

## Formulation and Analyzation of *Murraya koenigii* Herbal Antimicrobial Cream

Mane Snehal S.<sup>1,\*</sup>, Ubale Amol T.<sup>2</sup>, Mane Yogita L.<sup>1</sup>, Jadhav Shewata R.<sup>1</sup>, Pawar Neha V.<sup>1</sup>,  
Shinde Asha S.<sup>1</sup>, Jasmine H. Bagwan<sup>3</sup>, Monika Y. Waydande<sup>4</sup>

### Abstract

A person's skin is a crucial indicator of their overall health. Everyone experiences skin issues from time to time in their lives. Wrinkles, acne, pimples, dark spots, hypersensitivity, and atopic dermatitis are some of the ways they might manifest. The aim of this project was to formulate the herbal cream for the purpose of moisturising, cooling, cure inflammation, itching, skin eruptions, persistent boils, wound healing, antimicrobial, and treatment of various diseases of the skin. In this project work, attempt has been made to formulate herbal skin cream using *Murraya koenigii* (curry leaves) powder. Curry leaves plant has a wide range of traditional medical use. It is having vitamin A, vitamin B, vitamin C, vitamin B2, calcium, and it is also rich in many minerals such as iron, zinc, copper, etc. *M. koenigii* has many applications in traditional medicine and has been used widely in Indian food for millennia. The herb is supposed to have tonic and stomachic properties. Bark and roots serve as stimulants and can be administered topically to cure animal bites and breakouts. Green leafy vegetables, when raw, are used to cure vomiting, diarrhea, and dysentery. Furthermore, historically, leaves and roots have been used as analgesics, bitters, anthelmintics, and to cure leukoderma, blood disorders, inflammation, and itching. Many thorough scientific studies are currently being conducted to see whether the whole plant or particular parts of it may be used in different extract forms to treat different types of illnesses. Numerous active components possessing medicinal properties have been recognized and explained. This plant is supposed to have cholesterol-lowering, anti-oxidative, cytotoxic, antimicrobial, and antibacterial qualities.

**Keywords:** Antimicrobial, eruptions, *murraya koenigii*, skin cream, treat burning and cure boils, wound healing

#### \*Author for Correspondence

Mane Snehal S.  
E-mail: snehalmane402@gmail.com

<sup>1</sup>Lecturer, Department of Pharmacy, Mahalaxmi Institute of Pharmacy, Satara, Maharashtra, India

<sup>2</sup>Principal, Department of D. Pharmacy, Mahalaxmi Institute of Pharmacy, Satara, Maharashtra, India

<sup>3</sup>Lecturer, Department of Chemical, Late Narayandas Bhawandas Chhabada Institute of Engineering, Satara, Maharashtra, India

<sup>4</sup>Lecturer, Department of Nursing, Late Narayandas Bhawandas Chhabada Training College of Nursing, Satara, Maharashtra, India

Received Date: March 06, 2024

Accepted Date: March 30, 2024

Published Date: April 12, 2024

**Citation:** Mane Snehal S., Ubale Amol T., Mane Yogita L., Jadhav Shewata R., Pawar Neha V., Shinde Asha S., Jasmine H. Bagwan, Monika Y. Waydande. Formulation and Analyzation of *Murraya koenigii* Herbal Antimicrobial Cream. Research & Reviews: A Journal of Drug Formulation, Development and Production. 2024; 11(1): 8–14p.

### INTRODUCTION

The condition of someone's skin is a key reflection of their general health. It is made up of several elements, such as carbohydrates, amino acids, and lipids. A balanced diet is essential to maintaining healthy, glowing skin. Although maintaining a healthy diet is crucial, both sexes' bodies undergo numerous changes, especially during puberty.

Everybody has skin issues at some time in their lives. Atopic dermatitis, hypersensitivity, wrinkles, acne, pimples, and dark spots are some possible manifestations. There is no reason to worry too much because nature offers us a plethora of effective, safe, and non-toxic remedies that differ from conventional treatment. Curry leaves are utilized as an all-natural treatment for various skin ailments.

