



Formulation and Evaluation of Herbal Cream of Terminalia Arjuna Bark for Burn Spot Removal

¹Ms. Kajal Choudhary*, ²Ms. Komal Choudhary*, ³Mr. Jeevan Choudhary*, ⁴Mr. Gaurav Dalve, ⁵Dr. Jeevan Ghormade



<https://doi.org/10.55041/ijst.v2i6.139>

Cite this Article: Choudhary, K., Choudhary, K., Choudhary, J. & Dalve, G. (2026). Formulation and Evaluation of Herbal Cream of Terminalia Arjuna Bark for Burn Spot Removal. International Journal of Science, Strategic Management and Technology, 02(6).
<https://doi.org/10.55041/ijst.v2i6.139>

License: This article is published under the Creative Commons Attribution 4.0 International License (CC BY 4.0), permitting use, distribution, and reproduction in any medium, provided the original author(s) and source are properly credited.

ABSTRACT

Burns and burn scars are common dermatological concerns affecting millions of people globally. Conventional treatments are often associated with side effects and limited efficacy for long-term use. This study focuses on the formulation and evaluation of a herbal cream using Terminalia arjuna bark extract, a plant traditionally renowned for its antioxidant, anti-inflammatory, and wound-healing properties. The extract was prepared by decoction method and incorporated into an oil-in-water (O/W) cream base with suitable excipients. The formulated cream was evaluated for physicochemical parameters including pH, spreadability, viscosity, washability, irritancy, and stability. Phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, saponins, and glycosides. The results demonstrated that the cream was stable, smooth, non-irritant, and met all standard quality parameters. The study suggests that the formulated herbal cream may serve as a safe and effective natural alternative for burn spot management.

Keywords: Terminalia arjuna, Burn spot, Herbal cream, Wound healing, Antioxidant, Phytochemical screening, Topical formulation.

1. INTRODUCTION

Burns and burn scars represent one of the most challenging dermatological conditions encountered in clinical practice. Burns and scalds are local or systemic acute injury diseases caused by various agents including heat sources, chemical corrosive agents, electricity, and radioactive substances. According to statistics, the annual incidence of burns and scalds is significant, affecting all age groups, especially minor children. The repair mechanism for burn and scald involves four stages: inflammatory reaction, cell proliferation, connective tissue formation, and wound contraction and remodeling.

Topical drug delivery has emerged as a preferred route of administration for burn treatment due to its ability to directly target affected skin areas, avoid first-pass metabolism, and reduce systemic side

effects. Creams, as semisolid formulations, represent the most widely used topical dosage forms due to their ease of application, good patient compliance, and aesthetic acceptability. Herbal creams have gained special attention as they combine the therapeutic benefits of plant-based bioactive compounds with the advantages of modern pharmaceutical technology.



Fig. 1: Burn Spot on Skin

Terminalia arjuna (Arjuna), belonging to the family Combretaceae, is an important medicinal plant in Ayurveda with well-documented therapeutic properties including antioxidant, anti-inflammatory, antimicrobial, and wound-healing activities. The bark of *T. arjuna* is particularly rich in bioactive phytoconstituents such as flavonoids, tannins, glycosides, triterpenoids, and saponins. These compounds contribute to skin regeneration, reduction of oxidative stress, and promotion of wound healing, making the plant a promising candidate for burn spot management.

Despite its traditional use, limited scientific data is available on the formulation and standardization of *T. arjuna* in modern topical dosage forms such as creams. The present study, therefore, aims to formulate and evaluate a herbal cream containing *T. arjuna* bark extract for burn spot removal and assess its physicochemical properties and therapeutic potential.

2. PLANT PROFILE

Botanical Name: *Terminalia arjuna* Wight & Arn.

Family: Combretaceae

Terminalia arjuna is a large deciduous tree, commonly known as Arjuna, which grows extensively along the banks of rivers throughout India and parts of South Asia. It is one of the most significant medicinal plants used in Ayurveda for thousands of years, particularly known for its cardioprotective and wound-healing properties.



