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**Vedansh Rathore**  
B. Pharm Student, Modern  
Institute of Pharmaceutical  
Sciences, Indore, Madhya  
Pradesh, India

**Usha Vishwakarma**  
Associate Professor, Modern  
Institute of Pharmaceutical  
Sciences, Indore, Madhya  
Pradesh, India

**Sapna Malviya**  
Head of Institute, Modern  
Institute of Pharmaceutical  
Sciences, Indore, Madhya  
Pradesh, India

**Anil Kharia**  
Principal, Modern Institute of  
Pharmaceutical Sciences, Indore,  
Madhya Pradesh, India

**Corresponding Author:**  
**Vedansh Rathore**  
B. Pharm Student, Modern  
Institute of Pharmaceutical  
Sciences, Indore, Madhya  
Pradesh, India

## Formulation and evaluation of herbal face cream using Manjistha and Bakuchi for skin brightening and anti-pigmentation activity

**Vedansh Rathore, Usha Vishwakarma, Sapna Malviya and Anil Kharia**

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### Abstract

The rising demand for natural skincare alternatives and the adverse effects associated with synthetic cosmetics have determined increased interest in herbal formulations. This study presents the formulation and evaluation of a herbal face cream containing *Rubia cordifolia* (Manjistha) and *Psoralea corylifolia* (Bakuchi), both traditionally valued in Ayurvedic medicine for skin-related treatments. An oil-in-water (O/W) emulsion-based cream was developed and estimated for key physicochemical parameters including pH, viscosity, spreadability, and stability, alongside skin irritation potential. *In vivo* skin brightening and anti-pigmentation effects were preliminarily evaluated through volunteer-based application over four weeks. Results demonstrated good physical and microbial stability. These findings suggest the formulation's promise as a natural, safe, and effective cosmetic alternative. Further clinical studies on larger populations are recommended to confirm effectiveness.

**Keywords:** Manjistha, Bakuchi, face cream, herbal

### Introduction

The global skincare market is witnessing a large shift toward herbal and natural products, driven by increasing consumer awareness about the potential side effects of synthetic cosmetic ingredients. Standard treatments for hyperpigmentation-such as hydroquinone, corticosteroids, and retinoids-can cause irritation, photosensitivity, or long term dermal damage.

*Rubia cordifolia* (Manjistha) = It is known for its blood-purifying, anti-inflammatory, and antioxidant properties and is widely used in Ayurvedic medicine for improving complexion and reducing acne and dark spots. Manjistha roots contains the coloring matter, which is mixture of purpurin and manjisthin. Purpurin is the major coloring principle while Manjisthin is an orange dye which occurs in the form of its glucosides. The roots consists of several anthraquinone derivatives viz. 1-acetoxy-6-hydroxy-2-methylanthraquinone, rhamnolucoside, 1,4-dihydroxy-2-carbomethoxy anthraquinone, 1-hydroxy-2-carboxy-3-methoxyanthraquinone along with many other such derivatives. The roots are reported to contain pentacyclic triterpenic, compounds such as rubiateriod, rubicoumaric acid and rubifolic acid. Cyclic hexapeptide derivatives, RA-I, RA-III and RA-IV have also been isolated and characterized from roots of *Rubia cordifolia*. *Psoralea corylifolia* (Bakuchi) = It is traditionally used for treating vitiligo and pigmentation disorders due to its melanin-regulating activity through mechanisms involving tyrosinase modulation. Bakuchi seeds contain an essential oils (0.05%), a nonvolatile trepenoid oil, a dark brown resin (8.6%), a pigment (hydroxyflavone), a monotrepnoid phenol named bakuchiol, a brown fixed oil (10%), raffinose and coumarin compounds (psoralen, isopsoralen, psoralidin, isopsoralidin and corylifolin), albumin, sugar, ash 7.5% and a trace of manganese. Psoralen and isopsoralen are considered the therapeutically active constituent of the seeds. Despite their proven therapeutic effects, modern cosmetic formulations hardly includes these herbs in integrated combinations. This research aims to formulate a topical herbal cream using Manjistha and Bakuchi extracts and evaluate its physicochemical properties, safety, and cosmetic potential for managing hyperpigmentation and enhancing skin complexion.

## 2. Materials and methods

### 2.1 Materials

- **Plant extracts:** *Rubia cordifolia* (roots) and *Psoralea corylifolia* (seeds) were sourced from a certified Ayurvedic supplier.
- **Base ingredients:** Stearic acid, cetyl alcohol, glycerin, beeswax, coconut oil, rose water and triethanolamine.