Many plant species contain natural antioxidants and antibacterial preservatives. Biological substances with antimicrobial activity and the capacity to halt the growth of bacteria are known as antimicrobial substances. The fragrant *Murraya koenigii* is a tiny tree or shrub that is primarily deciduous. It can reach a height of 6 m and a diameter of 15 to 40 cm. Frequently called the “curry leaf plant”, it belongs to the Rutaceae family [1]. This tree may grow up to 1500 m in height and is typically found in forests with gregarious undergrowth.

It also flourishes in other countries in South Asia, such as Sri Lanka [2]. It inhabits nearly the whole Indian subcontinent. It smells just as good. In Indian dialects, *Murraya koenigii*, a member of the Rutaceae family, which comprises over 150 genera and 1600 species, is occasionally called curry leaf or karipatta. It is a major export good from India since it brings in a lot of foreign exchange [3–6]. Several different chemical components have been isolated from every part of the plant. Its strong, characteristic smell is mostly caused by O-phellandrene, P-caryophyllene, P-gurjunene, and P-elemene. There are a lot of carbazole alkaloids in the plant. *M. koenigii* has a number of chemical constituents that work in concert to provide a specific pharmacodynamic action.

## NEED AND OBJECTIVE OF PRESENT INVESTIGATION

### Need for Investigation

Curry leaves are having antimicrobial and antiinflammatory activities [5–8]. Curry leaves powder has also been used in some organic oil and cosmeceuticals formulations. Current market research revealed that there are rare topical formulations of curry leaves which are used for their antiinflammatory or wound healing properties; so, in the current project work, attempt has been made to formulate herbal cream containing curry leaves powder.

### *Murraya koenigii* (Curry Leaves)

*Plant Profile:*

*Synonyms:* Bergiakoenigii, Chalcaskoenigii

*Botanical:* *Murraya koenigii*

*English:* Curry leaves

*Marathi:* Kadipatta

### Biological Source

The species name commemorates the botanist Johann König [9]. The genus Murray commemorates Swedish physician and botanist Johann Andreas Murray who died in 1791. Hence the botanical name of the curry leaves is *Murraya koenigii*.

### Plant Taxonomy

*Kingdom:* Plantae

*Sub-kingdom:* Tracheobionta

*Super division:* Spermatophyte

*Division:* Magnoliophyta

*Class:* Magnoliopsida

*Subclass:* Rosidae

*Order:* Sapindales

*Family:* Rutaceae

*Genus:* *Murraya* J. Koenig ex L

*Species:* *Murraya koenigii* L., Spreng

### Pharmacognostic Features

The leaf of *Murraya koenigii* shows various characteristic pharmacognostic features such as:

*Shape:* Obliquely ovate or fairly rhomboid.

*Apex:* Acuminate obtuse or acute.

*Petiole:* 20–30 cm in length.  
*Venation:* Reticulate.  
*Margin:* Dentate.  
*Base:* Asymmetrical.  
*Stomata:* Anomocytic.  
*Trichomes:* Uniseriate multicellular.

## Morphological Characteristics

### Leaves

Leaves have a green color and a characteristic odor and taste. Exstipulate, bipinnately compound, 30 cm long, each bearing 24 leaflets having reticulate venation; leaflets lanceolate, 4.9 cm long, 1.8 cm broad, having 0.5 cm long petiole.

### Therapeutic Applications

The plant *Murraya koenigii* has a vital role in traditional medicine from Eastern Asia. leaves and root possess stomachic, tonic, and carminative qualities. When using leaves internally to treat dysentery, vomiting should be closely observed [10–12]. Leaves are applied externally to lesions and sores. Analgesic, bitter, acrid, anti-helminthic, and cooling qualities are found in the leaves and roots. It eases piles, lowers body temperature, lessens inflammation, and soothes itching. To stop vomiting, the roasted leaves were infused [13]. Applying crushed leaves topically helps heal skin breakouts and burns. Curry leaves are also used to treat calcium deficiency. It is rich in iron, calcium, and the vitamins B2, C, and A. Both young and elderly benefit from its nutritious worth. For immediate relief, a curry leaf paste is administered to these persistent boils. It has several uses, including those of a stomachic, purgative, febrifuge, anti-helminthes, anti-anemia, anti-ulcer, anti-inflammatory, cooling and itching, hair tonic, and hair growth stimulant (Table 1).

