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REVIEW ON FORMULATION AND EVAULATION OFPOLY HERBAL NASAL SPRAY

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Abstract
Herbal nasal sprays-aqueous or oil-based intranasal formulations containing plant, extracts-are increasingly investigated as complementary therapies for upper respiratory symptoms, rhinitis, and as antiseptic/decongestant agents. This review summarizes pharmacological activities of Tulasi (Lamiaceae) Neem (Azadirachta indica), Ginger(Zingiber aceae) and Turmeric (Zingiber aceae) (relevant to intranasal use, describes common formulation choices (vehicles, preservatives such as sodium benzoate) standard quality/evaluation tests, reported advantages and disadvantages, regulatory and safety considerations, and gaps for future research. Key evidence includes in-vitro and in-vivo studies demonstrating antimicrobial, anti-inflammatory, and antioxidant properties of these herbs, plus nasally-focused preclinical and small clinical formulations showing feasibility of intranasal delivery.

Keywords: Herbal nasal sprays, formulations, upper respiratory symptoms.

Introduction

The nasal route is attractive for local treatment of upper airway inflammation and infection because it delivers actives directly to mucosa, has rapid onset, and avoids first pass metabolism [1-8]. Herbal preparations-often distilled waters, extracts, or oil emulsions are used traditionally and are now formulated as sprays for convenience and dosing control [9]. Recent small formulation and stability studies show growing academic interest in Tulsi-based distillates and mixed herbal sprays. [10]

Respiratory Diseases

Respiratory diseases are illnesses that affect the lungs, airways [11], and breathing system. They can be caused by infections, allergies, smoking, pollution, or chronic conditions [12]. These diseases make it difficult for a person to breathe normally. Common Cold, Influenza (Flu), Asthma, Pneumonia, Bronchitis, Chronic Obstructive Pulmonary Disease (COPD), Tuberculosis (TB), Allergic Rhinitis, COVID-19[11].

Causes of Respiratory Disease

- Infections (viruses, bacteria)
- Air pollution,
- Smoking, Allergens (dust, pollen, mites),
- Genetic factors, occupational exposure (chemicals dust)

Symptoms

- Cough, breathlessness, chest tightness, wheezing,
- Fever, mucus, phlegm, sneezing or runny nose [11]

Table 01: Rationale for the Selected Herbs for Nasal Spray

Common name	Scientific name	Family	Main action	Rational for nasal spray	Major active compounds
Tulasi	Lamiace ae	***Ocimu m tenuiflorum* (*Ocimu m sanctu m*)**	Anti-inflammatory antimicrobial, antioxident.	Helps relieve nasal inflamm ation, reduce mild infection, support easier breathin g	Eugenol, rosmarinic acid, ursolic acid [2,14]
Ginger	Zingiber aceae	***Zingibe r officina le***	Anti-inflammatory, anti- oxident, anti allergic.	Helps reduce swelling of nasal passage and support infection control	Gingerols, shogaols. [3,15]
Turmeric	Zingiber aceae	***Curcu ma longa***	Potent anti-inflammatory and antioxidants.	Reduce nasal irritation and inflamm atory; supports	Curcumin.[4,16]
Neem	Azadirachta indica	***meliaceae***	Antibacterial, antiviral ,anti fungal	Helps lower microbial loading nasal passage supports natural antisepti c effect	Azadirachtin, nimbidin, quercetin. [5,17]
Sodium bonzoate	Nil	Nil	Antimicrobial preservative (controls bacteria,yeast,molds)	Prevents contamin ation in liquid in nasal spray increase shelf life	Nil [6]

Formulation of Herbal Nasal Spray

1. Wash all the herbs cleanly.
2. Dry cleaned Neem and Tulasi leaves under shadow for 6-7 days and blend them into fine powder
3. Chop ginger
4. Take equal proportions of Tulasi, neem, ginger and Turmeric powder (1:1:1:1) or desired ratio and mix all ingredients
5. Boil all the ingredients in the distilled water (1:10)
6. Heat at 60°-70°C for 1 hour
7. Filter through Whatman no.1 filter paper
8. Add sodium benzoate (0.1%) and mix thoroughly using magnetic stirrer for uniformity.
9. Adjust pH to 5.5 -6.5. and adjust the final volume with purified water.
10. Filter sterile solution using a 0.22µm membrane filter. [7,18]
11. Take the sterile spray bottle and fill it with the prepared formulation. [6]

Evaluation Parameter

1.Appearance

The colour and opacity of the nasal spray is observed to determine its physical appearance. [19]

2.Physical evaluation

The basic physical properties of spray are checked by simple visual examination like colour, odour, texture, state (liquid, non-sticky) [19]

3.Irritancy test

The nasal spray was applied on the left dorsal side surface of 1sq.cm and observed in equal intervals up to 24hr for irritancy, redness, edema. [20]

4.Homogeneity

The test was done by physical touch or rubbing between fingers or near the nose area. A good spray should feel smooth, evenly mixed, and free from lumps. [19]

5. Determination of pH

By using a buffer solution, the pH meter was calibrated. [19]

6. Extrudability Test:

This test checks how easily the spray comes out of the pump [22].

7. Solubility Test

Tulasi distillate, derived from the Tulasi herb, is slightly water soluble and viscous when used in nasal formulations it can be formulated into an intranasal delivery system [2]

8. Stability Study

Stability studies were performed on all the formulations by maintaining room temperature and store it in a cool, dry place away from direct sunlight. These studies typically stability parameters like sterelity,visual appearance and potential changes in the formulation properties. [23]

Medicinal Uses

Tulsi (Ocimum sanctum Linn.) is traditionally used in the management of various types of fever. During the rainy season, when infections such as dengue and malaria are more prevalent, decoctions prepared from Tulsi leaves are commonly consumed to help reduce fever. Tulsi is a key ingredient in many Ayurvedic cough formulations due to its ability to loosen mucus and ease expectoration in respiratory conditions. It is effective in relieving cough and chest congestion. For sore throat, boiled Tulsi leaf extract is used for drinking or as a gargle to reduce throat irritation. Tulsi is beneficial in respiratory disorders such as asthma and bronchitis by improving breathing and reducing inflammation. A decoction of Tulsi leaves combined with ginger and honey is widely used as a home remedy for colds and respiratory infections. The plant also shows beneficial effects in influenza by providing symptomatic relief. External application of Tulsi juice helps in the treatment of fungal infections and other skin disorders. Tulsi is also known to enhance immune function by supporting the body's natural defense mechanisms against microbial infections. [25-28]

Conclusion

Herbal nasal sprays prepared using natural ingredients such as Tulasi, Neem, Ginger, Turmeric and a safe preservative Sodium benzoate offer a promising, effective, and safer alternative to synthetic nasal sprays. These herbal ingredients possess strong anti-inflammatory, antimicrobial, antioxidant, and decongestant properties, which help reduce nasal congestion, sinus inflammation, infections, and allergic symptoms. The formulation is generally safe, non-irritant, and well-tolerated, making it suitable for long-term use compared to synthetic sprays that may cause rebound congestion. Herbal nasal sprays also support holistic healing and enhance mucosal immunity. Herbal nasal sprays represent a cost-effective, natural therapeutic option for managing common nasal problems such as rhinitis, sinusitis, and mild respiratory infections. However, further clinical studies, stability testing, and standardization are required to ensure consistent efficacy, safety, and quality of the herbal formulation.[23]

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Conflict of interest

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Informed Consent and Ethical Statement

Not Applicable

Author contributions

All Authors Are Contributed Equally

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