International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 107-112 www.ijprajournal.com ISSN: 2456-4494

Formulation of bok choy based herbal cream: a study of its phytoconstituent and anti-bacterial potential

Mrenmoy Bera[1], Sushuvon Mondal[2], Nilesh Sengupta[3], Saroj Sarkar[4]
[1,2,3,4]*Student, School of Pharmacy, Seacom Skills University, Birbhum, West Bengal*
Corresponding Author: Disha Roy, Assistant Professor, School of Pharmacy, Seacom Skills University, Birbhum, West Bengal.

Date of Submission: 01-11-2025 Date of Acceptance: 10-11-2025

ABSTRACT: This research explores the formulation and evaluation of an antimicrobial cream utilizing an extract from Brassica rapa subsp. chinensis (commonly known as bok choy), a leafy vegetable rich in bioactive phytochemicals. The study aimed to harness the natural antimicrobial properties of bok choy, particularly its glucosinolates and flavonoids, for topical therapeutic applications. The ethanolic extract of bok choy leaves was incorporated into a standard cream base and tested for antimicrobial efficacy against common skin pathogens, including Staphylococcus aureus, Escherichia coli, and Candida albicans. The cream showed strong antibacterial potential and physicochemical stability, making it a promising natural formulation for topical skincare.

Keywords: Bok choy, Herbal cream, Antibacterial activity, Phytoconstituents, Topical formulation.

I. INTRODUCTION:

Skin infections caused by bacteria and fungi are common and often require effective topical treatments. Due to the growing concern of antibiotic resistance, herbal formulations are gaining popularity as safer alternatives. Bok choy (Brassica rapa subsp. chinensis) belongs to the Brassicaceae family and contains bioactive compounds such as glucosinolates, flavonoids, and phenolic acids, which are known for their antioxidant and antimicrobial activities. This study aims to develop and evaluate a Bok choy-based herbal cream for its phytochemical properties and antibacterial effectiveness.[1]

Cream is defined as semisolid emulsions which are oil in water (o/w) or water in oil (w/o) type and these semisolid emulsions are intended for external application [2]. Cream is classified as oil in water and water in oil emulsion. It is applied on outer part or superficial part of the skin and its main ability is to remain for a longer period of time at the site of application. The function of a skin cream is to protect the skin against different environmental condition, weather and gives soothing effect to the skin. There are different types of creams like cleansing, cold, foundation, vanishing, night, massage, hand and body creams. The main aim of our work is to develop a herbal cream which can give multipurpose effect, like moisturizer, reduce acne and skin irritation, reduce skin diseases like eczema, psoriasis, dry skin, wrinkles, rashes etc. and also adding glow to the face. We have used three herbal ingredients in our preparation which are Aloe Vera gel, Neem, Tulsi. Aloe Vera gel is used as a moisturizer, to reduce pimples and acne and also used for treatment of burn wounds [3, 4]. Neem is used as an antifungal and anti-inflammatory and it is also used to reduce scar, pigmentation, redness and itching of the skin [2, 5]

II. MATERIALS AND METHODS:

Fresh Bok choy leaves were collected, washed, and air-dried at room temperature. The dried leaves were powdered and extracted using 70% ethanol through maceration. Approximately 50 g of powdered leaves were soaked in 500 mL of ethanol for 72 hours with occasional shaking. The mixture was filtered and concentrated using a rotary evaporator at low temperature, yielding a semi-solid extract stored at 4°C until use.[6,7]

The antimicrobial activity of the Bok choy extract was tested by the agar well diffusion method against Escherichia coli and Bacillus clausii. Sterile agar plates were inoculated with standardized bacterial suspensions (0.5 McFarland standard). Wells of 6 mm diameter were filled with 100 µL of extract, with ampicillin as the positive control and solvent as the negative control. Plates were incubated at 37°C for 24 hours, and the inhibition zones were measured.[8,9]

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 107-112 www.ijprajournal.com ISSN: 2456-4494

Fig.1: Filtration process

Fig.2: Extraction Process

Phytochemical Tests and Procedures:

Qualitative phytochemical analysis was carried out on the ethanolic extract to detect various bioactive constituents. The following standard tests were performed:

