



FORMULATION AND EVALUATION OF HERBAL BURN CREAM

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Abstract

The primary objective of the current study was to develop and assess the burn healing properties of a cream made from herbal plants. Herbal remedies are now widely used for both medical and financial purposes. The burn cream made from herbal plants is more effective than synthetic medications, which can have certain negative side effects. According to this study, aloe vera has anti-inflammatory properties and mint has skin-healing properties. These two herbs work incredibly well together.

Keywords - Herbal burn cream formulation, evaluation, aloe Vera, Mint, anti-inflammatory

INTRODUCTION

The largest organ in the human body, the skin keeps the body hydrated and shields the internal organs from the outside world¹. Burn injuries, open wounds, excisions, tumors, and other dermatological conditions can cause trauma to it. Burn wounds are commonly described as physical injuries that result in skin breaking and opening^{2,3}. Physical damage (pressure ulcers), thermal damage (burns), mechanical damage (cuts, abrasion lacerations), etc. are all included in burn wounds⁴. The process of cell contraction, movement, and re-adhesion following injury underlies all forms of wound healing. In addition, angiogenesis, re-epithelization, blood clotting, platelet aggregation, fibrin synthesis, and an aggressive reaction to damage are all involved^{5,6}. The epidermis and dermis, which make up the two layers of skin, are supported by a variety of underlying structures. This organ serves a variety of purposes. It serves as a barrier between internal and external organs, shielding them from radiation, chemicals, trauma, microbes, mechanical stress, and the environment^{7,8}. Depending on their depth, burn wounds are divided into three subgroups: first degree (superficial), second degree (partial thickness), and third degree (full thickness)⁹. Mentha's aloe vera exhibited the highest capacity for healing burn wounds. Various herbs contain active constituents such as flavonoids, alkaloids, saponins, and phenolic compounds that aid in wound closure¹⁰. Among the primary active ingredients were proteolytic enzymes and glycosides, such as madecassoside and asiaticoside. The antimicrobial, anti-inflammatory, antioxidant, collagen synthesis stimulation, cell proliferative, and angiogenic effects of phytochemicals demonstrated beneficial activity at different stages of the burn wound healing process^{11,12}. As an alternative to traditional medical methods, a number of herbal medications have demonstrated notable efficacy in treating wounds, particularly

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burn wounds. Furthermore, a number of natural substances with the ability to heal wounds caused by burns have been shown to have promise as natural medications in the future¹³.

❖ **Type of burns:**

Burns are classified as first second, third-degree or fourth-degree depending on how deeply and severely they penetrate the skin's surface ¹⁴.

1. First degree (superficial burns):

First-degree burns only damage the epidermis, the skin's outermost layer. The burn site is painful, red, and blister-free. A mild sunburn is one instance. Long-term tissue damage is uncommon and typically manifests as a change in skin tone ¹⁵.

2. Second degree (partial thickness burns):

The dermis and a portion of the epidermis are burned in a second degree. The burn site appears blistered, red, and may be painfully swollen ¹⁶.

3. Third degree (full thickness burns):

The dermis and epidermis are destroyed by third-degree burns. They might penetrate subcutaneous tissue, the skin's deepest layer. The burnt area might appear charred and blackened, or white ¹⁷.

4. Fourth degree burn:

Burns of the fourth degree penetrate both the epidermis and the underlying tissue, as well as deeper tissue that may include bone and muscle. Because the nerve endings in that area have been destroyed, there is no feeling there ¹⁸.

OBJECTIVES:

- To formulate a burn cream with aloe vera and mint as ingredients in a herbal antiseptic.
- Evaluation of the herbal antiseptic burn cream, including its appearance, consistency, spread ability, pH, antimicrobial activity, and skin irritation test.

Table no. 1: Drugs and excipient profile

Sr no.	Ingredients	Category	Figure
1	Mint	Mint is used as cooling agent and also a strong antibacterial and anti- inflammatory.	
2	Aloe Vera	Aloe is used as anti-inflammatory and it promotes circulation and inhibits growth of bacteria.	

