

Formulation and Evaluation of Herbal Skin Cream for Wound Healing Activity

Manoj D. Jadhav, Mangesh P. Ubale, Shubham V. Kadam, Ansari M. Ehtesham

Matoshri Institute of Pharmacy, Dhanore, Yeola

Your Email: manojdadhav2001@gmail.com

Abstract—With the development of medical science, wound care is continually changing. Professionals in wound care are still searching for the ideal dressing material since they are up against a number of obstacles. In order to control wounds, wound care experts have turned back to the old healing techniques by adopting traditional and alternative medicine due to the advent of multi-resistant organisms and a decline in modern antibiotics. It is really gratifying to see how traditional medicine is being perceived by the public. In this study, creams were created based on an analysis of the effectiveness of plant extracts in treating wounds. *Acacia auriculiformis*, turmeric, tulsi, and aloe vera were chosen as herbal plants. Alcohol is used to remove certain dried plant components. Utilizing various evaluation techniques, the product's quality was evaluated. The physical characteristics remained unchanged, and the pH was within acceptable limits (about pH 7). During this study period, the formulations demonstrated good consistency, no sign of phase separation, and good spreadability. The viscosity of creams was discovered to be inversely proportional to the rate of shear (rpm), increasing when the rate of shear was decreased. During a stability study conducted for three months at (40 ± 2 °C and 75 ± 5% RH) in accordance with ICH guidelines, the creams were found to be stable. From the current study, it can be inferred that creams containing herbal extracts with wound-healing properties can be created and used to provide a skin barrier.

Keywords— Wound healing, *Acacia auriculiformis*, turmeric, aloe vera, Tulsi.

I. INTRODUCTION

Creams are semisolid dosage forms that are meant to be applied topically to the skin, on the eye's surface, or utilised nasally, vaginally, or rectally for medicinal or protective action. They can also serve an aesthetic purpose. These preparations are utilised for the localised effects that the drug's penetration into the skin's or mucous membrane's underlying layer produces at the application location. The skin is the intended organ for these devices' medication delivery systems, which are intended to treat cutaneous ailments.^[1]



Fig. 1. Formulation of herbal cream

Wound and Wound Healing Process

A loss or interruption of the cellular, anatomical, or functional continuity of the deep skin tissue or the living tissues may be referred to as a wound. Physical, chemical, thermal, viral, microbial, or immunological stress to the skin's surface can all result in wounds. In addition to having a negative impact on the patient's bodily and mental health, wounds can also be very expensive and leave long-lasting

scars. Generally speaking, a wound is a physical injury that opens up or breaks the skin.^[2]

After skin trauma or injury, cells contract, migrate, and readhere in a process known as wound healing. Platelet aggregation, blood clotting, fibrin production, inflammatory reactions to injury, changes in the ground substances, angiogenesis, and re-epithelialization all play a role in wound healing. The damaged surface must be vigorously stitched together by collagen and ultimately terminated by the formation of scars for the healing process to be complete. The presence of free radicals, which harm the tissues of the surrounding skin, may impede the healing of wounds. And a number of factors, including infections, nutrition, medications, hormones, the kind and locations of the wound, as well as specific illness conditions, have an impact on the healing process of wounds.^[3]

Ayurvedic medicines for wound healing

Aloe Vera



Fig. 2. Aloe Vera

A significant medicinal plant for treating and defending the skin is aloe vera. It is incredibly beneficial and protective

and works wonders on burns, sunburns, and a range of skin conditions (eczema, psoriasis, acne). Aloe Vera aids in the restoration of even the most delicate skin injuries. Aloe gel, however, may actually slow the healing process in some cases of severe burns.

Benefits of aloe-vera

- It has a cooling impact on rashes or sunburns.
- Its anti-inflammatory effects can lessen pain, swelling, and soreness of wounds or injuries.
- Hydrate the skin with essential .
- Prevents premature ageing.
- Prevent or decrease wrinkles and dark spots on your face.^[4]

Curcuma longa



Fig. 3. Curcuma longa

Turmeric has been applied physically to heal wounds and treat skin sores as well as internally to treat a number of illnesses, including indigestion, throat infections, colds, or liver diseases.

In particular, curcumin, which is extracted from Curcuma longa, has excellent effects for the skin. Additionally, it has been noted that curcumin exhibits good anti-inflammatory, anti-oxidant, and anti-microbial action.