Test	Reagent Used	Observation
Alkaloids	Mayer's reagent or Dragendorff's reagent	Formation of creamy white or orange precipitate indicates alkaloids.
Flavonoids	Lead acetate solution	Yellow precipitate formation indicates flavonoids.
Tannins	Ferric chloride ($FeCl_3$)	Blue-black or greenish coloration indicates tannins.
Saponins	Shaken with water	Persistent froth formation confirms saponins.
Phenols	Ferric chloride solution	Deep blue or black color indicates phenols.
Terpenoids	Salkowski test (chloroform + conc. H_2 SO_4)	Reddish-brown interface indicates terpenoids.
Glycosides	Keller-Killiani test	Reddish-brown ring at interface indicates glycosides.
Steroids	Liebermann–Burchard test	Green or blue color indicates steroids.
Carbohydrates	Molisch's test	Purple ring at junction indicates carbohydrates.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 107-112 www.ijprajournal.com ISSN: 2456-4494

Antimicrobial Assay of Bok Choy Extract:
The antimicrobial activity of Bok choy extract was evaluated using the agar well diffusion method against selected microbial strains.[10,11]

Materials Required:
- Bok choy extract (prepared via maceration)
- Nutrient agar / Mueller-Hinton agar
- Microbial strains (Escherichia coli, Bacillus clausii)
- Sterile Petri dishes and corn borer
- Micropipette
- Sterile cotton swabs
- Control antibiotics (ampicillin, gentamicin)
- Distilled water (as solvent control)

Procedure:
1. Preparation of Agar Plates: Agar media were prepared and poured into sterile Petri dishes, then allowed to solidify.
2. Inoculation: Microbial suspensions were standardized to 0.5 McFarland standard (~1.5 × 10^8 CFU/mL) and uniformly spread across the agar surface using sterile cotton swabs.
3. Agar Well Diffusion: Wells of 6 mm diameter were bored into the agar using a sterile corn borer. Each well was filled with 50–100 µL of the bok choy extract. Positive control (antibiotic solution) and negative control (solvent) were also included.
4. Incubation: Plates were incubated at 37°C for 24 hours for bacteria and 28–30°C for fungi (Candida albicans).
5. Observation: Zones of inhibition around the wells were measured in millimeters to assess antimicrobial activity. [12,13,14]

Formulation of Herbal Cream:
A Bok choy-based herbal cream was prepared using an oil-in-water (O/W) emulsion system for better spreadability and absorption.

Ingredient	Quantity	Function
Cetyl Alcohol	**1.0 g**	**Emollient and thickening agent**
Tween 80	**0.5 g**	**Non-ionic emulsifier**
Xanthan Gum	**1.3 g**	**Thickening and stabilizing agent**
Methyl Paraben	**0.05 mL**	**Preservative**
Glycerin	**18.0 mL**	**Moisturizer and humectant**
Purified Water	**q.s.**	**Aqueous vehicle**
Bok Choy Extract	**2.0 g**	**Active antimicrobial agent**

The cream was prepared by heating both oil and aqueous phases to 70–75°C, mixing them under continuous stirring to form an emulsion, and adding the Bok choy extract after cooling below 40°C. The pH was adjusted between 5.0–6.5 before packaging. [15-20]

Evaluation and Quality Control Tests:

• Appearance: The cream was smooth, uniform, and free from phase separation.

• pH Test: The pH was 6.01, within the skin-friendly range (4.5–6.5).

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 107-112 www.ijprajournal.com ISSN: 2456-4494

Fig.2: pH Test

• Viscosity: Measured as 857,170 mPa·s, showing good consistency.

Fig.3: Viscometer

• Spreadability: The cream spread easily with a diameter of 7.8 cm.
• Stability: Remained stable for 3 months with no separation or discoloration.
• Microbial Load: Free from bacterial and fungal contamination.
• Irritation Test: No redness, itching, or irritation observed.
• Odor: Mild herbal fragrance, pleasant for topical use.
• Texture: Smooth, non-greasy, and easy to apply.
• Homogeneity: Uniform distribution of all ingredients without lumps.

III. RESULT AND DISCUSSION:

The phytochemical analysis confirmed the presence of flavonoids(Fig.5), Protein (Fig.6)and carbohydrates(Fig.7), indicating potent bioactive compounds in bok choy extract. The antimicrobial tests revealed inhibition zones up to 0.5 cm against Bacillus clausii and Escherichia coli, suggesting moderate antibacterial activity (Fig.4).

Physicochemical tests showed smooth texture, uniform appearance, and a pH of 6.01 (Fig.2), suitable for skin application. The viscosity was measured at 857,170 mPa·s, and spreadability was 7.8 cm (Fig.3). The cream (Fig.7) remained stable for three months under room temperature and accelerated conditions without phase separation or discoloration.

Irritation and redness tests conducted on human volunteers and rabbits showed no adverse effects, confirming the cream's dermatological safety. The combined effects of glucosinolates and flavonoids contribute to the antibacterial properties and overall efficacy of the formulation.