3	Liquid paraffin	It is used as hydrating and cleansing agent.	
4.	Alum	It is used as astringent and anti-staining agent.	
5	Castor oil	Anti-inflammatory and pain reducing property. It stimulates growth of new tissues and helps to maintain moisture in skin.	
6	Petroleum jelly	It is used as an emollient which softens and moisturizes skin and decreases itching.	
7	Glycerine	It cools and soothes the skin, relieves scratches, cuts, burns, and itching. It prevents dry skin and skin irritation.	

8	Charcoal	It is used as Adsorbent.	
9	Lavender oil	It is used as flavoring agent and used in massage therapy.	
10	Purified water	Solvent, conditioning agent and cleansing agent.	

MATERIALS AND METHODS:

a. Process of extraction (Soxhlet method) -

Weight out 20 gm of mint leaf. The mint leaf is placed in a thimble shaped filter paper which is then kept in a Soxhlet extractor. Add 200 ml of ethanol as a solvent in the round bottom flask and heat at 60°C for 6 hours in the Soxhlet apparatus. A water condenser is attached to the Soxhlet at the top. This entire assembly is fitted into the neck of a round bottom flask containing the solvent. The flask is heated in a heating mantle. The solvent vapors reach the cylinder through the inlet tube and continue to pass upward into the condenser [19].

b. Processing of aloe vera sap-

Aloe Vera leaves were cut, washed and then sliced an inch both on upper and lower sides. The leaves were further cut and pulp was removed thereafter. The obtained pulp was further crushed in a mechanical crusher. After crushing of the pulp it was filtered in order to remove the attached fibers. The Aloe Vera juice thus prepared was heated at 50 – 60 °C and then treated with 2% charcoal by continuous stirring. Finally, Aloe Vera sap was prepared by filtering the treated juice. The obtained sap was collected and further used [20].

c. Preparation of cream-

The burn cream was formulated by using fusion method. In that firstly we were preparing cream base by mixing oil phase and aqueous phase and then herbal drug was mixed.

❖ **Preparation of cream base-**

- i- The oil phase is consisted of castor oil, petroleum jelly, liquid paraffin, glycerin which is weighed according to requirement in China dish and which were heated at 50-60 °C and stirred on magnetic Stirrer at 400 rpm.
- ii- Aqueous phase is prepared by weighing required quantity of aloe Vera sap,alum,mint extract and purified water which is also heated at 50-60 °C and stirred on magnetic stirrer.
- iii- Then add aqueous phase was added slowly to oil phase and both the phases were mixed thoroughly with constant stirring.
- iv- After 40-45 min heating was stopped and when system attained a temp of 40 degree C a few drops of lavender oil is added with continuous stirring. Finally, a smooth cream was obtained.

❖ **Formula-**

Table no. 2- Ingredients of Herbal antiseptic burn cream

Sr. no.	Ingredients	Quantity (%)
1.	Mint extract	1
2.	Aloe vera sap	10
3.	Castor oil	4
4.	Liquid paraffin	3
5.	Petroleum jelly	2
6.	Charcoal	0.5
7.	Alum	0.5
8.	Glycerine	2
9.	Lavender oil	Qs
10.	Purified water	Qs

PHARMACEUTICAL EVALUATION OF CREAM:²¹

The formulation has been evaluate using different pharmaceutical parameters.

a. Physical Appearance:

The consistency, color, transparency, and appearance of the formulated cream have been evaluated.

- Consistency : Smooth.
- Transparency : Non- transparent.
- Appearance :Semisolid in nature.
- Color : light green.



Figure no. 1: Burn Cream

b. Consistency:

The hands were used to determine the consistency of cream formulations. Using a pinch of cream, rub it in with your fingers²².

c. Spread ability:

A 500 mg of the formulated cream was sandwiched between two slides to test the cream's spreading ability. 100 grams of weight was put on the upper slide. The excess formulation was scraped off and the weight was removed. The apparatus's lower slide was fixed, and an upper slide with a 20g load applied to it was fixed with a non-flexible string. The amount of time the upper slide took to slip off was recorded [23].