Benefits of turmeric in health

- Skin health is improved.
- Treatment of acne.
- Potential relief from psoriasis.
- Clearing of the skin.
- Aiding in wound healing.
- Antibacterial agent.^[5]

Tulsi



Fig. 4. Tulsi

Tulsi's broad-spectrum antibacterial action suggests that it is commonly used as a mouthwash, hand sanitizer, and water purifier as well as in food preservation, animal husbandry, wound healing, and as herbal raw materials. This activity includes activity against a range of human and animal illnesses.^[6]

Benefits of tulsi leaf powder

- Promotes healthy skin ageing
- Eases skin conditions including eczema
- Excellent for curing skin issues
- Vitamin K is a good source
- Anti-aging benefits
- Acne prevention and stress reduction^[7]

Acacia Auriculiformis



Fig. 5. Acacia auriculiformis

Due to its low toxicity (LD50 = 3 741.7 mg/kg) and high efficacy, Acacia auriculiformis has demonstrated many pharmacological activities, including central nervous system depressant activity, antioxidant, antimicrobial, antimalarial, anti-filarial, cestocidal, antimutagenic, chemopreventive, spermicidal, wound healing, hepatoprotective, and antidiabetic activity. The presence of the main components flavonoids (Auriculoside) and triterpenoid saponin glycosides (acaciasides- acaciaside A & B) in various portions of this plant is also demonstrated by numerous phytochemical analyses.^[8]

Wound Healing Activity

Using excision and incision wound models in Swiss albino mice, the cream made with ethanol and aqueous extracts of Acacia auriculiformis leaves was assessed for studies on wound healing. Determining the hydroxyproline content and performing histopathological analyses on the treated groups were done. The findings demonstrated that both formulations have significant wound healing activity, which was demonstrated in all treated animals by shortened epithelialization time, enhanced wound contraction speed, tensile strength, hydroxyproline content, granulation tissue creation, and collagen fibre synthesis.^[9]

II. MATERIALS AND METHODS

Materials

TABLE 1: Formula

Sr. No.	Ingredients	F1C	F2C	F3C	F4C
1.	Turmeric extract	2.7 ml	1.42 ml	1 ml	0.9 ml
2.	Aloe Vera extract	2.8 ml	1.47 ml	1.67 ml	1.79 ml
3.	Tulsi extract	1.7 ml	1 ml	1.1 ml	1.2 ml
4.	Acacia auriculiformis extract	0.9 ml	0.28 ml	0.67 ml	0.55 ml
5.	Bees wax	5.45 gm	4.97 gm	6.03 gm	6.9 gm
6.	Liquid paraffin	18.1 ml	21.32 ml	20.1 ml	19.7 ml
7.	Borax	0.36 gm	0.56 gm	1.5 gm	1 gm
8.	Methyl Paraben	0.03 gm	0.59 gm	0.50 gm	0.7 gm
9.	Distilled water	q. s.	q. s.	q. s.	q. s.
10.	Rose Water	q. s.	q. s.	q. s.	q. s.



Fig. 6. Extraction of turmeric powder

TABLE 2: Ingredients and their roles

Sr. No.	Ingredients	Roles
1.	Turmeric	Antiseptics & Anti-inflammatory
2.	Aloe Vera	Anti-aging, reduce acne
3.	Tulsi	Antibacterial, add glow to face
4.	Acacia auriculiformis	Wounds healing
5.	Bees wax	Emulsifying agent
6.	Liquid paraffin	Lubricating agent
7.	Borax	Alkaline agent
8.	Methyl Paraben	Preservative
9.	Distilled water	Vehicle
10.	Rose Water	Fragrance



Fig. 7. Extraction of aloe Vera gel

Methods

Collection of plants material

From the neighbourhood botanical garden, turmeric, acacia auriculiformis, aloe vera, and tulsi were harvested. There is no disputing the fact that drugs are properly collected when they have the highest concentration of active components, regardless of the type of crude drug or the location of collection. When collecting crude medications, the benefits of the current environmental conditions are also taken into account. However, when collecting natural drugs on a commercial scale, special emphasis should be given to the employment of professional workforce. Rhizomes are harvested when they have a sufficient supply of reserve food and have the highest concentration of chemical constituents.

