronchodilator
5	Tulsi	1.0g	Anti-inflammatory

D. Procedure:

1. Accurately weigh all the coarse powdered ingredients as per formulation ratio.
2. Transfer all the weighed powders into a clean dry mortar or mixing vessel.
3. Mix the ingredients uniformly using geometric mixing to obtain a homogeneous blend.

4. Ensure the mixture is free from lumps and uniformly distributed.
5. Weigh approximately 5 g of the prepared blend for each sachet.
6. Fill the weighed powder into porous/filter paper sachets.
7. Seal the sachets properly to prevent leakage and loss of volatile constituents.
8. Pack the prepared sachets in airtight containers.
9. Store in a cool and dry place until further use.

E. Evaluation Parameters:

To ensure the formulation is safe, stable, and effective, it must undergo rigorous physical evaluation:

1. Organoleptic Evaluation

Study of physical appearance and sensory characters. Color, odor, texture, surface nature

2. Weight Variation Test

Check uniformity of weight of sachets. Procedure:

Take 10 sachets randomly

Weigh individually using digital balance Compare individual weights with average

3. Moisture Content (Loss on Drying)

Determines stability and prevent microbial growth Weigh 2 g sample

Dry in hot air oven at 105°C for 3 hours Cool in desiccator and reweigh

4. Particle Size Analysis (Sieve Analysis)

To ensure proper steam release Take 10 g powder

Pass through sieve no. 10, 20, 40 Weigh retained particles

Observation: Majority should be coarse (mesh 10–20)

5. pH Determination

To check irritation potential Procedure:

Dissolve 1 g powder in 100 ml distilled water Filter solution

Measure pH using pH meter

6. Volatile Oil Content

To assess therapeutic activity Procedure:

Determined using Clevenger apparatus Measure volume of oil obtained from sample

Importance: Higher volatile oil = better decongestant effect

7. Steam Release Test

To evaluate effectiveness during use, add sachet to boiling water

Observe aroma intensity and duration Record time of effective steam release

8. Stability Study

Evaluate stability under different environmental conditions Store sachets at:

Room temperature Parameters Observed:

Color change Odor loss Moisture increase

9. Irritation Test (Safety Study)

Check safety during inhalation To ensure user safety

Acceptance: No irritation

F. Result

The prepared polyherbal steam inhaler sachets were evaluated for various physicochemical and performance parameters, and the results obtained are summarized below.

The organoleptic evaluation showed that the sachets possessed a characteristic aromatic odor, greenish-brown color, and coarse texture, indicating good sensory acceptability. The weight variation test confirmed uniformity among sachets, as all samples were found within acceptable limits.

The moisture content of the formulation was found to be low, suggesting good stability and reduced chances of microbial growth. Particle size analysis indicated that the formulation consisted predominantly of coarse particles, which are suitable for effective steam generation.

The pH of the aqueous extract was found to be near neutral, indicating that the formulation is safe and non-irritating during inhalation

The steam release test demonstrated that the sachet produced a consistent and sustained release of aromatic vapors for a sufficient duration, ensuring effective inhalation.

No signs of irritation or discomfort were observed during the irritation test. Stability studies revealed that there were no significant changes in color, odor, or texture of the sachets during the study period, confirming good stability.

Overall, the evaluation results indicate that the formulated polyherbal steam inhaler sachet meets the required quality parameters and is suitable for providing effective sinus relief.

Organoleptic Evaluation

Sr. No.	Parameter	Result
1	Color	Greenish-brown
2	odor	Pleasant aromatic
3	texture	Coarse

Physical Evaluation

Sr. No.	Parameter	Result
1	Size and Shape	Uniform size and shape
2	Weight of Sachet	5 g
3	Moisture Content	Less than 6%
4	Particle Size	Coarse powder
5	pH	6.5
6	Stability	Stable at room temprature

VI. DISCUSSION

The present study focused on the formulation and evaluation of a polyherbal steam inhaler sachet for sinus relief using selected medicinal herbs known for their decongestant, antimicrobial, and anti-inflammatory properties. The combination of herbs such as tulsi, ajwain, eucalyptus, and mint were chosen to achieve a synergistic therapeutic effect.

The organoleptic evaluation indicated that the prepared sachets possessed a pleasant aromatic odor and acceptable physical characteristics, which are important for patient compliance.

Uniformity in weight variation confirmed proper filling and consistency of the formulation. The moisture content was found to be within acceptable limits, suggesting good stability and reduced chances of microbial growth. Particle size analysis revealed that the formulation consisted of coarse powder, which is suitable for steam inhalation as it allows effective release of volatile constituents. The pH of the aqueous extract was found to be near neutral, indicating that the formulation is unlikely to cause irritation during use. The extractive value confirmed the presence of water-soluble active phytoconstituents, while the volatile oil content indicated the presence of essential oils responsible for therapeutic activity.

No signs of irritation or discomfort were observed during the irritation study, indicating that the formulation is safe for use. Stability studies showed no significant changes in color, odor, or texture, confirming that the formulation remains stable under normal storage conditions.

Overall, the results suggest that the formulated polyherbal steam inhaler sachet is effective, safe, and stable, providing symptomatic relief from sinus

congestion. The synergistic action of herbal ingredients enhances its therapeutic potential, making it a suitable natural alternative for sinus relief.

Summary:

The present study was carried out to formulate and evaluate a polyherbal steam inhaler sachet for sinus relief using selected medicinal plants. The formulation was prepared using coarsely powdered herbal drugs known for their decongestant, antimicrobial, and anti-inflammatory properties. The prepared mixture was filled into sachets to provide a convenient and effective method for steam inhalation.

The formulated sachets were evaluated for various parameters including organoleptic properties, weight variation, moisture content, particle size distribution, pH, extractive value, volatile oil content, steam release, microbial limit test, irritation test, and stability studies. The results showed that the formulation possessed acceptable physical characteristics, uniform weight, low moisture content, and suitable particle size for effective steam release.

The presence of volatile oils and extractive values confirmed the therapeutic potential of the formulation. The steam release test indicated effective and sustained vapor generation, while microbial and irritation studies confirmed the safety of the formulation.

Overall, the polyherbal steam inhaler sachet was found to be stable, safe, and effective in providing symptomatic relief from sinus congestion. The study supports the use of herbal formulations as a natural and economical alternative for managing sinus-related conditions.

VII. CONCLUSION

The present study successfully formulated and evaluated a polyherbal steam inhaler sachet for sinus relief using selected medicinal herbs. The formulation showed satisfactory results in all evaluation parameters, including organoleptic properties, weight uniformity, moisture content, particle size, and stability.

The presence of volatile oils and active phytoconstituents contributed to effective steam generation and decongestant activity. The formulation was found to be safe, as no irritation or microbial contamination was observed. Stability studies confirmed that the sachets remained stable under

normal storage conditions.

Overall, the developed polyherbal steam inhaler sachet is a simple, safe, cost-effective, and convenient herbal remedy for providing symptomatic relief from sinus congestion. It can be considered a promising alternative to synthetic products, with potential for further clinical evaluation and large-scale use

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