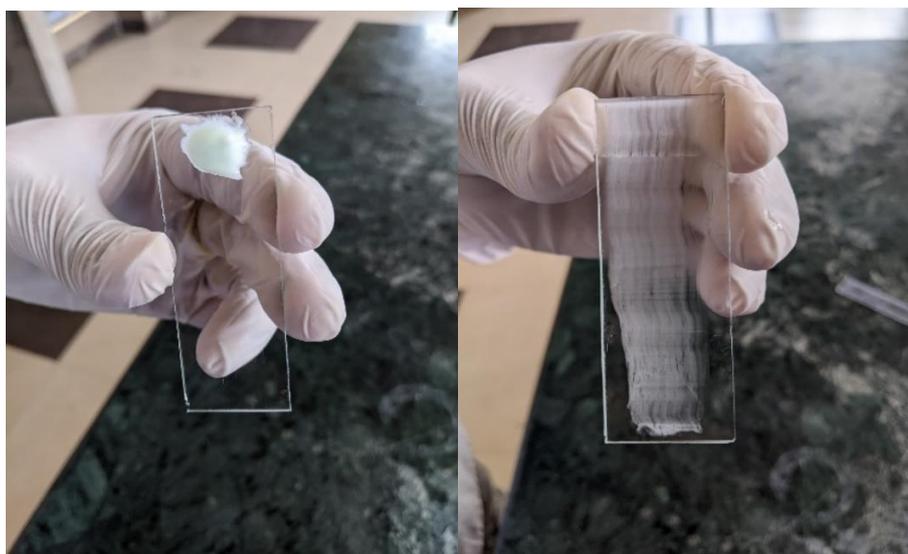


Figure no. 2: Spread ability (before)

Figure no. 3: Spread ability (after)

d. PH test:

By dissolving 1 gram of cream in 100 milliliters of water, a digital pH meter was used to measure the pH of the formulated cream. By dissolving the pH paper in the cream solution mentioned above, the pH of the cream was also identified [24].



Figure no. 4 :pH test

e. Stability studies:

By filling a plastic container with the cream and setting it in a humidity chamber at 45°C and 75% relative humidity, the stability of the formulation was examined. For three months, the formulation's stability was assessed once a month apart ²⁵.

f. Skin Irritation study:

In this procedure, 0.5g of herbal cream was applied to an area of skin that measured about 6 cm square. The skin was then covered with a gauze patch for one hour, during which time it was supposed to remain in contact with the skin. The patch was removed once the observation period had passed and the time period had been recorded. Control animals were prepared similarly, and 0.5g of cream containing all ingredients except the herbal extract was applied to the control animal and Similar to test animals, the skin was treated with the cream once a day for seven days, and any sensitivity was noted ²⁶.

g. Antimicrobial Activity:

Since aloe vera and mint have antimicrobial and anti-inflammatory properties, there may be a chance of bacterial or other microbial infection from the surrounding environment after a burn injury has occurred.

• **Medium:**

The following steps are taken: add 3.5g of Nutrient Agar to 100 ml of distilled water; autoclave at 121°C for 15 minutes at 15 lbs. and pour the mixture into sterile Petri plates until the agar is uniformly thick, about 4 mm and allow the agar to set at room temperature before using it.

• **Procedure:**

This procedure involves melting the agar, cooling it to 45°C, inoculating it with the test microorganism, and then pouring the mixture into a sterile Petri plate. After the agar plate has solidified, the method involves drilling a hole in the medium that is approximately 9 mm in diameter using a sterile cork borer. A second hole is then placed using a commercial formulation that serves as a standard. After two to three days of incubation at 30-35°C, the diameter of the zone of inhibition is measured. The zone of inhibition's diameter provides information about the relative efficacy of various antimicrobial substances against the microorganism under test ²⁷.

RESULT:

- This cream has the potential to be a medium for the easy and efficient use of these medicinal properties in a simple dosage form.
- A herbal wound healing formulation is nontoxic, safe, effective, and improves patient compliance because it contains herbal ingredients. Natural remedies are more widely accepted because they are safer and have fewer side effects than synthetic ones. From the ancient time.
- A number of standards were used to assess the prepared herbal wound healing cream, including appearance, consistency assessment, spread ability, skin irritation test, and antimicrobial activity against streptococci Aureus.
- The herbal burn cream was prepared by using o/w emulsion method using mixture of alcoholic extract of a crud drug mint. The extract was used and formulated and pass the evaluation test.

