



Formulation And Evaluation Of Herbal Ointment (Tulsi)

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ABSTRACTS:

This study focuses on the formulation and evaluation of an herbal ointment using *Ocimum sanctum* (Tulsi) extract. Tulsi is known for its antimicrobial, anti-inflammatory, and wound-healing properties. A simple ointment base was prepared incorporating Tulsi leaf extract. The formulation was evaluated for physical parameters such as color, texture, spreadability, pH, and stability. Antibacterial activity was tested against *Staphylococcus aureus* and *Escherichia coli*. The ointment showed good spreadability and a smooth texture. It maintained stability over four weeks under different storage conditions. The antibacterial results confirmed effective microbial inhibition. The study concludes that Tulsi-based ointment can be a promising herbal topical agent for skin infections and wound healing.

KEYWORDS:

Tulsi (*Ocimum sanctum*), Herbal ointment, Formulation, Evaluation, Antibacterial activity, Wound healing, Topical preparation, Phytotherapy, Natural medicine, Ointment base.

INTRODUCTION:

Ayurveda is considered as soul of Indian herbal medication system. Of all the herbs used within ayurveda, tulsi (*Ocimum Sanctum* Linn) is preeminent, and scientific research is now confirming its beneficial effects. Tulsi is an aromatic shrub in the basil family *Lamiaceae* (tribe *Ocimeae*) that is thought to have originated in north central India and now grows native throughout the eastern world tropics.

Within ayurveda, tulsi is known as “The Incomparable One,” “Mother Medicine of Nature” and “The Queen of Herbs,” and is revered as an “Elixir of Life” that is equal for both its medicinal and spiritual properties. ^(2,3)

Tulsi has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint, and exposure to cold. Tulsi has also been shown to counter metabolic stress through normalization of blood glucose, blood pressure and lipid levels, and psychological stress through positive effects on memory and cognitive function and through its anxiolytic and anti-depressant properties. Tulsi’s broad-spectrum antimicrobial activity, which includes activity against a range of human and animal pathogens, suggests

it can be used as a hand sanitizer, mouthwash and water purifier as well as in animal rearing, wound healing, the preservation of food stuffs and herbal raw materials and traveler's health. Cultivation of tulsi plants has both spiritual and practical significance that connects the grower to the creative powers of nature, and organic cultivation offers solutions for food security, rural poverty, hunger, environmental degradation and climate change. The use of tulsi in daily rituals is a treatment to ayurveda wisdom and provides an example of ancient knowledge offering solutions to modern problems. (4,7)

There is mounting evidence that tulsi can address physical, chemical, metabolic and psychological stress through a unique combination of pharmacological actions. Tulsi is perhaps one of the best examples of ayurveda's holistic lifestyle approach to health. Tulsi tastes hot and bitter and is said to penetrate the deep tissues, dry tissue secretions and normalize kappa and vat. Daily consumption of tulsi is said to prevent disease, promote general health, wellbeing and longevity and assist in dealing with the stresses of daily life. Tulsi is also credited with giving luster to the complexion, sweetness to the voice and fostering beauty, intelligence, stamina and a calm emotional disposition.

The medicinal properties of tulsi have been studied in hundreds of scientific studies including in vitro, animal and human experiments. These studies reveal that tulsi has a unique combination of actions that include: antimicrobial (including antibacterial, antiviral, antifungal, antiprotozoal, antimalarial, anthelmintic), mosquito repellent, anti-diarrheal, antioxidant, anti-cataract, anti-inflammatory, chemopreventive, radioprotective, hepatoprotective, neuro-protective, cardio-protective, anti-diabetic, anti-hypercholesterolemia, antihypertensive, anti-carcinogenic, analgesic, anti-pyretic, anti-allergic, immunomodulatory, central nervous system depressant, memory enhancement, anti-asthmatic, anti-tussive, diaphoretic, antithyroid, anti-fertility, anti-ulcer, anti-emetic, anti-spasmodic, anti-arthritic, adaptogenic, antistress, anti-cataract, anti-leukodermal and anti-coagulant activities.