Extraction process

Preparation of turmeric extract: Stir 1 g of turmeric powder with 10 ml of distilled water in a 250 ml volumetric flask that has been heated in a water bath for 5 to 10 minutes at 80°C to 100°C. After filtering it, turmeric extract is produced.

Preparation of aloe-vera extract: Pick an aloe vera leaf from the plant that is mature and fresh, then wash it with distilled water. It is hot air oven dried. Leaf longitudinally cut with a clean knife. Aloe vera that is semi-solid is gathered. Take out the fibres and contaminants. Extract from aloe vera is obtained.

Preparation of tulsi extract: Tulsi leaves were gathered, cleaned with distilled water, then dried in an oven using hot air. The leaves were then ground up after a thorough drying process. Then a volumetric flask was filled with 1 g of tulsi leaf powder and 10 ml of dimethyl sulfoxide. The solution was then boiled in a water bath at 80°C to 100°C for 5–10 minutes before being filtered through filter paper and tulsi leaf extract.



Fig. 8. Extraction of tulsi leaves

Preparation of acacia auriculiformis extract: Plant extract was created using the maceration procedure. After being air dried at room temperature, clean leaves were ground into a coarse powder. Petroleum ether was used to defatify the

powdered dry leaves of *Acacia auriculiformis*, and then chloroform, ethyl acetate, acetone, butanol, and methanol were used to extract them.^[10]



Fig. 9. Extraction of acacia auriculiformis leaves



Fig. 10. Extraction of Herbal Plants

Formulation of cream

Take 75 °C liquid paraffin and bees wax and heat it there (oil phase) in a borosilicate glass breaker. Borax and methyl paraben should be dissolved in distilled water in another beaker while maintaining a temperature of 75°C with a water bath. The aqueous phase of the solution should be stirred with a glass rod until all solid particles are dissolved. Gently pour the hot aqueous phase into the heated oily phase while continuing to mix. Aloe-vera extract, Tulsi extract, *Acacia auriculiformis* extract, and turmeric extract should be added right away after combining the two stages. Glass rod blending should continue until a smooth cream emerges. Rose oil should be added as a fragrance once the cream has formed.^[11]

Evaluation Parameters

1. Organoleptic Properties:

The organoleptic properties such as colour, odour and appearance was observed.

2. Determination of PH:

The pH value of freshly formulated emulsion was determined using a digital pH meter at room temperature.

3. Determination of homogeneity:

The homogeneity of the herbal preparation was observed by visual appearance and by touch.

4. Determination of spread ability:

The area to which the topical application spreads after being administered to the skin's afflicted area is referred to as

the spread ability. The herbal formulation's therapeutic effectiveness also depends on how widely it spreads.

Determining the developed formulation's spreading capacity is therefore necessary. A thin film of consistent thickness was created for the measurement by pressing roughly 3 gramme of cream between the two glass slides.

For five minutes, a weight of five grammes was placed over the top slide to exert the necessary pressure. The upper slide was then pulled with the aid of a thread linked to a hook after the addition of around 10 gms of weight to a pan.

Under a particular force, it was noted how long it took the two slides to glide across one another by a distance of 10 cm.

The spreadability of the prepared formulation can be determined using the formula listed below.

$$S = m \times L/T$$

Where,

S- Solubility

m- Weight tied to upper glass slide

L- Length moved on glass slide

T- Time taken.

The results were carried out in a triplicate manner and the average of these readings were noted

7. Irritancy test:

The formulated cream shows no redness, edema, irritation and inflammation during studies. The formulated cream is safe to use.

6. Phase Separation : Prepared cream is kept in tightly closed container at room temperature away from sunlight and observed for 24 hours for phase.

7. Washability: Formulation was applied on the skin and then ease extend of washing with water and checked.^[12]

III. RESULTS AND CONCLUSION

Evaluation Parameters

TABLE 3: Physical Parameter

Sr. No.	Parameters	F1C	F2C	F3C	F4C
1.	Colour	Faint Yellow	Faint Yellow	Faint Yellow	Faint Yellow
2.	Odour	Pleasant	Pleasant	Pleasant	Pleasant
3.	Texture	Smooth	Smooth	Smooth	Smooth
4.	State	Semi solid	Semi solid	Semi solid	Semi solid

TABLE 4: Irritancy Test

Sr. No.	Formulation	Irritant effects	Erythema	Edema
1	F1C	Nil	Nil	Nil
2	F2C	Nil	Nil	Nil
3	F3C	Nil	Nil	Nil
4	F4C	Nil	Nil	Nil