### Leaves

The leaves of *Murraya koenigii* are rich in several chemical components. The constituents depend on the state of the leaves, either the leaves are fresh or dry. The leaves also consist of the volatile oil, carotenoids and carbazole alkaloids as the major constituent in it (Figure 1).

**Table 1.** Active compounds of *Murraya koenigii* (curry leaves) and their activities.

<i>Murraya koenigii</i> compounds	Source	Biological activity
Lutein	Leaves	Antioxidant activity
Tocopherol	Leaves	Antioxidant activity, Hepatoprotective
Carotene	Leaves	Antioxidant activity
Koenimbine	Leaves	Antioxidant activity
Isomahanine	Leaves	Anticaries
Murrayanol	Leaves	Mosquitocidal, Antimicrobial
Murrayanine	Steam bark	Antifungal
Girinimbine	Leaves	Hepatoprotective



**Figure 1.** Morphology of *Murraya koenigii* plant along with, (a) Flowers, (b) Fruits, (c) Bark and Leaves.

## EXPERIMENTAL WORK

### The Preparation of *Murraya koenigii* (Curry Leaves) Powder

1. The fully matured fresh leaves of *Murraya koenigii* (curry leaves) were collected from limb in Satara district, Maharashtra.
2. The leaves were washed thoroughly with water, and dried in sunlight, or air dried.
3. 200 gm of dried curry leaves were powdered by a mechanical grinder.
4. Curry leaves powder was passed through the cotton cloth.
5. This curry leaves powder was used to formulate the cream (Figure 2).

### Formulation of Cream

In the formulation table provided, each row corresponds to a specific ingredient, with variations denoted by columns labeled F1, F2, F3, and F4. The serial number (Sr. No.), ingredients, and corresponding quantities for each variation are detailed meticulously in Tables 2 and 3.

### Procedure

- Melted the Bees wax and mineral oil together and at temperature of about 70°C.
- Dissolved borax in the water. This solution was heated up to 70°C.
- Added Water phase into oil phase with rapid stirring.
- When the cream is formed, curry leaves powder was added and triturate in mortel pestle.
- The prepared cream was filled into the suitable container.



**Figure 2.** Dry curry leaves powder.

**Table 2.** Formulation of antimicrobial cream.

S.N.	Ingredients	F1	F2	F3	F4
1	Bees wax	3.3 gm	3.3 gm	3.3 gm	3.3 gm
2	Mineral oil	10 ml	10 ml	10 ml	9.5 ml
3	Borax	0.1 gm	0.1 gm	0.1 gm	0.1 gm
4	Water	5.6 ml	5.1 ml	4.6 ml	4.6 ml
5	Curry leaves powder	1 gm	1.5 gm	2 gm	2.5 gm

**Table 3.** Collections of materials used for cream.

S.N.	Ingredients	Source of suppliers
1	Bees wax	College laboratory
2	Mineral oil	College laboratory
3	Borax	College laboratory
4	Water	College laboratory
5	Curry leaves	Limb medicinal garden

### Methods of Evaluation Tests for the Cream

- *Cream pH*: The pH meter was calibrated using standard buffer solution, about 0.5 g of the cream was weighed and dissolved in 50 ml of distilled water and its pH was measured.
- *Physical stability of cream*: The ability of cream to maintain its consistency was determined by keeping it at 25°C for 30 days.
- *Non-volatile matter at 105°C*: 1 gm of cream was taken in glass bottle and kept in an oven at 105°C for 2 h.
- *Homogeneity*: The formulations were tested for homogeneity by visual appearance and by touch.
- *Appearances*: The appearance of the cream was judged by its color, roughness, grade and pearlescence.
- *Emolliency*: It included spreadability and emolliency. A fixed amount of cream was applied on dorsal skin surface of human volunteer and properties were observed.
- *Irritancy test*: Mark the area on the left hand dorsal surface. The cream was applied to the specific areas and time was noted. Irritancy was checked if any, for regular interval up to 24 h and reported.
- *Removal of cream*: A portion of cream was applied on the skin and examined by washing with the tap water.
- *Evaluation: washability*: The product was applied on hand and tested under running water (Table 4).

