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(RESEARCH ARTICLE)

In vitro evaluation of the herbal cream formulation from methanolic extract of Bouganvilea spectabelis. W bracts for topical application.

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Abstract

The methanolic bract extract of *Bougainvillea spectabelis* was combined with a cream base to create a homogenous herbal cream.W..The cream's in vitro antibacterial activity and physicochemical characteristics were assessed. The cream was assessed using the following methods: viscosity, homogeneity, PH test, irritancy test, washability test, and viscosityThe cream's antibacterial effectiveness against Staphylococcus aureus (ATCC2523) and Escherichia coli (ATCC2953) was assessed using the disc diffusion method. The methanolic extract of *Bougainvillea spectabelis* was utilized in the herbal cream *Bougainvillea spectabelis*.W bracts; it shown efficacy in topical skin therapy and was found to be gentle, washable, stable, and yellow.

Keywords: *Bougainvillea spectabelis*; W bracts; Topical treatment; Herbal cream; Skin infection; Disc diffusion

1. Introduction

Skin infections are a major global health concern, despite their frequent neglect. According to the World Health Organization (WHO), one of the leading causes of global burden of disease is skin infections. Since they rank fourth in the world for disability and cause a large number of fatalities [1, 2, 3]. It's still alarming that the antimicrobial medications made from petrochemicals that are already on the market don't seem to be working to solve the issue because bacteria have grown resistant to them over time. Health care professionals faced difficulties as a result of this resistance, which must now be addressed immediately [4].

The *Bougainvillea spectabelis* W. is used totreat Topical skin infections caused by , Staphylococcus aureus, and E. Coli,. Furthermore, the microbes have become increasingly resistant to conventional antimicrobial drugs, leading to a rise in the incidence and severity of skin infections among the populations. Even more hazardous, opportunistic, and polymicrobial in nature, E. Coli and Staphylococcus aureus can cause extremely difficult infections that are difficult to treat [6, 7]. This suggests that treating bacterial skin infections with traditional medications is still difficult. Therefore, the quest for discovering and creating novel antimicrobial medicines that counteract resistance and reduce skin infection occurrences remains imperative.In order to successfully treat skin diseases, scientists are continuously searching for novel or alternative antibacterial substances from medicinal plants. A potential new actor in the creation of medications to treat both infectious and non-infectious disorders is medicinal plants.[8,9,10] The herbal remedies that are widely used in Ayurvedic medicine in India.

The purpose of this project is to examine how natural resources can be used to find antimicrobial compounds that can treat bacterial skin infections and possibly lower antibiotic resistance. Numerous research have revealed that the bioactive components of the medicinal plant, such as phytocompounds, have antibacterial and inhibitory activities against skin diseases.[11,12,13,14,15] Flavonoids, terpenes, and steroids are examples of phytochemicals that

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significantly contribute to the antibacterial properties and therapeutic usefulness of this plant [15]. This plant has been traditionally used for generations to treat fungal and bacterial skin problems, and it may one day be a source of new antimicrobial medicines [12]. Boganvilea spectabelis possesses such ethnomedical and pharmacological qualities.Bracts, W. inspires higher stages, such the preparation of herbal remedies, particularly semisolids made from this variety of plant. One of the key therapeutic forms utilized for topical dose therapy is the semisolid herbal formulations, which include creams, gels, and ointments [16] The active ingredients from medicinal plants are combined with semisolid bases to make topical skin infection treatment doses. However, herbal formulations—a crucial step—come before the antibacterial activity of either extracts or pure components from medicinal plants. Nowadays, it's commonplace to find herbal medication formulations made from local medicinal plants in China and India. These countries sell and use these herbal formulations, known as sessiles, to treat skin infection issues in healthcare settings all over the world [17, 18, 19]. The formulations of herbal medicines derived from *Bougainvillea spectabelis*.W, a medicinal plant mostly found in India, have never been documented. As a result, In light of the pharmacological research and stated therapeutic qualities of *Bougainvillea spectabelis*, this is the case.The goal of this study is to create herbal creams using *Bougainvillea spectabelis* bracts.W methanolic extract is available for topical use in India.