Fig. 2: Terminalia arjuna Tree and Plant Parts



Fig. 3: Morphological Parts of Terminalia arjuna

2.1 Scientific Classification

Taxonomic Rank	Classification
Kingdom	Plantae
Sub Kingdom	Tracheobionta
Division	Magnoliophyta
Sub Division	Spermatophyta
Class	Magnoliopsida
Order	Myrtales
Family	Combretaceae
Genus	Terminalia
Species	arjuna

2.2 Morphology

T. arjuna is a large, ever-green tree that grows 20–25 meters in height, commonly found along riverbanks. The bark is smooth, grey-green to pinkish-grey externally and reddish internally. Leaves are oblong or elliptic, with rounded or subcordate bases. Flowers are small, white, and fragrant, appearing in spikes or racemes. Fruits are ovoid to ellipsoidal, woody, and hard with 5–7 fibrous wings. Seeds are brown, hard, and wedge-shaped.

2.3 Phytochemical Constituents

The bark of T. arjuna is particularly rich in medicinally active compounds. The major phytochemical classes present include:



Triterpenoids and Glycosides: Arjunic acid, arjunin, arjunetin, arjugenin, arjunoglycoside I-IV, and terminoside A.

Flavonoids: Arjunolone, quercetin, kaempferol, luteolin, and baicalein — responsible for antioxidant and anti-inflammatory activity.

Tannins: Punicalagin, punicallin, castalagin, and casuariin — contributing to astringent, wound-healing, and antimicrobial effects.

Minerals and Amino Acids: Calcium (3133 mg/g), magnesium (4000 mg/g), zinc (119 mg/g), copper (19 mg/g), along with tryptophan, tyrosine, histidine, and cysteine. The bark also contains 34% ash content consisting entirely of pure calcium carbonate, and aqueous extract contains approximately 23% calcium salts and 16% tannins. These constituents collectively support burn wound healing through antioxidant, anti-inflammatory, and tissue-regenerative mechanisms.

3. PHYTOCHEMICAL SCREENING

Phytochemical screening of the aqueous bark extract of *Terminalia arjuna* was performed using standard qualitative tests. The following tests were conducted to detect the major classes of bioactive compounds:

S.No.	Test	Reagent/Procedure	Observation	Result
1	Hager's Test (Alkaloids)	1 ml extract + 2 drops Hager's reagent	Yellow precipitate	+
2	Alkaline Test (Flavonoids)	1 ml extract + NaOH + dil. HCl	No yellow coloration	-
3	Lead Acetate Test (Flavonoids)	1 ml extract + lead acetate reagent	Yellow precipitate	+
4	Gelatin Test (Tannins)	1 ml extract + Gelatin + NaCl	White precipitate	+
5	Potassium Dichromate Test (Tannins)	1 ml extract + $K_2Cr_2O_7$	No precipitate	-
6	Foam Test (Saponins)	1 ml extract + 2 ml distilled water, shake	Stable persistent foam	+
7	Borntrager's Test (Glycosides)	HCl hydrolysis + chloroform + NH_3	Red coloration	+

Table 1: Phytochemical Screening of *Terminalia arjuna* Bark Extract



Fig. 4: Phytochemical Screening Test Tubes

4. MATERIAL AND METHODOLOGY

4.1 Collection of Plant Material

Fresh and clean bark of *Terminalia arjuna* was collected from locally available trees in the Burhanpur region. The plant was identified and authenticated based on its botanical characteristics. The bark was collected carefully without damaging the tree.

4.2 Preparation of Powder

The collected bark pieces were washed thoroughly with distilled water to remove surface contaminants. The washed bark was shade-dried for 15 days until completely dry. Shade drying was preferred over direct sunlight to protect phenolic contents and other heat-sensitive chemical constituents from evaporation and degradation. After drying, the bark pieces were ground into a coarse powder using a mechanical grinder, then passed through a sieve to obtain a fine powder. The fine powder was collected into an air-tight container and stored at room temperature until further use.