Several medicinal plants have been used as cosmetics since time immemorial, and showed promising effects on various skin infections like acne, blackheads, age spots, skin rashes, skin allergy, ageing of skin, wrinkles, skin whitening agents etc. Some very common plants like aloe vera, azadirachta indica, annona squamosa, a terocarpus heterophyllus, carica papaya, canella asiatica, curcuma longa, mangier indica, maringa centifolia, osmium sanctum, phyllanthus embolic, sodium guava, terminalia arjun, terminalia chaebol, vitus viniferous etc. Have been extensively reported in ayurveda, siddha and unani systems of medicines for their cosmetic potential. (5)

Majority of ointments consist of a base, which mainly acts as a carrier or vehicle for the medicaments. The nature of the base also controls its performance; hence, selection of ointment base is a very important aspect of formulation. Traditional ointment bases have been oleaginous in nature, which include hydrocarbons such as petrolatum, beeswax, and vegetable oils that do not allow inclusion of any water inversely to fatty alcohols. Ointments are used topically for several purposes such as protective, antiseptic, emollient, antipruritic, catalytic, and astringent. The base of an ointment is of prime importance if the finished product is expected to function as any of the above categories. The ointment base composition determines not only the extent of penetration but also controls the transfer of medicaments from the base to the body tissues.

Boselli acid, tetra hydro curcuminoids, retinoid, pantheon, glucopyranosides, hydroxyl acids, antioxidants, vitamin e etc. These are some active constituents present in herbs which act on the skin and used as cleansing agent, toners and moisturizers. They help the skin in many ways in enhancing the beauty and protecting the skin from infections. The objective of present study is to prepare skin care product that not only moisturizes and softens the skin but also helps in healing of skin diseases and skin infections. An herbal cream that can give effective protection to skin and free from any side effects or toxic residue or any irritation when regularly used and should also be cosmetically acceptable.

MATERIALS AND EQUIPMENTS

Table No.1 LIST OF MATERIAL

Sr. No	Ingredient	Properties
1	Wool fat	Emollient
2	Beeswax	Ointment base
3	Cetostearyl alcohol	Surfactant
4	Softparaffin	Ointment base
5	Lavender oil	Fragrance
6	Propyl paraben	Preservative
7	Tulsi extract	Antimicrobial/anti-inflammatory
8	Glycerin	Humectant

Table No. 2 LIST OF EQUIPMENT'S AND MANUFACTURER

Sr. No	Equipment's	Uses
1	Mortar and pestle	for grinding Tulsi leaves
2	Heating mantle or water bath	to melt ointment base ingredients
3	Beakers and glass rods	for mixing ingredients
4	Weighing balance	for accurate measurement of materials
5	Filter paper and funnel	for filtering the Tulsi extract
6	Measuring cylinders	for measuring liquid ingredients
7	Stainless steel spatula	for mixing and transferring the ointment
8	Ointment jars or tubes	for storing the final product