2. Materials and methods:

2.1. Materials

2.1.1. Plant materials and extraction:

Bougainvillea spectabelis is a plant whose bracts were obtained from Tadepalligudem in west Godavari.A.P.The plant taxonomist and botanist from the Horticultural University of Ramanagadem, Nallazerla Mandal, determined the species of the plant.

The flower bracts were removed, dried in a 50°C hot air oven for 72 hours, and then processed into a powder using an electronic blender.

About 10 grams of dried bracts powder were thoroughly extracted utilizing a hot, continuous extraction method using a Soxhlet equipment and 100 milliliters of methanol over the course of 48 hours.Whattmann filter paper was used to filter the mixture mentioned above.Next, the collected filtrate is dried in a Rotory evaporater at 55^0 c after being evaporated at reduced pressure.

2.2. Methods

2.2.1. Formulation of herbal cream:

Making a cream with extract from Bougainvillea spectabilis bracts:

- A water-in-oil emulsion base was used to generate a cream; when the emulsifier was dissolved and heated to 75 °C, additional oil-soluble substances including cetyl alcohol and rose oil were added.
- Preservatives, water-soluble ingredients, propylene glycol, triethanolamine, and Boganvillea spectabilis methanol extract were added after the combination had been dissolved in an aqueous phase and heated to 75 °C.

After heating the oil phase and adding the aqueous phase, the mixture was constantly stirred until the emulsifier cooled.

Table 1 Composition of cream

S.no	Ingredients[gm]	Quantity[gm]
1	Methanolic extract of Bougainvillea	2gm
2	Stearic acid	12gm
3	Cetyl alcohol	3ml
4	Rose oil	4ml
5	Methyl paraben	0.028gm
6	Propyl paraben	0.029gm

7	Propylene glycol	4gm
8	Tri ethanolamine	Q.S
9	Water	Q. S

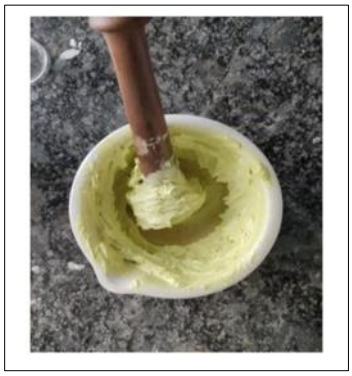

Figure 1 Herbal Cream Formulations

2.2.2. Evaluation parameters for cream:

Organo leptic evaluation

Physical evaluations were done for the cream color, smell, texture, and condition.

Irritancy test

A 1 cm dorsal section of the left hand was treated with a cream, and for up to 24 hours, the area was observed for erythema, edema, and irritation.

Washability test

To find out how well a product leans, the washability test is a crucial tool.[20]

PH test

A digital PH meter was used to determine the PH of 0.5g of cream that had been dissolved in 50ml of distilled water.[21]

Homogenity

By using touch and appearance, the formulation's homogeneity was evaluated[20].

Spreadability

Using a 100 gram weight, a cream sample was uniformly squeezed between two glass slides; after 30 g of effort, the upper slide moved with ease.

$$S=m\times L/T$$

S=stands for spreadability.
M=Weight connected to the top slide l is the glass's length and t is the time in seconds.

Viscosity

A spinning viscometer was used to determine the viscosity of the formulation. r.At 100 rpm, three duplicate measurements were taken, and the outcomes were expressed in centipoises.[22]

2.2.3. Physicochemical assessment of the herbal cream formulations

Organo leptic evaluation

Table 2 Results of organoleptic evaluation

Sr.no	Physical property	cream
1	Colour	Light green
2	Odour	Organic
3	Texture	Smooth

Irritancy test

Table 3 Results of irritancy test

S.no	Formulation	Irritant effect
1.	cream	nill

Washability test

When the herbal cream formulations were rinsed with water, they removed the substance well and left no residue on the skin, demonstrating good washability features.

Table 4 Washability test

s.no	Formulation	Wash ability
1.	cream	Cream easily washed off with water

PH test

The pH of the herbal formulation is more in line with the 6.65 that skin requires, but the pH of the cream is between 5.6 and 6.8, which is suitable for skin.

Homogenity

The cream's excellent level of workmanship was evident in its appearance and tactile qualities, which were used to evaluate the homogeneity of the formulation. Since the spreadability test revealed that the manufactured cream has exceptional spreadability, a shorter separation time indicates higher spredability.