Fig. 5: Powder of *T. arjuna* Bark

4.3 Extraction by Decoction Method

Exactly 10 g of the weighed powder of *T. arjuna* bark was transferred into a Round Bottom Flask (RBF). Distilled water (200 ml) was added to the flask in a 1:20 ratio. The mixture was boiled in a heating mantle at 100°C for 30– 45 minutes. After the heating period, the mixture was allowed to cool to room temperature. The cooled extract was filtered through Whatman filter paper No. 1. The filtrate was collected

into a well-closed container and stored at a cool and dry place for further formulation.



Fig. 7: Decoction Process



Fig. 8: Filtration

5. FORMULATION OF HERBAL CREAM

5.1 Composition of the Herbal Cream

S.No.	Ingredient	Quantity (%)	Purpose / Function
1	Terminalia arjuna extract	5.0%	Active ingredient – antioxidant, anti-inflammatory, wound healing
2	Stearic acid	3.5%	Emulsifying and thickening agent
3	Cetyl alcohol	2.0%	Emollient, stabilizer, enhances cream texture
4	Glycerin	4.0%	Humectant, maintains skin hydration
5	Almond oil	5.0%	Moisturizer, rich in Vitamin E, soothes dry skin
6	Beeswax	2.0%	Natural thickener, skin barrier protection
7	Paraben mix (preservative)	0.2%	Prevents microbial growth
8	Rose water / Purified water	Up to 100%	Aqueous phase, acts as vehicle

Table 2: Formulation of Herbal Cream of Terminalia arjuna Bark Extract



5.2 Preparation of Emulsion (Oil-in-Water Cream)

The herbal cream was prepared as an oil-in-water (O/W) emulsion using the standard emulsification method, involving separate preparation of oil and aqueous phases followed by controlled mixing under continuous stirring.

Step 1 – Oil Phase Preparation: Stearic acid, cetyl alcohol, beeswax, and almond oil were accurately weighed and melted together in a beaker on a water bath at 70–75°C until a uniform clear melt was obtained.

Step 2 – Aqueous Phase Preparation: In a separate beaker, glycerin and methyl paraben were dissolved in rose water/purified water. The T. arjuna bark extract was incorporated into this phase. The aqueous phase was heated to approximately 70°C to match the temperature of the oil phase.

Step 3 – Emulsification (Mixing): The heated aqueous phase was slowly added dropwise to the oil phase with continuous mechanical stirring. Constant stirring was maintained to ensure proper emulsification and obtain a uniform, homogeneous cream.

Step 4 – Cooling and Finishing: The emulsion was continuously stirred while cooling to room temperature. After complete cooling, the prepared cream was transferred into a suitable container and stored at a cool and dry place for evaluation.

6. EVALUATION PARAMETERS

The formulated herbal cream containing T. arjuna bark extract (5%) was evaluated for its physicochemical properties, stability, safety, and therapeutic efficacy as described below:

6.1 Organoleptic Evaluation

The prepared cream was visually inspected for colour, odour, appearance, and texture. The cream was examined for homogeneity and presence of any lumps or phase separation.

6.2 pH Determination

The pH of the cream was measured at room temperature using a calibrated digital pH meter. The pH should ideally be in the range of 5.0–6.5 to be compatible with skin pH and ensure stability.

6.3 Washability

A small amount of cream was applied on the skin and washed with water to determine washability. O/W creams should be easily washable with water.



6.4 Irritancy Test

The formulation was tested for skin irritation by applying the cream on a small area of skin and observing for any signs of redness, irritation, or swelling over a period of 8 hours.

6.5 Spreadability

Spreadability was determined by placing a known quantity of cream between two glass slides of a fixed weight and measuring the extent of spreading after a defined time period. Good spreadability is essential for uniform application on the affected area.