Sr.no.	Evaluation parameter	Observation
1.	Appearance	light green
2.	Consistency	Smooth
3.	Spread ability	Easily spreadable
4.	pH	6.77
5.	Skin Irritation test	No irritation

CONCLUSION:

The main focus of the herbal antiseptic burn cream formulation was to remedy or cure the burn injury. The developed herbal cream shown strong wound healing potential against thermal burn injury, it can be found. The formulated herbal cream's antiseptic burn activity may be given to the medicinal properties of its main ingredients, which are extracted from these healing plants. Natural remedies are becoming more and more popular in the market because they have fewer side effects. Herbal remedies are also more stable, effective, and stable than synthetic formulations. When compared to creams made from synthetic medications, those made from natural sources have fewer adverse effects. When applied to the skin where the injury has occurred, the prepared herbal antiseptic burn cream was found to be suitable based on a number of evaluation parameters. The cream does not cause any skin irritation and does not cause any toxic or hypersensitive reactions.

In crafting an article on the efficacy of mint and aloe vera in burn care, it is pivotal to highlight the scientific foundation behind the therapeutic properties of these natural ingredients. Aloe vera is renowned for its extensive use in dermatological applications, chiefly due to its potent anti-inflammatory, moisturizing, and antibacterial effects. These properties make it ideal for treating minor burns, as it can significantly reduce inflammation and redness, create a protective barrier that keeps moisture locked into the skin, and inhibit the growth of bacteria that could complicate the healing process. The plant's gel also contains vitamins A, C, and E, all of which are known to aid in the skin's natural regeneration process, thus speeding up healing and reducing the likelihood of scarring.

On the other hand, mint, and specifically the menthol found in it, brings a unique cooling effect by stimulating the skin's cold receptors, which provides a natural analgesic effect without the use of pharmaceuticals. This cooling sensation not only alleviates the painful burning sensation almost immediately but also makes the healing process more comfortable for the patient. Furthermore, menthol's mild analgesic properties help to dull sharper pain sensations, providing a soothing effect that can be particularly beneficial during the initial, most painful stages of a burn.

When combining these two powerful botanicals in a burn cream, the synergistic effects can greatly enhance the healing process. The formulation of such a cream would require careful consideration of ingredient concentrations and overall skin compatibility to ensure it delivers maximum benefits without causing irritation or adverse reactions. Additionally, including other skin-soothing ingredients such as vitamin E, chamomile, or lavender could further boost the cream's efficacy. This kind of holistic approach not only addresses the immediate symptoms of pain and swelling but also supports the skin's natural healing mechanisms, making a mint and aloe vera burn cream an essential, multifunctional treatment option in both home and clinical settings.

REFERENCE:

1. Singh, Gurpreet, and Arnab Chanda. "Mechanical properties of whole-body soft human tissues: A review." *Biomedical Materials* 16, no. 6 (2021): 062004.
2. Markiewicz-Gospodarek, Agnieszka, et al. "Burn wound healing: clinical complications, medical care, treatment, and dressing types: the current state of knowledge for clinical practice." *International journal of environmental research and public health* 19.3 (2022): 1338.
3. Hermans, Michel HE, and Terry Treadwell. "An introduction to wounds." Percival; Steven; Cutting; Keith (ed.), *Microbiology of wounds*. CRC Press, New York (2010): 83-114.
4. Hermans MH, Treadwell T. *An introduction to wounds*. Percival; Steven; Cutting; Keith (ed.), *Microbiology of wounds*. CRC Press, New York. 2010 Apr 26:83-114.
5. Hackam DJ, Ford HR. Cellular, biochemical, and clinical aspects of wound healing. *Surgical infections*. 2002 Dec 1;3(S1):23-35.
6. Sekhon UD, Sen Gupta A. Platelets and platelet-inspired biomaterials technologies in wound healing applications. *ACS Biomaterials Science & Engineering*. 2017 May 24;4(4):1176-92.
7. Xu C, Wang X. *Imaging Technologies and Transdermal Delivery in Skin Disorders*.
8. Olubummo, Adeyemi. *Human Anatomy and Physiology: Study Notes*. iUniverse, 2010.
9. Monstrey, S., Hoeksema, H., Verbelen, J., Pirayesh, A. and Blondeel, P., 2008. Assessment of burn depth and burn wound healing potential. *burns*, 34(6), pp.761-769.