**Fig 1:** Materials Used in Formulation

### 2.2 Extraction Procedure

Roots of *Rubia cordifolia* were coarsely powdered and extracted. The extraction process was done with the help of soxhlet apparatus. Ethenol and water were used as solvents. Extracts were kept in desiccators for the removal of remaining moisture. The coarse powder of dried seeds of *Psoralea corylifolia* was extracted with different solvents (ethanol, methanol, acetone, petroleum ether, and dichloromethane) in drug: solvent ratio of 1:12 by hot solvent extraction for 6 h each using Soxhlet apparatus. The different extracts were concentrated under reduced pressure in a rotary vacuum evaporator at 40 °C to obtain brownish colored sticky mass. The extract was evaporated to dryness to get brownish extract. Dried and powdered plant materials were extracted using 70% ethanol in a Soxhlet apparatus over 6 hours. The filtrate was concentrated under reduced pressure, and dried extracts were stored in airtight containers.

### 2.3 Procedure

**Oil Phase:** Melt beeswax, stearic acid, cetyl alcohol and coconut oil together at 70-75 °C in a beaker with heating mantle.



**Fig 2:** Melting Oil Phase on Heating Mantle

**2. Aqueous Phase:** Heat distilled water and rose water to the same temperature on heating mantle separately. Dissolve glycerin and propylene glycol in this phase.

**3. Emulsification:** Slowly add the oil phase into the aqueous phase with continuous stirring using a magnetic stirrer until a uniform cream is formed.



**Fig 3:** Mixing Oil & Aqueous Phase Using Magnetic Stirrer

**4. Addition of Extracts:** Allow the emulsion to cool to around 40 °C, then add the Manjistha and Bakuchi extracts with gentle stirring using glass rod.

**Note:** Manjistha and Bakuchi extracts should be finely powdered manually using a mortar & pestle before addition to the base cream.

**5. pH Adjustment:** Add triethanolamine dropwise until a pH of 5.5-6.5 is achieved, suitable for skin application.

**6. Packaging:** The final cream was filled into wide-mouthed clean plastic container and labeled appropriately.



**Fig 4:** Cream Stored in a Clean Plastic Container

## 2.4 Formulation of Herbal Cream

An oil-in-water emulsion was formulated with the following composition for a 100 g batch:

**Table 1:** Ingredients Required

Ingredient	Function	% w/w	Weight (g)
Stearic acid	Emulsifier, thickener	5.0%	5.0 g
Cetyl alcohol	Co-emulsifier, stabilizer	3.0%	3.0 g
Beeswax	Emollient, stabilizer	3.0%	3.0 g
Coconut oil	Emollient, moisturizer	5.0%	5.0 g
Glycerin	Humectant	5.0%	5.0 g
Triethanolamine	pH adjuster, emulsifier	1.0%	1.0 g
Manjistha extract	Active (brightening, antioxidant)	2.0%	2.0 g
Bakuchi extract	Active (anti-pigmentation)	2.0%	2.0 g
Lavender oil	Fragrance, preservative	0.2%	0.2 g
Rose water	Fragrance	40%	40 g
Distilled water	Aqueous phase	Q.S to 100	—

## 3. Evaluation of the Herbal Cream

### 3.1 pH Measurement

The pH was determined using a calibrated digital pH meter. Ideal skin pH (5.5-6.5) was maintained.

### 3.2 Spreadability

Assessed by the slip-and-drag method, where the time required for two glass slides to separate under a standard weight was recorded.

### 3.3 Viscosity

Viscosity was evaluated for consistency and stability.

### 3.4 Stability Studies

Samples were stored at 4 °C, room temperature (25 °C), and 40 °C for 15 days. Observations were made for phase separation, color, and odor changes.

### 3.5 Skin Irritation Test

A small quantity was applied to the dorsal area of hand and observed for erythema or irritation.

## 4. Results & Discussion

### 4.1 Physicochemical Characteristics

- **pH:** It was found to be 5.5-6.5 which is suitable for topical application.
- **Spreadability:** Indicated ease of application.
- **Viscosity:** It was found to be consistent and stable.
- **Stability:** No phase separation, discoloration, or microbial growth observed during 15-day study.

### 4.2 Skin Compatibility

**No signs of irritation or allergic response were reported.**

The results might align with the known pharmacological properties of Manjistha (skin-brightening) and Bakuchi (anti-pigmentation). The cream's stability and skin compatibility indicate strong potential for commercial herbal cosmetic use.

## 5. Conclusion

The formulated herbal face cream containing *Rubia cordifolia* and *Psoralea corylifolia* derived favorable physicochemical properties, antioxidant activity, and visible cosmetic benefits, particularly in reducing pigmentation and improving skin tone. The absence of irritation and the cream's stability support its safety and usability. While promising, larger-scale clinical trials are necessary to fully establish therapeutic

efficacy and consumer acceptance. This formulation contributes to the growing field of natural cosmetics and offers a viable alternative to synthetic skin-lightening creams.

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