6.6 Stability Studies

Stability studies were performed under different storage conditions including room temperature (25°C) and refrigerated conditions (2–8°C). Parameters monitored included colour, pH, appearance, and phase separation over a specified period.

7. RESULTS AND DISCUSSION

7.1 Organoleptic and Physicochemical Evaluation

8. Table 3: Evaluation Results of Herbal Cream

Sr. No.	Evaluation Parameter	Observed Result
1	Colour	Off-white to cream
2	Appearance	Smooth, homogeneous
3	Odour	Characteristic (mild herbal)
4	Texture	Smooth, free from grittiness
5	pH	5.5 – 6.2
6	Spreadability	Good
7	Washability	Easily washable with water
8	Irritancy Test	Non-irritant (No redness or swelling)
9	Phase Separation	Absent
10	Stability	Stable under all tested conditions



Fig. 9: Prepared Herbal Cream of *Terminalia arjuna* Bark

8.1 Discussion

The herbal cream containing *T. arjuna* bark extract (5%) was successfully formulated as a stable oil-in-water emulsion. The formulation showed good homogeneity, smooth texture, and no phase separation, indicating proper selection of excipients including stearic acid, cetyl alcohol, beeswax, glycerin, and almond oil. The pH of the cream was found to be within the skin-friendly range (5.5–6.2), making it safe for topical application on burn-affected skin.

The phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, saponins, and glycosides. Flavonoids present in *T. arjuna* such as quercetin and kaempferol exert potent antioxidant and anti-inflammatory effects that help reduce oxidative stress and inflammation associated with burn wounds. Tannins contribute astringent and wound-healing properties, while saponins and glycosides provide additional antimicrobial protection against secondary infection.

The cream exhibited good spreadability, appropriate viscosity, and was found to be non-irritant in the skin irritancy test — no redness, swelling, or discomfort was observed. The addition of glycerin and almond oil to the formulation enhances skin hydration and nourishment, supporting skin repair and reducing scar formation. Stability studies showed that the formulation remained stable under both room temperature and refrigerated conditions with no changes in colour, phase separation, or pH, confirming its shelf-life suitability for practical use.

9. PHYSIOLOGY OF SKIN IN RELATION TO BURN HEALING

Understanding the structure of skin is essential for appreciating how topical formulations work. The skin consists of three principal layers: the epidermis, dermis, and subcutaneous tissue. Burns disrupt the integrity of these layers, initiating a complex repair cascade.

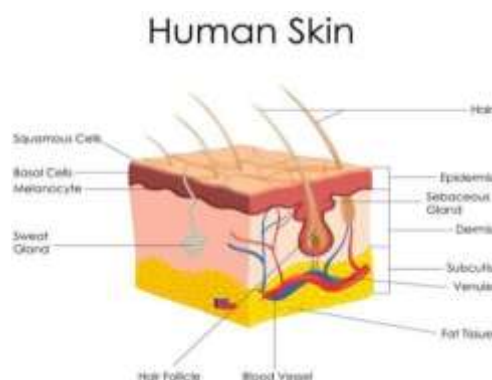


Fig. 10: Cross-Section of Human Skin Showing Layers

The epidermis is the outermost layer composed of stratified keratinised squamous epithelium. It has no blood vessels, and its deeper layers are bathed in interstitial fluid providing oxygen and nutrients. The dermis, located beneath the epidermis, is tough and elastic, formed from connective tissue containing collagen and elastic fibers. Collagen fibers bind water and provide tensile strength, but their ability declines with age and injury, leading to scar formation. Burn injuries damage these layers, triggering inflammatory responses, cell proliferation, and remodeling stages. Topical application of *T. arjuna* herbal cream targets these layers directly, delivering antioxidant and anti-inflammatory agents to the site of injury to promote faster healing.

10. CONCLUSION

The present study successfully formulated and evaluated a herbal cream containing *Terminalia arjuna* bark extract (5%) for the management of burn spots. The cream was prepared as a stable oil-in-water emulsion with acceptable physicochemical properties including a skin-compatible pH (5.5–6.2), smooth texture, good spreadability, and no evidence of skin irritation or phase separation.