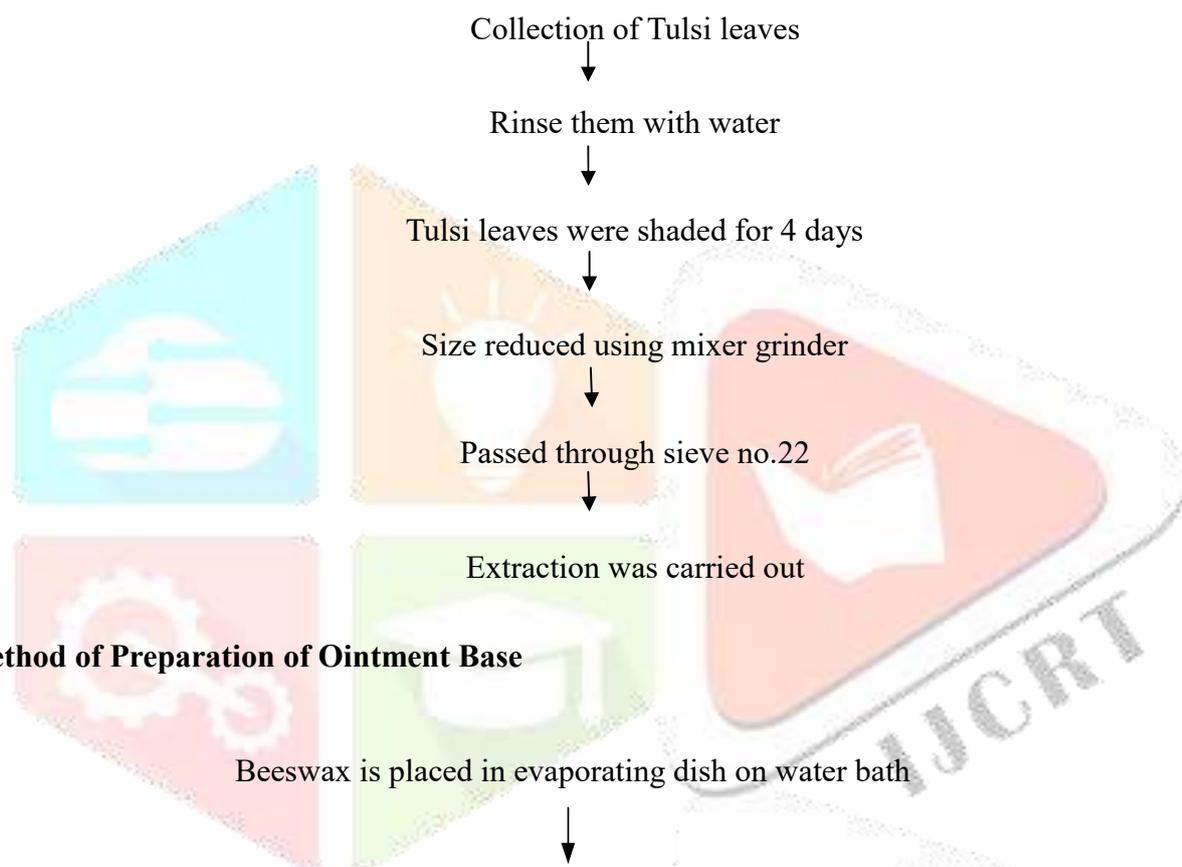
FORMULSTION

Initially ointment base was prepared by weighing accurately grated soft paraffin which was placed in evaporating dish on water bath. After melting of soft paraffin remaining ingredients (wool fat, cetostearyl alcohol, hard paraffin, etc.) were added and stirred gently to aid melting and mixing homogeneously followed by cooling of ointment base.

Herbal ointment was prepared by mixing accurately weighed tulsi extract to the ointment base to prepare a smooth paste. Add baser until to form homogeneous ointment, finally transferred in a suitable container.

METHOD

Method of Extraction



Method of Preparation of Ointment Base

Beeswax is placed in evaporating dish on water bath

After melting of soft paraffin remaining ingredients (wool fat, hard paraffin, cetostearyl alcohol, propyl paraben, glycerine, rose oil) were added and stirred gently.

Mix homogeneously followed by cooling of ointment base.

Method of preparation of Herbal ointment

Herbal ointment was prepared by mixing tulsi extract to the ointment base



Add baser until to form a homogenous ointment



Transfer it to a suitable container

Table No. 3 Formulation Table

Sr. No.	Ingredients	F1	F2	F3
1	Wool fat	0.5gm	0.5 gm	0.3 gm
2	Hard paraffin	0.5 gm	0.5 gm	0.2 gm
3	Soft paraffin	6.2 gm	9 gm	6 gm
4	Cetostearyl alcohol	0.5 gm	1 gm	0.2 gm
5	Rose oil	3 drops	3 drops	3 drops
6	Propyl paraben	0.3 mg	0.2 mg	0.3 mg
7	Tulsi extract	0.12 gm	0.12 gm	0.12 gm
8	Glycerine	2 ml	4 ml	3 ml

EXTRACTION PROCESS

Tulsi leaves (*ocimum sanctum*) were shaded for 4 days and size reduced using mixer grinder. Leaves converted in to coarse powder and passes through sieve number 22. The coarse powder was stored for further studies. Tulsi leaves (coarse powder) were extracted using ethanol in a soxhlet apparatus. The extraction was carried out for 3 hrs. Taking 100 grams of plant material with 500ml of ethanol. The extract was evaporated in a rotary evaporator. The obtained ethanol extracts were preserved for further studies.