### Antimicrobial Study

The antimicrobial activity of prepared curry leaves formulations was studied on nutrient agar medium by using microorganism *staphylococcus aureus*.

- *Culture preparation*:
  - 28 gm of nutrient agar was mixed with 1000 ml water and autoclaved for the steriilization.
  - Each petri plate was then filled with 20 ml nutrient agar.
  - Using sterilized Nichrome wire, loop the petri dish containing nutrient agar were seeded.
  - Test plate were incubated at 37°C for 24 h.
  - Antimicrobial activity were studied by measuring the zone of inhibition.

The formulation of cream F1, F2, F3, F4 have concentration of antimicrobial agent as 2, 4, 6 and 8% respectively. The formulation of F4 has better antimicrobial activity than the other formulation [14, 15].

### RESULT AND DISCUSSION

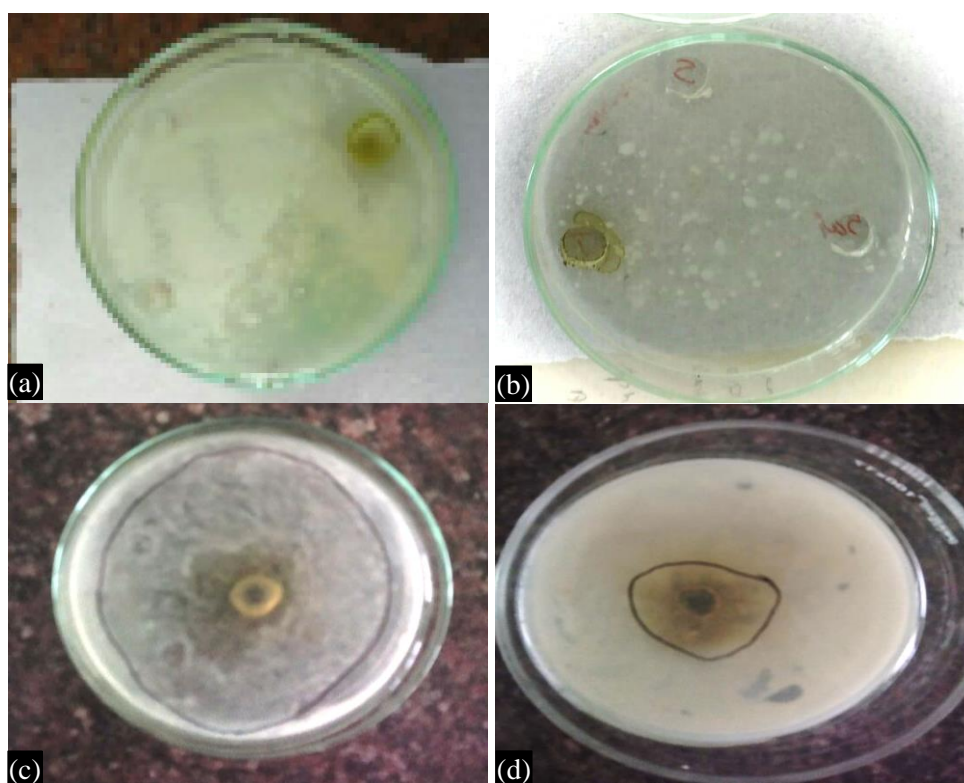
The formulated herbal cream is w/o type. The pH of herbal cream was 6.3 as confirmed by the pH meter. The stability and homogeneity, and spreadability of the cream is satisfactory. The irritancy test for sensitivity testing result showed that the formulation is safe in respect to irritation and allergic sensitization.

### Antimicrobial Activity of *Murraya koenigii* (Curry Leaves)

Antimicrobial activity of *Murraya Koenigii* (curry leaves) were evaluated on nutrient agar medium by using micro-organism (*Staphylococcus aureus*) (Figure 3).

**Table 4.** Evaluation tests for cream.

S.N.	Parameter	Observation
1	Formulation	w/o type
2	pH	6.3
3	Homogeneity	Good
4	Appearance	Green and dark green
5	Spread ability	Satisfactory
6	Emolliency	Emollient and cooling sensation
7	Physical Stability	Stable at 25°C for 30 days
8	Volatility	Non-Volatile



**Figure 3.** Antimicrobial susceptibility testing, (a) F1 formulation, (b) F2 formulatuion, (c) F3 formulation, (d) F4 formulation.

