World Journal of Pharmaceutical Science and Research
www.wjpsronline.com
Research Article
ISSN: 2583-6579
SJIF Impact Factor: 6.916
Year - 2026
Volume: 5; Issue: 6
Page: 592-603

FORMULATION AND EVALUATION OF HERBAL PAPER SOAP WITH WOUND HEALING AND ANTIBACTERIAL PROPERTIES

Ronit Bhoir[1], Suraj Ujgare[1], Vaishnavi Chavan[1], Sujal Yadav[1], Nitin Mahale*[2], Dr. Santosh Ghule[3]

[1]Students, Samarth College of Pharmacy, Belhe, Pune, India 412410.
[2]Associate Professor, Samarth College of Pharmacy, Belhe, Pune, India 412410.
[3]Principal, Samarth College of Pharmacy, Belhe, Pune, India 412410.

Article Received: 15 April 2026 | | Article Revised: 05 May 2026 | | Article Accepted: 26 May 2026

***Corresponding Author: Nitin Mahale**
Associate Professor, Samarth College of Pharmacy, Belhe, Pune, India 412410.
DOI: https://doi.org/10.5281/zenodo.20445966

How to cite this Article: Ronit Bhoir, Suraj Ujgare, Vaishnavi Chavan, SujalYadav, Nitin Mahale, Dr. Santosh Ghule (2026) FORMULATION AND EVALUATION OF HERBAL PAPER SOAP WITH WOUND HEALING AND ANTIBACTERIAL PROPERTIES. World Journal of Pharmaceutical Science and Research, 5(6), 592-603.

ABSTRACT

Herbal paper soap is a cutting-edge, portable cleansing solution that uses natural ingredients to promote personal hygiene and offer therapeutic benefits. The present study focuses on the formulation and evaluation of herbal paper soap with antibacterial and wound healing properties using neem, turmeric, and aloe vera extracts. The antibacterial, anti-inflammatory, skin-protective, and restorative properties of these herbal components are widely recognised. In order to create dissolvable soap strips, hydroxypropyl methylcellulose (HPMC) was utilised as the film-forming polymer and water-soluble paper as the basis material. To guarantee quality, stability, and efficacy, the prepared herbal paper soap was assessed using common pharmaceutical metrics such as appearance, thickness, pH, folding endurance, foamability, washability, and disintegration time. The prepared strips showed good flexibility, rapid dissolution, satisfactory foam formation, and effective cleansing action. The results imply that herbal paper soap can be a practical, sustainable, and efficient substitute for traditional soaps for skin protection and personal hygiene.

KEYWORDS: Antibacterial, Wound Healing, Skin Protective, Water Soluble Paper, Hygiene.

INTRODUCTION

Personal hygiene has a significant contribution in ensuring proper health and preventing the transmission of infectious diseases. Various hand cleansing preparations such as soap and hand sanitizer are commonly employed for cleaning the skin surface by eliminating the dirt, microorganism, and any kind of contamination. Recently, there has been high

consumer preference for portable, environmental-friendly, and herbal soaps which have dual functionality of cleaning and healing. Herbal soaps are preferred over synthetic soaps due to their safer, environmentally friendly, non-irritating nature, and curative qualities Paper soap is a type of soaps which is thin and water-soluble.

The reason behind its increasing popularity is that being small in size and easy to handle, it is an innovative way to practice hygiene. Herbal content of paper soap helps increase its efficiency by making it antibacterial, anti-inflammatory, antioxidant, and healing for wounds.

Neem (Azadirachta indica) is well known for its strong antibacterial and antifungal properties and has been traditionally used in skin infections and wound treatment. Turmeric (Curcuma longa) contains curcumin, which exhibits antimicrobial, anti-inflammatory, and healing properties. Aloe vera possesses soothing, moisturizing, and skin-repairing activities, making it beneficial in topical formulations. The combination of these herbal ingredients can improve skin protection and promote wound healing while maintaining cleanliness.