(24,25)



Fig No. 1: - Tulsi powder

EVALUATION PARAMETERS (25,27,28)**Physical Evaluation:**

Physical parameters like color and odor were examined by visual examination. In this test color, odour, texture, and state of the three formulations were checked. Determination of pH: - pH of prepared herbal ointment was measured by using digital ph meter. The solution of ointment was prepared by using 100ml of distilled water and set aside for 2hrs. pH was determined in triplicate for the solution and average value was calculated.

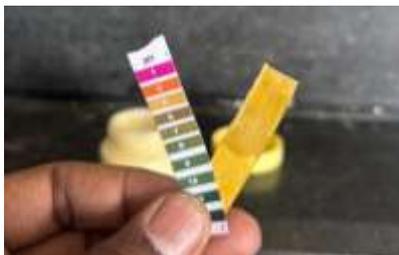


Fig No. 2: - pH determination

The homogeneity of a prepared formulation is tested by touch and by appearance.

Appearance: -

The appearance of the ointment was judged by its color, pearlescence, roughness and graded.

After feel: -

The emollient nature and smoothness are checked after application.

Irritancy: -

Mark the area (1 cm) on the left-hand dorsal surface. Then the ointment was applied to that area and the time was noted. Then it is checked for irritancy and erythema if any for an interval up to 24 hrs. reported.

Type of smear

- The formation of smears after applying to the skin is checked.
- The applied ointment was observed for removal by using tap water.

Viscosity: -

The viscosity of the ointment was done by using brooke field viscometer at a temperature of 25⁰C using spindle number 63 at 2.5 rpm.

Washability: -

A washability test was carried out by applying a small amount of ointment to the hand then washing it with tap water.

Phase separation: -

The prepared ointment was kept in a closed container at a temperature of 25- 100⁰ C away from light. Then phases separation was checked 24 hrs. for 30 days. Any change in the phase separation was

Spreadability: -

The spreadability was expressed in terms of time in seconds taken by two slides to slip off from the ointment, placed in between the slides, under a certain load. Lesser the time is taken for the separation of the two slides better the spread ability. Two sets of glass slides of standard dimension were taken. Then one slide of suitable dimension was taken and the ointment formulation was placed on that slide. Then another slide was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the ointment between two slides was pressed.

Uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to the slides was scrapped off. The upper slide was allowed to slip off freely by the force of weight tied to it. The time taken by the upper slide to slip off was noted.

$$\text{Spreadability} = m \times l/t$$

M = standard weight which is tied to or placed over the upper slide

L = length of a glass slide

T = time taken in seconds

RESULT AND DISCUSSION**Physical evaluation: -**

In this test color, odor, texture, and state of the three formulations were checked

Table No 4: Physical evaluation

Sr. No.	Parameter	F1	F2	F3
1	Colour	Light Green	Light Green	Light Green
2	Odor	Pleasant	Pleasant	Pleasant
3	Texture	Smooth	Smooth	Smooth
4	State	Semi Solid	Semi Solid	Semi Solid

Homogeneity: -

All prepared formulations produce uniformity of Ointment. Homogeneity was confirmed by appearance and by touch.

Table No. 5: Homogeneity

Parameter	Formulation		
	F1	F2	F3
Homogeneity	Good	Good	Good

Appearance: -

When formulation was kept for a long time, it found that no change in the color of ointment.

Table No. 6: Appearance

Parameter	Formulation		
	F1	F2	F3
Appearance	No Change	No Change	No Change

After Feel

Emolliency, slipperiness and amount of residue left after the application of a fixed amount of ointment were found.

Table No. 7: After Feel

Sr. No.	Formulation	After feel
1	F1	Emollient
2	F2	Emollient
3	F3	Emollient

Type of Smear: -

After the application of the cream, the type of smear formed on the skin was nongreasy.

**Fig No 3: -Type of smear****Table No.8: Smear**

Sr.No.	Formulation	Smear
1	F1	Slight greasy
2	F2	Slight greasy
3	F3	Slight greasy

Removal:

The ointment of F1, F2, and F3 applied on the skin was easily removed by washing with tap water.

Table No. 9: Removal

Sr.No	Formulation	Removal
1	F1	Good
2	F2	Good
3	F3	Good

Irritancy: -

Mark the area (1 cm²) on the left-hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy and erythema if any for an interval upto 24 hours reported. According to the results all three formulations that are showed no sign of irritancy and erythema.