After an incubation period of 24 h, the plates containing microorganisms revealed enhanced antimicrobial activity in the F4 formulation.

## CONCLUSION

Herbal topical creams are widely available in the market. Curry leaves were shown to have several medicinal applications after a thorough examination of the literature. In the current project work, multipurpose herbal cream was prepared using curry leaves. Among the four formulations prepared, formulation F4 containing 2.5 gm of curry leaves powder showed better antimicrobial property; so, the formulation F4 was considered as the best formulation.

## REFERENCES

1. Mhaskar KS, Blatter E, Caius JF. Kirtikar and Basu's Illustrated Indian Medicinal Plants XI. 3rd Edn. Delhi, India: Indian Medical Science Series; 2000; 86–96.
2. Prajapati ND, Purohit SS, Sharma AK, Kumar TA. Book of Medicinal plants. India: Agrobios India; 2003.
3. Muthumani P, Venkatraman S, Ramseshu KV, Meera R, Devi P, Kameswari B *et al.* Pharmacological studies of anticancer, anti-inflammatory activities of *Murraya koenigii* (Linn) Spreng in experimental animals. *J Pharm Sci Res.* 2009; 1(3): 137–141.
4. Giday M, Asfaw Z, WOULDU Z, Teklehaymanot T. Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an ethnobotanical investigation. *J Ethnobiol Ethnomed.* 2009; 5: 34(10p).
5. Ningappa MB, Srinivas L. Purification and characterization of ~ 35 kDa antioxidant protein from curry leaves (*Murraya koenigii* L.). *Toxicol in vitro.* 2008 Apr 1; 22(3): 699–709.
6. Bhattacharjee SK. Hand Book of Medicinal Plant. 3rd Edn. Jaipur: Pointer Publishers; 2001; 230.
7. Ogston A. On Abscesses. *Classics in Infectious Diseases. Rev Infect Dis.* 1984; 6(1): 122–128.
8. Hanci SY. Classics of infectious diseases: a bibliometric analysis of the 100 most cited articles. *Medicine.* 2023 Apr 28; 102(17): e33607.

9. Makarova K, Slesarev A, Wolf Y, Sorokin A, Mirkin B, Koonin E, Pavlov A, Pavlova N, Karamychev V, Polouchine N, Shakhova V. Comparative genomics of the lactic acid bacteria. *Proc Natl Acad Sci.* 2006 Oct 17; 103(42): 15611–6.
10. Sanders Jr WE, Sanders CC. Enterobacter spp.: pathogens poised to flourish at the turn of the century. *Clin Microbiol Rev.* 1997 Apr; 10(2): 220–41.
11. Pruthi JS. Spices and Condiments. 9th Edn. India: National Book Trust; 2018. Accessed March 30, 2024. [https://www.nbtindia.gov.in/books\\_detail\\_\\_8\\_\\_india-the-land-and-the-people\\_\\_177\\_\\_spices-and-condiments.nbt](https://www.nbtindia.gov.in/books_detail__8__india-the-land-and-the-people__177__spices-and-condiments.nbt)
12. Mhaskar KS, Blatter E, Caius JF. In Kirtikar and Basu's Illustrated Indian Medicinal Plants Their Usage in Ayurveda and Unani Medicine. Vol. 3. Delhi: Shri Satguru Publication; 2000; 656–659.
13. Parmar C, Kaushal MK. Wild fruits of the Sub-Himalayan region. New Delhi: Kalyani Publishers; 1982; 45–48.
14. Lawal H, Atiku MK, Khelpai DG, Wannang NN. Hypoglycaemic and hypolipidaemic effects of the aqueous leaf extract of *Murraya koenigii* in normal and alloxan–diabetic rats. *Niger J Physiol Sci.* 2008; 23(1–2): 37–40.
15. Thirumurugan K, Shihabudeen MS, Hansi PD. Antimicrobial activity and phytochemical analysis of selected Indian folk medicinal plants. *Steroids.* 2010; 1(7): 430–34.