This research emphasizes on the preparation and evaluation of herbal paper soap consisting of extracts from neem, turmeric, and aloe vera using water soluble papers along with appropriate film forming agents. This formulated soap was tested against different pharmaceutical and physiochemical parameters including appearance, pH, thickness, folding endurance, foaming property, washing effect, and disintegration time. The study further includes antibacterial and wound healing activity to evaluate the therapeutic efficacy of the prepared herbal paper soap.

Objectives

1. To formulate herbal paper soap using water-soluble paper and suitable film-forming polymers.
2. To incorporate herbal ingredients such as neem, turmeric, and aloe Vera for antibacterial and wound healing activity.
3. To evaluate the prepared herbal paper soap for physicochemical parameters including appearance, thickness, pH, folding endurance, foamability, and disintegration time.
4. To study the antibacterial activity of the formulated paper soap against selected microorganisms.
5. To assess the wound healing and skin-protective potential of the herbal ingredients used in the formulation.
6. To develop a portable, eco-friendly, and user-friendly herbal cleansing product suitable for daily use.

Materials Required & Procedures

S.r No	Material	Quantity	Role/use
1	Neem (Azadirecta indica)	4 ml	Antibacterials and antiseptic agent
2	Turmeric (Curcuma Long)	4ml	Anti – septic agent
3	Aloe vera (Barbadensis miller)	4ml	Skin soothing and healing agent
4	SLS	0.46 g	Foaming and cleansing agent
5	HPMC	0.45 g	Film – forming polymer
6	Glycerine	0.37g	Moisturizing agent
7	Lavender oil	5 drops	Fragrances
8	Distilled water	15 ml	Solvent
9	Water soluble paper	15 strips	Carrier material

Neem (Azadirecta Indica)

Neem (Azadirachta indica) is an important medicinal plant and widely used in herbal and Ayurvedic preparations. It is antibacterial, antifungal, antiseptic and anti-inflammatory. Neem helps prevent skin infections, reduce inflammation

and promote wound healing. Neem has antimicrobial activity and is therefore used in soaps, creams, lotions and other skincare products. It also aids in keeping the skin clean and protects the skin from harmful microorganisms.

Procedure (Maceration)

1. Fresh neem leaves were collected and washed well with water.
2. Leaves were shade dried for few days.
3. Leaves weredried and powdered using grinder.
4. Neem powder (10 g) was taken in a clean container.
5. The powder was added with ethanol or distilled water.
6. The mixture was kept closed for 24-72 h.
7. The mixture was shaken from time to time during maceration.
8. After maceration, the mixture was filtered through filter paper.
9. The collected neem extract was the filtrate obtained.
10. The extract was kept in an air tight container for further use.

Turmeric (Curcumalonga)

Turmeric (Curcuma longa) is a medicinal plant and widely used in herbal preparations due to its antiseptic, antibacterial and anti-inflammatory properties. It contains curcumin that helps in healing wounds, reduces inflammation and protects the skin from infections. Turmeric is frequently found in skin care and beauty products to help keep skin healthy.

Extraction Method: Maceration Method

1. Fresh rhizomes of turmeric were collected and washed thoroughly.
2. Dried rhizomes (shade) were cut into small pieces.
3. Dried turmeric was ground to powder using grinder.
4. 10 g turmeric powder was taken in a clean container.
5. Powder was mixed with ethanol or distilled water.
6. The mixture was kept closed for 24-72 h.
7. The mixture was shaken from time to time during maceration.
8. After maceration, the mixture was filtered with filter paper.
9. The obtained filtrate was collected as turmeric extract.
10. The extract was stored in an airtight container for future use.

Aloe Veraa (Aloe barbadensis Miller)

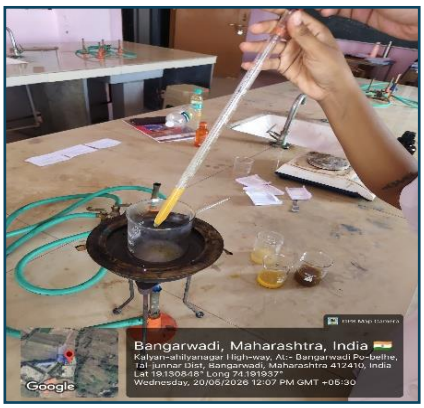
Aloe vera (Aloe barbadensis miller) is a herb which is extensively used for various medical purposes owing to its moisturizing, soothing, and healing properties. This herb contains vitamins, enzymes, and antioxidants and helps to heal the damaged skin, minimize skin irritation, and maintain hydration level of the skin. Aloe vera has mild antibacterial and anti-inflammatory properties.