Phytochemical screening confirmed the presence of key bioactive compounds — flavonoids, tannins, alkaloids, saponins, and glycosides — which collectively contribute to the antioxidant, anti-inflammatory, antimicrobial, and wound-healing activities of the formulation. The effectiveness of the cream is primarily attributed to these constituents of *T. arjuna* bark, which support skin repair and reduce burn-related scarring.

Supporting excipients such as glycerin and almond oil further enhance skin hydration, nourishment, and



patient acceptability. The formulation offers advantages such as ease of application, avoidance of first-pass metabolism, and reduced systemic side effects compared to oral conventional medications. Stability studies confirmed the product's suitability for storage under standard conditions.

Overall, the herbal cream of *T. arjuna* bark demonstrates significant potential as a safe, effective, and natural alternative to synthetic creams for burn spot management. With proper standardization, quality control, and clinical validation on a larger scale, this formulation has the potential to be developed into a commercially viable herbal product for wound care and dermatological health

11. REFERENCES

1. Miao M, Wang T, Tian S. Specification for Preparation of Animal Model of Burn (scald). *Chinese Journal of Experimental Traditional Medical Formulae*. 2017; 23(24): 11–16.
2. Sahu SA, Agrawal K, Patel PK. Scald burn, a preventable injury: Analysis of 4306 patients from a major tertiary care center. *Burns*. 2016; 42(8).
3. Huang M, Wang X, Wu J. Research progress on mechanism of action of traditional Chinese medicine in treating burn and scald. *Medical Review*. 2017; 23(11): 2240–2244.
4. Liu Z, Sun X. Network Pharmacology: A New Opportunity for Modernization of Traditional Chinese Medicine. *Journal of Pharmacy*. 2012; 47(06): 696–703.
5. Shailja et al. Pharmacognostical and phytochemical standardization of *Terminalia arjuna* bark and formulation of a topical herbal cream. 2025.
6. Shete SS et al. Evaluation of efficacy of gel prepared from ethanolic bark extract of *Terminalia arjuna* for wound healing. 2025.
7. Renuka Bhanudas et al. *Arjuna Bark Paste: Safety and efficacy for burned skin condition*. 2021.
8. Vijaylakshmi et al. Antimicrobial and anti-acne formulation from *Terminalia arjuna* bark. *International Journal of Pharmacy*. 2011.
9. Gupta A et al. Antimicrobial activity of *Terminalia arjuna* bark extract against skin pathogens. 2014.
10. Chaudhuri and Ray. Anti-inflammatory activity of *T. arjuna* extract. 2012.
11. Bansal et al. Development and evaluation of herbal creams containing plant extracts for wound healing. 2016.
12. Sharma et al. Herbal creams formulated with plant extracts show better patient compliance. 2015.
13. Vinod Kumari et al. Polymeric nanoparticles of methanolic extract of *Terminalia arjuna*. 2019.
14. Keke Chu et al. Network pharmacology analysis of burns and scalds treatment. 2019.
15. Khandelwal KR. *Practical Pharmacognosy: Techniques and Experiments (19th ed.)*. Nirali Prakashan. 2008.
16. Kokate CK, Purohit AP, Gokhale SB. *Pharmacognosy (50th ed.)*. Nirali Prakashan. 2014.
17. Lachman L, Lieberman HA, Kanig JL. *The Theory and Practice of Industrial Pharmacy (3rd ed.)*. CBS Publishers. 2009.
18. Indian Pharmacopoeia Commission. *Indian Pharmacopoeia (Vol. I–III)*. Government of India. 2018.
19. World Health Organization. *Quality Control Methods for Herbal Materials*. WHO Press. 2011.
20. ICH Q1A(R2): *Stability Testing of New Drug Substances and Products*. International Council for Harmonisation. 2003.