

Research Article

GREEN FORMULATION STRATEGIES FOR TOPICAL ANTI-INFLAMMATORY SPRAY USING *OCIMUM BASILICUM* EXTRACT

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ABSTRACT

Ocimum basilicum (sweet basil) is a medicinal plant widely recognized for its anti-inflammatory, analgesic, and antimicrobial properties due to the presence of phytoconstituents such as flavonoids, phenolics, and essential oils. The present study aims to formulate, prepare, and evaluate a herbal anti-inflammatory spray using *Ocimum basilicum* extract for topical application. The herbal extract was obtained by suitable extraction techniques using a hydroalcoholic solvent. The anti-inflammatory spray was prepared by incorporating the *Ocimum basilicum* extract into a spray formulation containing appropriate solvents, stabilizers, penetration enhancers, and preservatives to ensure uniform drug delivery and stability. The prepared formulation was evaluated for physical appearance, pH, viscosity, spray pattern, spreadability, content uniformity, skin irritation, microbial growth, leakage, and stability studies according to standard evaluation guidelines. The results demonstrated that the formulated spray possessed acceptable physicochemical properties, uniform spray characteristics, good spreadability, and was non-irritant to the skin. The study concludes that the herbal anti-inflammatory spray containing *Ocimum basilicum* extract is a safe, effective, and patient-friendly topical dosage form for the management of inflammatory conditions.

Keywords: *Ocimum basilicum*, Evaluation parameters, Herbal formulations. Flavonoids, Phenolics.

INTRODUCTION

Inflammation is a protective response of the body, but excessive inflammation can lead to pain and tissue damage. Herbal formulations are increasingly preferred due to their safety and minimal side effects. *Ocimum basilicum* (sweet basil) is a medicinal plant known for its anti-inflammatory, antioxidant, and antimicrobial properties, attributed to the presence of flavonoids, phenolic compounds, and essential oils. An anti-inflammatory spray formulated using *Ocimum basilicum* extract offers the advantages of easy application, rapid onset of action, uniform drug distribution, and improved patient compliance. The spray formulation is designed for topical use to provide localized relief from inflammation while reducing systemic exposure. The formulated spray is evaluated for physicochemical parameters such as pH, viscosity, spray pattern, spreadability, stability, and skin irritation to ensure its safety, effectiveness, and quality. Thus, *Ocimum basilicum*-based anti-inflammatory spray represents a promising herbal alternative for topical inflammatory condition.

(Pattanayak P *et al.*, 2010). A spray is dynamic collection of drops dispersed in gas. The process of forming a spray is known as atomization. A spray nozzle is the device used to generate a spray. The two main uses of sprays are to distribute material over a cross-section and to generate liquid surface area. There are thousands of applications in which sprays allow material to be used most efficiently. Spray atomization can be formed by several methods. The most common method is through a spray nozzle which typically has a fluid passage that is acted upon by different mechanical forces that atomize the liquid. In pharmaceutical industry a spray is a liquid kept under pressure in a can or other container, which you can force out in very small drops. Sprays are preparations of drugs in media which may be aqueous, alcoholic or glycerin. They are applied to the mucous membrane of nose and throat. An extract that has been dissolved in alcohol and water is known as nebulizer which removes large droplets by a baffling system. Traditionally, sprays were made from plant and animal substances and prepared in the form of waters, oils, powders and alcohol. Techniques involved in

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spray extraction from plant include solvent extraction, maceration, distillation and enfleurage method. These methods to a certain extent distort the odor of aromatic compounds that are obtained from the raw materials. Important things in relation to spray making There are three key ingredients you will need to produce a spray. Essential oil - these have been extracted from various plants (organic or inorganic) and when combined give the smell of spray you are trying to produce. (Verma S *et al.*,2008)



Figure 1. Extraction

MATERIALS AND METHODS

The required quantity of *Ocimum basilicum* extract was taken in a clean beaker. Required amount of alcohol was added beaker. The *Ocimum basilicum* was completely dissolved in alcohol. The required quantity of amla, dugdhika, has taken in beaker. All ingredients were dissolved in sufficient quantity of alcohol individually. All dissolved ingredients from different beakers were mixed in common beaker. 6.5ml of turpentine oil was added in beaker as per formula. (Allen LV *et al.*,2012).