Procedure of Extraction Using Maceration Method

1. Fresh aloe vera leaves were collected and washed thoroughly.
2. The green peelings were stripped from the leaves.
3. The inner gel was carefully extracted from the leaves using a knife or a spoon.
4. The gel was finely chopped and crushed.
5. Approximately 10 g of aloe vera gel was weighed out.
6. Alcohol or distilled water was added to the gel.
7. The resultant mixture was allowed to macerate for 24 hours.
8. It was occasionally agitated during the period of maceration.
9. The resultant mixture was filtered through filter paper.
10. The filtered solution was collected as aloe vera extract.

Method of Preparation of Herbal Paper Soap

1. HPMC was allowed to soak in 10-15mL of distilled water.
2. The solution was stirred continuously until a gel formation occurs.
3. Then SLS was introduced to the gel base to form a proper mixture.
4. Glycerine was added to help in maintaining moisture and softness.
5. Neem, turmeric, and aloe vera extracts were slowly dripped into the mixture using a dropper.
6. Lavender oil was also added in few drops to give a pleasant aroma.
7. Paper strips of water soluble paper were placed on a clean and flat surface.
8. Then, using a brush, a thin layer of the prepared solution was applied to each strip.
9. The coated strips were keep for drying in sun light for 4-5 hrs
10. Once dried completely, the strips were then cut to suitable sizes.
11. The herbal paper soap strips were kept in moisture-proof sachet



Evaluation parameters

1 Organoleptic Test of Herbal Paper Soap

The formulated herbal paper soap strips were evaluated for organoleptic characters like color, appearance, texture, flexibility and uniformity. The prepared strips were light pinkish brown in color and smooth thin film appearance. The strips were flexible, soft and easy to handle and would not snap easily. Slight herbal residues were uniformly observed on the surface, indicating proper incorporation of the herbal ingredients. The formulation showed good physical appearance and acceptable aesthetic properties for topical cleansing application.

Observations

Color: Pinkish brown light

Appearance: Thin square strips

Appearance: Thin square strips

Texture: Smooth and somewhat rough surface

Flexibility Flexible, foldable

Uniformity: Uniform dispersion of formulation

Odour: Slight characteristic herbal odour.

2 Size and Shape

The prepared herbal paper soap strips were checked for size and shape to ensure uniformity and convenience for the users. The developed strips were square / rectangular in shape having smooth edges and satisfactory appearance. The width of the strips was measured by a scale.

Herbal Paper Soap Dimensions

Height (H): 7 cm

Width (W): 6 cm

The strips were found convenient for handling, storage and application and had a uniformity of size that was acceptable. The strips were thin and flexible, suggesting the strips would form a suitable film for portable cleansing applications

3. pH evaluation Test of Herbal paper soap

The pH of the prepared herbal paper soap was checked by using calibrated digital pH meter. The sample solution was prepared by dissolving one strip of herbal paper soap in distilled water. The electrode of the pH meter was immersed in the solution and the pH was recorded after stabilization of the reading.

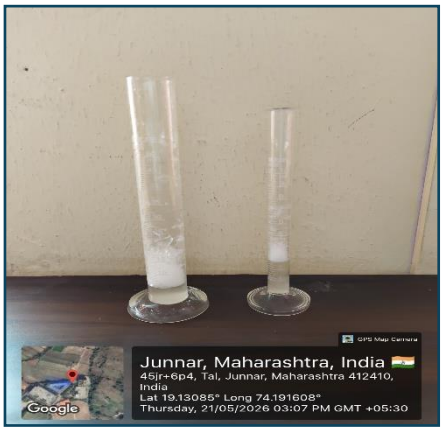
Observation

pH observed: 9.78

Temperature: 32ºC

Result and Interpretation

The prepared herbal paper soap showed pH value of 9.78 which indicates its mildly alkaline nature which is a normal observation in soap based formulations. The obtained pH was within the acceptable range of cleansing preparations and showed satisfactory soap characteristics.



