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The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
Impact Factor (RJIF): 6.34
TPI 2025; 14(8): 44-49

www.thepharmajournal.com
Received: 16-06-2025
Accepted: 12-07-2025

Somnath wadghane
Department of Pharmaceutical Chemistry, Abasaheb Kakade College of Pharmacy, Bodhegaon, Ahmednagar Maharashtra, India

Rajesh Mokate,
Department of Pharmacognosy, Abasaheb Kakade College of Pharmacy, Bodhegaon, Ahmednagar Maharashtra, India

Puja Aher
Department of Pharmacognosy, Abasaheb Kakade College of Pharmacy, Bodhegaon, Ahmednagar, Maharashtra, India

Raut Vishvambar
Students of, Sayali Chartible Truts College of pharmacy, Chhatrapati Sambhajinagar, Maharashtra, India

Dahiphale Rupesh
Students of, Abasaheb Kakade College of Pharmacy, Bodhegaon. Maharashtra, India

Corresponding Author:
Somnath wadghane
Department of Pharmaceutical Chemistry, Abasaheb Kakade College of Pharmacy, Bodhegaon, Ahmednagar Maharashtra, India

Formulation and evaluation antibacterial herbal cream

Somnath wadghane, Rajesh Mokate, Puja Aher, Raut Vishvambar and Dahiphale Rupesh

DOI: https://www.doi.org/10.22271/tpi.2025.v14.i8a.26222

Abstract
The objective of this work is to formulation and evaluation of Antimicrobial herbal Cream for glowing skin. This formulation using natural ingredients. Formulations containing ingredients such as Garlic oil, neem leave extract peel, curry leave extract, and honey. All prepared formulations were evaluated by different parameters like organoleptic properties and physico-chemical parameters and stability along with irritancy test etc. Cosmetics are the products used to clean, beautify and promote attractive appearance of skin.

Keywords: Skin, herbal cream, preparation, natural product, formulation

Introduction
From the ancient era the herbal medicine are important part of our medicine system. Medicinal plants are naturally gifted expensive bioactive compounds which form the backbone of traditional medicines. The basic herbs have the answer with no side effects and effective remedies and they have no matter on what age group you use. [3]
When two or more herbs are used in the formulation they are known as Polyherbal1 formulations. From Antibacterial activity is the ability of the substance to inhibit or kill bacterial cells. Microorganisms such as bacteria can cause many types of skin-related diseases such as skin rashes, acne, eczema, psoriasis, dermatitis and etc. The past three decades has witnessed the production of various new antibiotics by pharmacological industries for treatment of bacterial diseases. The use of antibiotics at sub therapeutic dose as growth promoters, also was on the increase. The overuse and misuse of antibiotics has led to genetic mutation in bacteria leading to the development of bacterial resistance to antibiotics. A surge in the development and spread of antibiotic resistance has become a major cause for concern. The quest for alternative products has clearly intensified in the recent years with the increase in regulations regarding the use of antibiotic growth promoters and the rise in consumer demand for poultry products from “Raised without Antibiotics” or “No Antibiotics Ever” flocks. Currently there has been an increased awareness on usage of traditional herbal medicine as alternative to antibiotics. These herbal preparations of plant origin are easily available, inexpensive, safe, efficient, and rarely cause any side effects. Plants have an amazing ability to produce a wide variety of secondary metabolites, like alkaloids, glycosides, terpenoids, saponins, steroids, flavonoids, tannins, quinones and Coumadin’s. These secondary plant metabolites are a source of plant derived antimicrobial substances. these natural plant products are highly efficient in the treatment of bacterial infections [4]. evaluation of antibacterial activity of extracts of Neem, curry, honey and garlic oil Escherichia coli are the main pathogen that causes these skin infections. Topical cream containing extract of medicinal plant is one alternative to treat the skin infection caused by bacteria and prevent the use of oral antibiotic which then can develop bacterial-resistant. Honey consists of various constituents such as water, carbohydrates, proteins, vitamins, amino acid, energy and minerals. Besides the major ones, there must also be several minor constituents in honey, which may be playing a key role in determining the antibacterial behavior of honey.[12] The extract of curry leaves(family rutacease) an antibacterial agent which kill or inihibit bactyerial growth, neem leave extract(family meliaceae) contain lots of antibacterial agent. and garlic oil contain broad spectrum of antibacterial agent,alliin and these cream agent showing a sufficient amount of zone inihibitin on E-coli.[3,8].