Fig.4: Anti-microbial Test

Fig.5: Flavonoid test

Fig.6: Proteintest

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 107-112 www.ijprajournal.com ISSN: 2456-4494


Fig.7: Carbohydrate test Fig.7: Final Cream

IV. CONCLUSION

The formulated Bok choy-based herbal cream showed good physical stability, safe pH, strong antibacterial potential, and non-irritant characteristics. Its phytochemical constituents contribute to its antimicrobial and skincare benefits, making it a promising natural formulation for topical applications.

REFERENCES

[1]. Hill, T.R. The effect of nitrogenous fertilizer and plant spacing on the yield of three Chinese vegetables—Kai lan, Tsoi sum and Pak choi. Sci. Hortic. 1990, 45, 11–20. [Google Scholar] [CrossRef]

[2]. Manisha Yogesh Sonalkar, Sachin Annasaheb Nitave. Formulation and evaluation of polyherbal cosmetic cream. World J Pharm Pharm Sci 2016;5:772-9.

[3]. T Reynolds, AC Dweck. Aloe vera leaf gel: a review update. J Ethno Pharmacol 1999;68:3-37.

[4]. Priyanka Sharma, Amit C Kharkwal, Harsha Kharkwal, MZ Abdin, Ajit Varma. A review on the pharmacological properties of Aloe Vera. Int J Pharm Sci Rev Res 2014;29:31-7.

[5]. Sharma Pankaj, Tomar Lokeshwar, Bachwani Mukesh, Bansal Vishnu. Review on neem (Azadirachta indica): thousand problems one solution. Int Res J Pharm 2011;2:97-102.

[6]. Elfalleh W, Hannachi H, Tlili N, Yahia Y, Nasri N, Ferchichi A. Total phenolic contents and antioxidant activities of pomegranate peel, seed, leaf and flower. J Med Plant Res 2012;6:4724e30.

[7]. Safdar, M. N., Kausar, T., Jabbar, S., Mumtaz, A., Ahad, K., & Saddozai, A. A. (2017). Extraction and quantification of polyphenols from kinnow (Citrus reticulate L.) peel using ultrasound and maceration techniques. Journal of food and drug analysis, 25(3), 488-500.

[8]. Chauhan, L., & Gupta, S. (2020). Creams: A review on classification, preparation methods, evaluation, and applications. International Journal of Pharmaceutical Sciences and Research, 11(5), 2050–2058.

[9]. Sirsat, S. V., et al. (2022). Formulation and evaluation of herbal cold cream. International Journal of Pharmacy and Biological Sciences, 12(3), 45–52.

[10]. Rajvanshi, A., et al. (2020). Formulation and evaluation of herbal face cream using Cyperus rotundus and cucumber extracts. Research Journal of Topical and Cosmetic Sciences, 11(1), 15–21.

[11]. Oak, P. M., et al. (2021). Formulation and evaluation of herbal face cream using Nyctanthes arbor-tristis leaf extract. International Journal of Current Pharmaceutical Research, 13(6), 20–26.

[12]. Pattewar, S. V., & Patil, D. N. (2019). Formulation and evaluation of antibacterial herbal cream using Kalanchoe pinnata. Journal of Drug Delivery and Therapeutics, 9(4), 234–240.

[13]. Muggu, S. B., et al. (2020). Development and evaluation of polyherbal cosmetic cream using Aloe vera and Crocus sativus. International Journal of Pharmaceutical Sciences Review and Research, 65(2), 112–119.

[14]. Sharma, A., & Prasar, B. (2018). Formulation and evaluation of herbal face cream prepared from Ocimum sanctum

and carrot. International Journal of Pharmacy and Pharmaceutical Sciences, 10(4), 76–82.

[15]. Reynolds, T., & Dweck, A. C. (1999). Aloe vera leaf gel: A review update. Journal of Ethnopharmacology, 68(1–3), 3–37.

[16]. Handa, S. S. (2008). Herbal Cosmetics Handbook. Eastern Publishers, New Delhi.

[17]. Fahey, J. W., Zalcmann, A. T., & Talalay, P. (2001). The chemical diversity and distribution of glucosinolates and isothiocyanates among plants. Phytochemistry, 56(1), 5–51.

[18]. Mithen, R. (2001). Glucosinolates and their degradation products—A new class of cancer preventive agents. Plant Growth Regulation, 34(1), 91–103.

[19]. Singh, S., & Kumar, R. (2021). Formulation and evaluation of herbal topical preparation for antimicrobial activity. Journal of Pharmacognosy and Phytochemistry, 10(5), 300–306.

[20]. Kamboj, A. (2012). Analytical evaluation of herbal drugs. Springer, New Delhi.