4. Foamability test method

Foamability of formulated herbal paper soap was evaluated by cylinder shake method. Distilled water was added to graduated measuring cylinders containing various concentrations of soap solution. The cylinders were shaken vigorously for a fixed time and the foam that was produced was observed and measured.

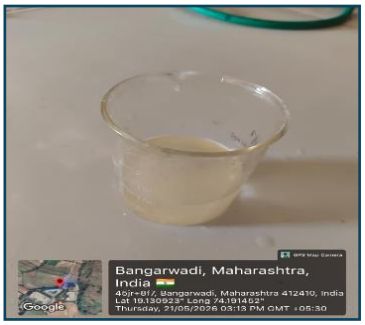
Observation

After shaking both measuring cylinders showed satisfactory foam formation. The foam was creamy white and sat for a few minutes.

Results

Graduated Cylinder Observed Foam Height Large Measuring Cylinder 4–5 mL Small Measuring Cylinder ml 2-3 Analysis.

The formulation showed good foamability and satisfactory cleansing characteristics. Presence of stable foam was a reflection of surfactant activity and proper soap formulation.



5. Disintegration Test Herbal Paper Soap Method

Disintegration test of formulated herbal paper soap was carried out to determine the time required for complete dissolution of the strip in water. Astrip of herbal paper soap was put in a beaker containing distilled water at room temperature and the time taken for complete disintegration/dissolution was recorded with the help of a stopwatch.

Notice

The herbal paper soap strip quickly decomposed in water and completely disintegrated in 16 seconds.

Outcome

The prepared herbal paper soap showed fast disintegration with dissolution time of 16 seconds. It indicates good water solubility and fast usability during the hand washing.

6. Test for weight variation Procedure

Ten strips of the herbal paper soap were randomly taken from the prepared batch and weighed individually by using a digital analytical balance. The uniformity of the formulation was assessed by recording the weights of individual items and determining the average weight.

Observation Table

Strip No.	Weight
1	0.383
2	0.323
3	0.413
4	0.369
5	0.358
6	0.366
7	0.338
8	0.388
9	0.421
10	0.329

Calculation Average Weight: 3.688 / 10 = 0.3688

Average weight of one strip = 0.369 g

Result

The prepared herbal paper soap strips exhibited acceptable weight uniformity with minimum variation among individual strips indicating good consistency and uniform distribution of the formulation.

7. Procedure for the Skin Irritation Test

To assess the manufactured herbal paper soap formulation's safety on the skin, a skin irritation test was conducted. A tiny amount of the dissolved paper soap solution was applied to a small patch of skin on the hand or forearm, and during a certain amount of time, any indications of irritation, such as redness, itching, swelling, or burning feeling, were noted.

Observation

Parameter observed	Result
Redness	**Absent**
Itching	Absent
swelling	Absent
Burning sensation	Absent

Result

During the trial, there were no indications of skin irritation, redness, itching, or inflammation with the herbal paper soap formulation. As a result, the formulation was determined to be safe and appropriate for topical skin application.

CONCLUSION

The present study successfully formulated and evaluated herbal paper soap containing natural ingredients with antibacterial and wound healing properties. The prepared paper soap strips were found to be smooth, portable, easy to use, and rapidly soluble in water. Evaluation parameters such as organoleptic characteristics, pH, foamability, disintegration time, weight variation, and skin irritation test showed satisfactory results. The formulation produced good foam, showed acceptable uniformity, disintegrated rapidly, and caused no skin irritation. Hence, the developed herbal paper soap can be considered a safe, effective, eco-friendly, and convenient alternative to conventional soap formulations for personal hygiene and skin care.