Objectives
- To prepare cream with greater zone inihibition as compare to current available

antibacterial product.
- Decrease adverse effect which occur due to the chemical antibacterial cream.
- To produce that inexpensive cream than antibiotic / chemical cream.
- Reduce cream have an antibacterial cum healing property.
- To kill / Inihibit the bacteria of belonging to broad spectrum.
- Produce cream that don't irritate when applied to skin.
- Usually most of the antibiotic cream are not available over the counter, so herbal cream not need prescription.
- To produce an herbal cream that have a greater self-life than available marketed cream.
- To reduce side effect and toxicity.

Materials and Methods

Collection of Plants and Material

Fresh leaves of curry leave and neem leaves were collected from area of Bodhegaon village. Honey, garlic & were purchased from local market.

Physiochemical analysis of curry and neem leaves:

The collected leaves of curry and leaves were shade dried for 7 days and finally pulverized in to coarse powder. It was stored in a well closed container free from environmental climatic changes till usage simultaneously [1].

Ingredients of Formulation

1. Garlic oil

Scientific name: Allium Sativum *(Amaryllidaceae)*

Chemical Composition Allyl methyl trisulphide, Allyl propynil disulphide, dimethyl trisulphide. [14] Allin is present in the garlic when the garlic clove crushed then enzyme allinase is converted allin into allicin and allicin again form sulphide compound [2].

Fig 1: garlic oil

2. Honey

Chemical composition: Antibacterial activity in most honeys is due to the enzymatic production hydrogen peroxide. [12] Indeed, medicinal importance of honey has been documented in the world oldest medical literature and since the ancient times, it has been known to possess antimicrobial property as well as wound healing activity. The healing property of honey due to the fact that pit offer antibacterial activity, maintain moist condition, and its high viscosity helps to provide a protective barrier to prevent infection its immune modulatory property relevant to wound repeat too [12].

3. Neem leaves extract

Scientific name: Azadirachta indica meliaceae.

Chemical composition: Nimbin, Nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexa cosanoland amino acid.[6] Neem showed significant increasing in DNA damage when compared to control in human lymphpctes, the neem is an infective antibacterial agent against the bacterial pathogen V.vulnisificus, and it was foumd to be non-toxic at lower conc to human lyphpcutes [3].

Fig 3: Neem leaves extract powder

4. Curry Leaves Extract

Scientific name: Murraya koenigii

Chemical Composition: Linalool, elemol, geranyl acitate, myrcene, alloocimene, alfa-terpinene, and (e) beta-ocimene. [12] Curry leaf extract showed a broad a spectrum of very significated anbacterial activity by producing aclear zone of inihibition against S.aurues, e-coli [3].

Fig 4: Curry leave powder

5. Formula of cream

Table 1: Composition of Formulated Herbal Creams (F1, F2, and F3) Containing Varying Concentrations of Active Pharmaceutical Ingredients (APIs) [1, 2, 3]

API	F1	F2	F3
Curry leaves	0.4gm	0.7gm	1.2gm
Neem leaves	0.4gm	0.9gm	1.2gm
Methonic honey	0.4gm	0.7gm	1.2gm
Garlic oil	0.3gm	0.6gm	0.9gm
Cream base	Upto 10gm	Upto 10gm	Upto 10gm

Preparation of herbal extracts

Preparation of methanolic extract of curry & neem leaves

The leaves of curry leaves and neem leaves were dried in shade under normal environmental condition and homogenized to coarse powder and stored in opaque screw tight jars until use. Powdered drug was put into soxhlet apparatus with methanol solvent. Extract with methanol

solution filter through filter paper and filtrate was heated on water bath until the dried sample was remained in the flask].simulteneously methanolic extract was collected simulteously. [3]

Fig 5: Extraction of Neem leaves

Fig 6: Extraction of Curry leaves

Metabolic extract of Honey

Extraction of raw honey was performed by using organic solvents, for this, 10g of honey was taken in a test tube and sufficient amount of solvent dissolve. shaking with hands for about 15 minutes. Supernatant was collected from each test tube in a round bottom. After extraction residue of each honey were also checked for their Antibacterial activity flask by filtration. The extracts were prepared using the solvent methanol. [4]