TABLE 5: Washability test

Sr. No.	Formulation	Washability
1	F1C	Washable
2	F2C	Washable
3	F3C	Washable
4	F4C	Washable

TABLE 6: Phase Separation

Sr. No.	Formulation	Phase separation
1	F1C	No Phase separation
2	F2C	No Phase separation
3	F3C	No Phase separation
4	F4C	No Phase separation

TABLE 7: pH Test

Sr. No.	Formulation	pH
1	F1C	7.3
2	F2C	6.8
3	F3C	6.9
4	F4C	7.6

TABLE 8: Spreadability test

Sr. No.	Formulation	Time (sec)	Spreadability (gcm/sec)
1	F1C	7	2.14
2	F2C	5	3
3	F3C	6	2.5
4	F4C	4	2.7

IV. CONCLUSION

The cream demonstrated wound healing effects from the usage of turmeric, aloe vera, Acacia auriculiformis, and tulsi, and all of the herbal constituents showed various noteworthy actions. According to the findings, all formulations F1C, F2C, F3C, and F4C were stable at room temperature and may be applied to the skin without risk. As a result, the formulation of F2C is superior to that of F1C, F3C, and F4C for the formulation of herbal cream. The potential of herbal extracts for cosmetic purposes is the focus of the current studies. The personal care industry has greatly expanded its usage of cosmetics. The use of bioactive ingredients in cosmetics affects the biological processes of the skin and supplies it with the nutrients it needs to be healthy. Throughout the trial period, the produced formulation shown high consistency, good spreadability, and no signs of phase separation.

The produced herbal cream has the best qualities and offers nutritional benefits while using less chemicals to protect the skin from a variety of skin problems. The cream is

inexpensive since it was made with basic materials and a straightforward process. The herbal cosmetic mixture can be used to provide a barrier to protect skin and is safe for use. The results of various cream tests indicated that the formulation may be applied topically to shield skin from harm. The idea that natural medicines are safer and have fewer negative effects than synthetic ones makes them more acceptable. To verify the formulation's synergistic function scientifically, more research will be conducted.

REFERENCES

- [1]. Mahalingam RC, Xiaoling L, Bhaskara RJ. "Semisolid Dosages: Ointments, Creams and Gels", Pharmaceutical Manufacturing Handbook. 2006; 2(3): 267-274.
- [2]. Biswas TK, Mukherjee B, "Plant medicines of Indian origin for wound healing activity: a review" The international journal of lower extremity wounds, 2003; 2(1):25-39.
- [3]. Kiran K, Asad M, "Wound healing activity of Sesamum indicum L seed and oil in rats"
- [4]. Christaki EV, Florou-Paneri PC. Aloe vera: A plant for many uses. J Food Agric Environ. 2010; 8(2): 245-249.
- [5]. Araujo CA, Leon LL. Biological activities of Curcuma longa L. Mem Inst Oswaldo Cruz. 2001;96(5):723-728.
- [6]. Reddy AKG, Saranya SC, Kumar ACK. "Wound healing potential of Indian medicinal plants". Int J Pharm Rev Res. 2012; 2(2):75-87.
- [7]. Sah AK, Vijaysimha M, Mahamood M. The tulsi, queen of green medicines: Biochemistry and pathophysiology-a review. Int J Pharm Sci Rev Res. 2018; 50(2): 106-114.
- [8]. Girijashankar V. Micropropagation of multipurpose medicinal tree Acacia auriculiformis. Journal of Medicinal Plants Research, 5:462-466, 2011
- [9]. Singh S, Sharma N, Evaluation of Wound Healing Activity of Acacia auriculiformis A. Cunn. Stem Bark. Asian Journal of Pharmaceutical and Clinical Research, 7:204-207, 2014.
- [10]. Kapoor S, Saraf S. Formulation and evaluation of moisturizer containing herbal extracts for the management of dry skin. Pharmacog J. 2010; 2(11): 409-417.
- [11]. Pal A, Soni M, Patidar K, "Formulation and evaluation of polyherbal cream" International Journal Pharmaceutical and Biological Archives, 2014; 5: 67-71
- [12]. Aswal A, Kalra M, Rout A, "Preparation and evaluation of polyherbal cosmetic cream" Der Pharmacia Lettre, 2013; 5(1):838.