Viscosity:

The cream's viscosity, which varied from 500 to 1000 cps, demonstrated how easily it spread with little shear.

2.2.4. Antimicrobial activity evaluation:

Selection and sub-culturing of bacteria strains:

The study utilised bacteria from NCIM, Pune, namely Staphylococcus aureus (ATCC2523) for Gram positive purposes and Escherichia coli (ATCC2953) for Gram negative purposes. Mueller Hinton Agar was used to subculture the bacteria (MHA). The strains were inoculated, and they were then incubated for 24 hours at 37^0C.

The Disc diffusion approach (Disc diffusion technique), as previously demonstrated by Hudzicki (2009), was applied to the antibacterial bioassay [23]. The efficacy of the boganvilea spectabelis.W. bracts methanolic extracts used in the cream formulations was tested using an antimicrobial testing. 6 mm diameter discs were made from Whatman's No. 1 (filter paper) using a paper puncher. Four discs were injected with a bacterial inoculum onto MHA petri dishes that had solidified. They were then placed on seeded agar plates with 20 µL of cream sample added. For a whole day, the

generated sample was incubated at 37°C in order to look for zones of inhibition, which would indicate that it could stop pathogen development on the plates that had developed. To determine the antibacterial viability, zones of inhibition were measured using an antibiotic zone reader and compared to the control (commercial pharmaceutical standards). Ciprofloxacin is a common medication used to treat germs.

3. Results and discussion

Using medicinal plants to fight a variety of diseases in healthcare settings is made possible in large part by herbal formulation. Besides, the most common topical application for herbal cream semisolid formulations is the treatment of skin infections. The antimicrobial creams that are created by combining active ingredients shield the skin from microbial skin conditions.

Because it shields the body from environmental issues like microbial diseases, skin care is unquestionably important. The study looked at the physicochemical properties and antimicrobial efficacy of a cream formulation made of herbs against S. aureus and E. coli.

Representative bacteria include S. aureus and E. coli. The cream formulation was subjected to bacteria that cause topical skin infections [5, 6].

Table 5 In vitro AntiMicrobial activity for the tested cream samples

Organism	Type of organism	Concentration of extract [in µl]	Zone of inhibition [in mm]
Staphylococcus aureus	Gram positive	20	1.1
Escherichia coli	Gram Negative	20	1.0
Staphylococcus aureus	Gram positive	40	1.2
Escherichia coli	Gram Negative	40	1.1
Staphylococcus aureus	Gram positive	60	1.3
Escherichia coli	Gram Negative	60	1.2

The antimicrobial activity measured from zones of inhibitions was used to evaluate the effectiveness of the cream formulation's bioactives, which was supported by earlier studies on antibacterial qualities.[14] Furthermore, the anticipated effectiveness of the herbal cream formulation might have been influenced by bioactives that are congruent with the identified phytochemicals of the same medicinal plant. [15] The presence of bioactives with antimicrobial qualities, such as terpenes, fatty acids, saponins, and flavonoids, which have an active moiety and lipophilic qualities, may be responsible for the herbal cream's effectiveness. These bioactives can be found in concentrations up to 25 mg/mL [24, 25]. Thus, we anticipate that topical skin disease pathology may benefit from the use of herbal cream.

Still, more investigation is needed to assess the efficacy of the herbal cream generated using in vivo animals, which could lead to human clinical trials for the administration of real medicine.

4. Conclusion

The human skin is one of the most important organs that need constant care to keep out bacteria, fungus, and other microorganisms that can cause skin infections. The medical community is in charge of combating microbial skin infections with petrochemical medications, and medicinal plants, which produce large amounts of bioactives, are the most promising natural option to combat severe drug resistance. Herbal medicines made from medicinal plants have the potential to be the future focus of medication development and discovery. A herbal cream made from the methanolic bract extract of *Bougainvillea spectabelis*, for example, performed well, indicating that the plant has the potential to be used in the search for an antibacterial agent that could be used to treat skin infections brought on by the bacteria S. aureus and E. coli.The bioactive components of creams—flavonoids, terpenoids, tannins, and terpenoids—were largely responsible for their marked utility at the time. It may be possible to find and apply antimicrobial creams to treat skin infections brought on by S. aureus and E. coli.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors have no conflicts of interest regarding this investigation**.**

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