Preparation of methanol oil extract of garlic

Fresh garlic cloves was put into soxhlet apparatus with methanol solvent. Extract with methanol solution filter through filter paper and filtrate was heated on water bath until the yellowish oil remain in the flask. [2]

Fig 7: Garlic oil

Preparation of cream formulation

Preparation of oil phase

White Bees Wax, stearic acid, cetyl alcohol were melted in a stainless steel vessel. To this mixture Liquid paraffin were added and allowed to melt. The temperature of oil phase maintained between 65 - 70 °C

Preparation of Aqueous phase

Water was heated to 65 - 70 °C. In this weighed propylene glycol, methyl paraben and propyl paraben were added the temperature of the phase was maintained at 65 - 70 °C.

Development of Cream formulation

Oil portion was then slowly incorporated into the aqueous phase at 65-70 °C and mixed for 10 to 15Minutes. When the water and oil phase were at the same temperature, the aqueous phase was slowly added to the oil phase with moderate agitation and was kept stirred until the temperature dropped to 40 °C. And the cream formulation was added to it. The emulsion was cooled to room temperature to form a semisolid cream base [2, 7].

Fig 8: Cream base

Formula for cream base

Table 2: Composition of Oil and Aqueous Phases Used in the Preparation of the Cream Base [2, 7]

Part A (oily phase)		Part B (Aqueous phase)	
Ingredient	Quantity	Ingredient	Quanlity
Stearic Acid	2.5%	Propylene Glycol	5%
White Bees Wax	1.5%	Methyl Paraben	0.01%
Stearyl Alcohol	5%	Propyl Paraben	0.04%
Cetyl Alcohol	6.5%	Water	Upto to 100%

Method of cream preparation

1. Trituration

When adding finely divided insoluble powders or liquids, geometric dilution is used. When adding liquids, a well is made into the center. To avoid air pockets, we used glass slabs when smaller quantities were needed. Large quantities of powder were ground with a mortar and pestle.

2. Levigation

Adding coarse particles that are insoluble, this is also referred to as "wet grinding". A molten liquid base, a liquid base, or a semisolid base is used to rub coarse powder. The shearing force must be considered to avoid grittiness.

3. Fusion method

In the fusion technique, drugs and other solids are dissolved in an ointment base and then combined. By melting the

ingredient into the base, the soluble constituents are dissolved. After speculation or trituration, the congeal mixture is smoothed out. Fusion uses special techniques to ensure that the base and other components will not be damaged by thermal degradation. [2, 16]

Evaluation parameters

Take about 1 gram of cream in a clean petri dish and observe visually.

1. Physical Examination

A. The prepared topical creams were inspected visually for their

1) Color
2) Consistency
3) Spread ability
4) Phase separation. [3]

Fig 9: Formulated cream

B. PH

The ph was measured in cream using a pH meter, which was 10 min priors to taking the reading at room temperature. The pH of a topical preparation should be within the pH range corresponding to the calibrated before each use with standard buffer solutions [2].

(PH of the skin lies 4.5- 7)

Fig 10: PH Measurement

2. Viscosity

The viscosity of formulated creams was measured by Brook field Viscometer LVD using spindle S 94 at varying speed and shear rates. The measurements were done over the range of speed setting from 0.10, 0.20, 0.30, 0.40 and 0.50 rpm in 60 s between two successive speeds as equilibration with shear rate ranging from 0.20 s-1 to 1.0 **s**-1.

(Viscosity determinations were performed at room temperature)[1, 2]

3. Tube extrudability

In the present study, the method adopted for evaluating cream formulation for extrudability was based upon the quantity in percentage cream extruded

From tube on application of finger pressure more quantity extruded better was extrudability. (Tube extrudability was then determined by measuring the amount of cream extruded through the tip when a pressure was applied on a tube)[2]

Fig 11: Application of topical cream from tube onto fingertip

4. Stability test

Formulated cream are take in a porcelain dish and place in water bath increase the temperature gradually [5].

5. Microbiological studies

The microbiological study was performed on E-coli, for the microbiological study the nonresistance e-coli was taken, for microbiological study disc diffusion method was used. Horizontal and vertical zic zak line of culture was applied on petri dish by using cotton stick.and two spot of cream given on petri dish, incubated petri dish for 24 houirs. And measure the zonal inihibition [1, 2, 4].