REFERENCES

1. Phatak M, Pimparkhede P, Rathod A, Rathod A, Rathod K, Dhawale S. Formulation and Evaluation of Herbal Paper Soap. Department of Pharmaceutics, D K Patil Institute of Pharmacy, Sayal Road, Loha, Nanded-431708.
2. Saraswathi D, Kavitha PN, Sampagavi M, Upadhyay SK, Poudyal B, Manda P. Formulation and Evaluation of Herbal Paper Soap.
3. Antony A, Varghese AM, Sanil D, Reji L, Ramesh R. Formulation and Evaluation of Antibacterial Herbal Paper Soap Containing Essential Oil of Ocimum basilicum L. Int J Pharm Res Appl, 2025; 10(1): 1034-1047. doi:10.35629/4494-100110341047.

4. Gomase PV, Patil RR, Pawar SP. Formulation and Evaluation of Antibacterial Polyherbal Paper Soap. Int J Res Pharm Allied Sci, 2022. ISSN: 2583-6544.
5. Matsagar SV, Kandalkar PS, Mohan RS, Lodha MP, Tupe AS. Eco-Friendly Herbal Paper Soap: Amla, Reetha and Shikakai Based Formulation and Evaluation. Int J Res Trends Innov, 2025; 10(5): b695. ISSN: 2456-3315.
6. Kaur H, Sharma P, Gupta R. Development and Evaluation of Herbal Paper Soap Using Neem and Aloe vera Extract. Int J Pharm Sci Rev Res, 2021; 68(2): 145-150.
7. Patel D, Chauhan N, Solanki R. Preparation and Evaluation of Portable Herbal Paper Soap for Hand Hygiene. J Drug Deliv Ther, 2020; 10(5): 98-103.
8. Reddy MS, Lakshmi PK, Kumar AS. Formulation and Antimicrobial Evaluation of Herbal Paper Soap Strips. Int J Pharm Investig, 2021; 11(3): 275-280.
9. Singh V, Tiwari A, Mishra P. Evaluation of Herbal Soap Film Containing Natural Antibacterial Agents. J Pharm Res Int, 2022; 34(18): 25-32.
10. Joshi M, Patil S, Deshmukh R. Formulation and Characterization of Herbal Dissolvable Soap Strips for Personal Hygiene. Int J Curr Pharm Res, 2023; 15(2): 40-46.
11. "Turmeric". Drugs.com, 2009. Retrieved 24 August 2017.
12. Leos, M.J. and R.P. Salazar S., The insecticide neem tree Azadirachta indica A. Juss in México. Universidad Autonóma de Nuevo León. Agronomy Faculty. Tech. Brochure 3. Marín, N.L. México, 2002.
13. Bhalodia, N.R., Nariya, P.B., Acharya, R.N., Shukla, V.J., Evaluation of Herbal Cosmetic Preparations.International Journal of Research in Ayurveda and Pharmacy, 2011; 2(1): 61-63.
14. Pattanayak, P. et al., Herbal Cosmetics: Trends in Skin Care Formulation. Pharmacognosy Reviews, 2010; 4(7): 82–89.
15. Gupta, A., Sharma, P.K., Formulation and Evaluation of Herbal Hand Wash. Der Pharmacia Lettre, 2011; 3(2): 295–301.
16. SCCS – Scientific Committee on Consumer Safety, Guidance on Safety Assessment of Cosmetic Products. European guidelines including pH test limits for skin care products, 2012.
17. Gupta, A., Sharma, P.K., Formulation and Evaluation of Herbal Hand Wash.Der Pharmacia Lettre, 2011; 3(2): 295–301. (Includes pH test as part of herbal product evaluation.)
18. Pattanayak, P. et al., Herbal Cosmetics: Trends in Skin Care Formulation. Pharmacognosy Reviews, 4(7), 82–89. Reviews herbal ingredients with cleansing and foaming actions like Reetha and Shikakai, 2010.
19. Namiesnik and rabba jczyk, Wilson. Fresh water parameter and specification of physiochemical forms of metal in surface water and sediments. Chemical's specification and bioavailability, 2010- 11; 22(1): 1-22.
20. Alamzafar (queens, NY, US 07/25 2002, One Time Use disposable paper soap and method of making: application 200-20098994.