Table No. 10: Irritancy

Sr.No	Formulation	Irritancy	Erythema
1	F1	Nil	Nil
2	F2	Nil	Nil
3	F3	Nil	Nil

Washability: -

A washability test was carried out by applying a small amount of cream to the hand and then washing it with tap water. All three formulations were easily washable.

**Fig No 4: - Washability****Table No. 11: Washability**

Sr.No.	Formulation	Washability
1	F1	Easily Washable
2	F2	Easily Washable
3	F3	Easily Washable

Phase separation: -

The prepared ointment was kept in a closed container at a temperature of 25-100°C away from light. Then phase separation was checked for 24 h for 30 days. Any change in the phase separation was observed/checked. According to the results, no phase separation was observed in all three formulations.

Table No. 12: Phase Separation

Sr.No.	Formulation	Phase separation
1	F1	No Phase Separation
2	F2	No Phase Separation
3	F3	No Phase Separation

Spreadability: -

The spreadability of the three formulations that is F1, F2, and F3 was carried out and out of that for F2 the time taken by the 2 slides to separate is less so as said in the description of the evaluation test lesser the time taken for separation of the two slides better the spreadability so according to this statement F2 showed better spreadability.

**Fig No 5: - Spreadability****Table No. 13: Spreadability**

Sr.No.	Formulation	Time(sec)	Spread ability(g×cm/sec)
1	F1	10	23.2
2	F2	7	31.7
3	F3	15	14.04

USES ⁽²³⁾

- Anti-inflammatory properties of herbal ingredients.
- Anti-microbial properties.
- Skin protective properties.
- Anti-aging properties.
- It helps to protect the body without side effects.

CONCLUSION

The formulation and evaluation of a herbal ointment containing Tulsi (*Ocimum sanctum*) demonstrate its potential as a safe, effective, and natural topical treatment for various skin conditions. Tulsi is renowned in traditional medicine for its powerful antimicrobial, anti-inflammatory, antioxidant, and wound healing properties. These qualities make it particularly effective in treating infections, cuts, burns, rashes, and other minor skin irritations.

The ointment formulation typically includes Tulsi extract incorporated into a suitable base, such as petroleum jelly or beeswax, which supports skin application and enhances absorption. During formulation, key parameters like pH, spreadability, viscosity, stability, and homogeneity are assessed to ensure the product is skin-friendly, easy to apply, and remains effective over time. A skin-compatible pH (around 6–7.5) and good spreadability are essential for user comfort and efficacy.

Evaluation results have shown that Tulsi-based ointments possess strong antibacterial activity against pathogens such as *Staphylococcus aureus* and *Escherichia coli*, which are common causes of skin infections. Additionally, the anti-inflammatory properties of Tulsi help reduce redness, swelling, and discomfort in affected areas. Patch testing or skin irritation studies confirm the formulation is non-irritant and safe for regular use.

However, challenges such as variability in Tulsi's chemical composition due to growing conditions and extraction methods highlight the need for standardization. Consistent quality control is crucial for maintaining the effectiveness of the final product.

In conclusion, Tulsi herbal ointments provide a natural, effective alternative to synthetic topical products, aligning with the increasing demand for herbal and chemical-free skincare. With further research and advancements in formulation technology, Tulsi-based ointments have the potential to become a widely accepted option in both therapeutic and cosmetic skin care applications.

SUMMARY

The research article details the formulation and evaluation of an herbal ointment using Tulsi (*Ocimum sanctum*) extract, known for its medicinal properties. The process involved extracting Tulsi leaves with ethanol, preparing an ointment base with ingredients like soft paraffin and beeswax, and then incorporating the Tulsi extract into the base. The resulting ointment was evaluated for physical characteristics (colour, odour, texture, state, homogeneity, appearance, after-feel, smear type, removal, irritancy, washability, phase separation, and spreadability) and showed favourable properties such as smooth texture, good spreadability, and no skin irritation. The study suggests that the Tulsi-based ointment has potential as a natural topical agent due to the inherent antimicrobial and anti-inflammatory properties of Tulsi.

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