10. Criollo-Mendoza MS, Contreras-Angulo LA, Leyva-López N, Gutiérrez-Grijalva EP, Jiménez-Ortega LA, Heredia JB. Wound healing properties of natural products: Mechanisms of action. *Molecules*. 2023 Jan 6;28(2):598.
11. Tan SC, Bhattamisra SK, Chellappan DK, Candasamy M. Actions and therapeutic potential of madecassoside and other major constituents of *Centella asiatica*: a review. *Applied Sciences*. 2021 Sep 13;11(18):8475.
12. Qadir A, Jahan S, Aqil M, Warsi MH, Alhakamy NA, Alfaleh MA, Khan N, Ali A. Phytochemical-based nano-pharmacotherapeutics for management of burn wound healing. *Gels*. 2021 Nov 13;7(4):209.
13. Pereira RF, Bartolo PJ. Traditional therapies for skin wound healing. *Advances in wound care*. 2016 May 1;5(5):208-29.
14. Abazari, M., Ghaffari, A., Rashidzadeh, H., Badeleh, S.M. and Maleki, Y., 2022. A systematic review on classification, identification, and healing process of burn wound healing. *The International Journal of Lower Extremity Wounds*, 21(1), pp.18-30.
15. Pabitha C, Vanathi B. FASTER-RCNN for Skin Burn Analysis and Tissue Regeneration. *Computer Systems Science & Engineering*. 2022 Sep 1;42(3).
16. Lewis, G.M., Heimbach, D.M. and Gibran, N.S., 2012. Evaluation of the burn wound: management decisions. *Total burn care*, 4, pp.125-130.
17. Kirwan HO, Pignataro RO. The skin and wound healing. *Pathology and Intervention in Musculoskeletal Rehabilitation*. 2015 Nov 3;25:1352-6.
18. Kirwan, H. O. L. L. I. E., and R. O. S. E. Pignataro. "The skin and wound healing." *Pathology and Intervention in Musculoskeletal Rehabilitation* 25 (2015): 1352-1356.
19. De Castro, MD Luque, and Feliciano Priego-Capote. "Soxhlet extraction: Past and present panacea." *Journal of chromatography A* 1217, no. 16 (2010): 2383-2389.
20. Waller, Todd A., Ronald P. Pelley, and Faith M. Strickland. "Industrial processing and quality control of *Aloe barbadensis* (Aloe vera) gel." *Aloes*. CRC Press, 2004. 157-224.
21. Prajakta, S. and Shahu, K., 2020. Formulation and evaluation of vanishing herbal cream of crude drugs. *Asian Journal of Pharmaceutical Research and Development*, 8(3), pp.66-69.
22. Savary, G., Gilbert, L., Grisel, M., & Picard, C. (2019). Instrumental and sensory methodologies to characterize the residual film of topical products applied to skin. *Skin Research and Technology*, 25(4), 415-423.
23. Vijayalakshmi, A., Tripura, A., & Ravichandiran, V. (2011). Development and evaluation of anti-acne products from *Terminalia arjuna* bark. *Int J Chem Tech Res*, 3, 320-27.
24. Sheraz, M.A., Khan, M.F., Ahmed, S., Kazi, S.H., Khattak, S.R. and Ahmad, I., 2014. Factors affecting formulation characteristics and stability of ascorbic acid in water-in-oil creams. *International Journal of Cosmetic Science*, 36(5), pp.494-504.
25. Tan PL, Rajagopal M, Chinnappan S, Selvaraja M, Leong MY, Tan LF, Yap VL. Formulation and physicochemical evaluation of Green Cosmeceutical Herbal face cream containing standardized Mangosteen Peel Extract. *Cosmetics*. 2022 Apr 27;9(3):46.
26. Shank, Ph D., Thomas J. Slaga, and Paul W. Snyder. "Amended Safety Assessment of Quaternium-18 and Quaternium-18 Bentonite as Used in Cosmetics." (2020).
27. Patra, J.K., Das, G., Das, S.K., Thatoi, H., Patra, J.K., Das, G., Das, S.K. and Thatoi, H., 2020. Isolation, Culture, and Biochemical Characterization of Microbes. *A Practical Guide to Environmental Biotechnology*, pp.83-133.