Results

1. Physical Examination

1. The cream color is Brown
2. Cream appearance is smooth
3. Cream are easy to apply on skin

The API and cream base all are homogenous there are no sign of phase separation [3].

Fig 12: cream for visual infection

B. pH measurement

The pH of cream is 7.0

Ideal cream should be too acidic cause's irritation in skin and too alkaline cause scaly skin [2].

Fig13: PH measurement

2. Viscosity measurement

Cream viscosity measure by using Brookfield Viscometer Viscosity of cream found to be [1, 3].

3. Stability test

Formulated cream start melting at 49 degree Celsius, Hence cream are keep away from direct sunlight [4].

4. Microbiological studies

From the microbiological we found that our hedral cream showing a good antimicrobial activity on E coli. The zone inhibition calculated by using zone meter

We studied a three formulation having a different concentration API [1, 2, 4].

Zone inhibition of different formulation.

Formulation 2 result on E-coli. B. Formulation 1 result on E-col

Fig 14: Formulation 3 result on E-coli.

Formulated Cream are compared with marketed cream GARAMYCIN 0.1% (API Gentamycin) Garamycin showing a 9.47mm zone inihibition on E-coli. Zone inihibition (in mm) of different formulation on E-coli are given in below table.

Formulation	Zone Inihibition (mm)
F1 (7%)	10mm
F2 (6%)	13mm
F3 (7%)	15mm
Standard (gentamycin)	9.47mm

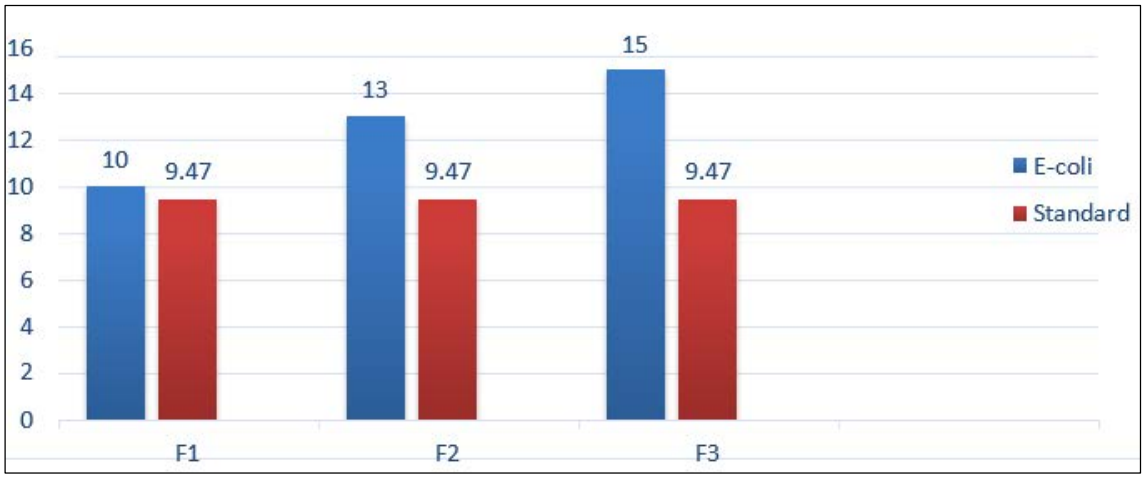

Fig 15: Inhibition zone (mm) of different formulations (F1, F2, F3) against E. coli compared to the standard antibiotic

The above graph shows that the F3 formulation exhibits better inhibition than the standard gentamycin cream, so we selected the F3 formulation for final use

Result and discussion

The zone inhibition measured in different formulation on Escherichia coli on above pictures

Disc diffusion was employed to evaluate the antibacterial efficiency of polyherbal cream

The zone diameter are found 10, 13, 15 to formulation f1, f2, f3 respectively.

The biggest zone inhibition were shown in formulation f3

(8%) showed greater activity on Escherichia coli
The antibacterial activity of prepared cream were compared with garamycine (0.1%) using selected species of microorganism such as Escherichia coli It obseved that formulation f3 shows greater activity on Escherichia coli as compared to garamycine 0.1% cream So the prepared cream has better activity against E.coli as compared to standard 0.1% geramycine cream.

Conclusion
Hence the study concluded that efficient antibacterial cream with anti-bacterial activity can be formulated from the methaonic plant extract of neem leaves, curry leaves, garlic oil and honey which can be also be used for antibacterial infection and various skin infection.

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