Figure 2. Formulation

Experimental work

Table 1. Formulation of spray (50ml).

S. No	Materials	Quantity	Function
1.	Extract of <i>Ocimum basilicum</i>	10ml	Anti-inflammatory
2.	Amla	10ml	Strong anti-oxidant
3.	Dugdhika	10ml	Inhibit inflammatory mediators
4.	Liquid paraffin	3.5ml	Emollient
5.	Glycerin	3ml	Humectant
6.	Turpentine oil	6.5ml	Analgesic
7.	Alcohol	QS	Vehicle

Evaluation tests of formulation

It is very essential to maintain a uniform standard for Herbal Anti-inflammatory spray, keeping the view in mind the formulated halitosis spray was evaluated on the parameters such as organoleptic characteristics (colour, odour, taste). Specificity, viscosity, pH, spreadability, skin irritancy, microbial growth, leakage test, stability studies etc. Evaluation tests are carried out to ensure the quality, safety, efficacy and stability of the Anti-inflammatory spray.

Organoleptic characteristics

It involves visual inspection, to evaluate the physical appearance and uniformity of Anti-inflammatory spray and to ensure its stable acceptable and free from defects.

Specificity

It is the ability of the test to correctly identify those without the disease from all individuals free from the disease.

Viscosity

Viscosity can be defined measurement of a liquid resistance to flow. It improves patient acceptability and performance, and to maintain uniform spray pattern and droplet size.

p^H

The p^H of formulated Herbal Anti-inflammatory spray was determined by using PH meter. It determines ensure the drug remains chemically stable and does not degrade

during storage, it ensures skin compatibility and prevent irritation.

Spreadability

It ensures uniform distribution of the drug on the skin, It maintains consistent therapeutic effect. It ensures patient comfort.

Skin irritancy

The skin irritancy test is performed to evaluate whether the Anti-inflammatory spray causes irritation, redness, itching or edema on the skin after application. To assess the safety of the Anti-inflammatory spray for topical use.

Microbial growth

The microbial growth test is performed to determine the presence and extent of microbial contamination in an Anti-

inflammatory spray. This test ensures microbiologically safe for topical application.

Leakage test

The leakage test is carried out to determine whether the container-closure systems of the Anti-inflammatory spray is leak-proof during storage and use.

Stability studies

Stability studies are carried out to determine how the quality of an Anti-inflammatory spray changes with time under the influence of temperature, humidity and light. (Patel RP *et al.*,2011)

RESULTS AND DISCUSSION

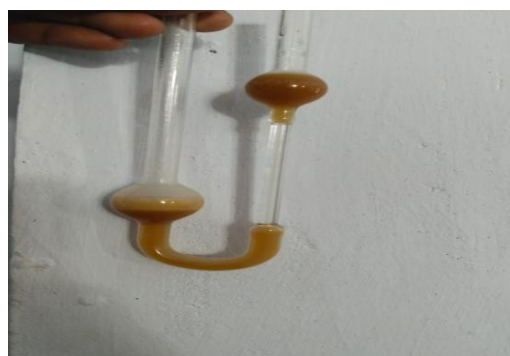
The herbal Anti-inflammatory spray was prepared. The suitable ingredient formulation was chosen accordingly. The final formulation was subjected for testing its quality through evaluation test.

Table 2. Results of formulation.

Evaluation tests	Results
Colour	Brownish yellow
Odour	Strong aromatic
Foreign particles	No particles observed
pH	7.2
Stability	Stable
Microbial growth	No microbial growth
Leakage test	No leakage
Spredability	Good



(a) Microbial test



(b) Viscosity test



(c) Spreadability test



(d) skin irritation test

Figure 3. Evaluation tests

CONCLUSION

This research provides guidelines on use of natural ingredients in the preparation of Anti-inflammatory and Herbal spray having minimal and no side effects. The natural ingredients like *Ocimum basilicum*, Dugdhika, Amla, Turpentine oil, etc. The *Ocimum basilicum* is a leafy annual herb from the mint family. It provides potent Anti-inflammatory, Anti-oxidant, and neuro protective effects. Turpentine oil is applied to the skin for joint pain, muscle pain, nerve pain. Dugdhika is used for inhibition of inflammatory mediators. The overall conclusion is that the formulation shows better results for reduce the inflammation.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

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AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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