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Research Article

Formulation and Evaluation of Wound Healing Cream

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ABSTRACT

Anti-inflammatory creams are topical drugs intended to lessen pain and inflammation brought on by a number of ailments, including sprains, strains, and arthritis. Nonsteroidal anti-inflammatory medicines (NSAIDs), which are commonly found in these creams, function by preventing the body from producing chemicals that cause pain and inflammation. In order to treat inflammation, our study looks at the creation and assessment of an anti-inflammatory cream that contains two main medications: "Bauhinia racemosa" and "Aloe barbadensis miller." The bidi leaf tree, or Bauhinia racemosa, is a rare medicinal blooming shrub with religious significance. A little deciduous tree, the Bidi Leaf Tree (Bauhinia racemosa), also called Apta in Marathi, is indigenous to tropical and subtropical areas of Southeast Asia and the Indian subcontinent. The bidi leaf tree, or Bauhinia racemosa, is a rare medicinal blooming shrub with religious significance. The Bidi Leaf Tree (Bauhinia racemosa), also called Apta in Marathi, is a small deciduous tree that grows naturally in China, the Indian subcontinent, and tropical and subtropical areas of Southeast Asia. Its twisted trunk and drooping branches define its characteristic height of 3 to 5 meters. Nowadays, the natural substance aloe vera is widely employed in the cosmetics industry. Although it has a number of indications, controlled trials are required to ascertain its true effectiveness. The succulent plant known as aloe vera (Aloe barbadensis miller) is well-known for its therapeutic and aesthetic uses. For millennia, people have recognized and utilized the health, cosmetic, therapeutic, and skin care benefits of aloe vera plants. Aloe vera's name comes from the Arabic word "Alloeh," which means "shining bitter substance," and the Latin word "vera," which means "true.".

INTRODUCTION

Ayurveda and traditional medicine have long utilized Bauhinia racemosa, a medicinal plant with

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anti-inflammatory, antibacterial, and antioxidant qualities, to treat wounds, infections, and skin conditions. The powerful extract of Bauhinia racemosa used in the formulation of our Bauhinia racemosa Wound Healing Cream is enhanced with bioactive substances that hasten wound healing, lower inflammation, and guard against microbial infections. For minor cuts, burns, ulcers, and abrasions, this herbal-based preparation works well because it promotes tissue regeneration, reduces scarring, and calms sensitive skin.

Principal Advantages:

- Speeds up tissue restoration and wound healing.
- Has antibacterial qualities that help stop infections.
- Relieves irritation and lowers inflammation
- Increases the production of collagen for better skin renewal.
- Safe for delicate skin because it doesn't include harsh ingredients.
- This scientifically supported composition offers a safe and efficient wound care solution by combining contemporary dermatological research with ancient herbal knowledge. Our Bauhinia racemosa Wound Healing Cream is an essential for natural and efficient wound care, and it works for all skin types.
- The body's natural reaction to damage, infection, or negative stimuli is inflammation. It is a defense mechanism that aids in the body's healing process, but when it persists for an extended period of time, it may lead to a number of health issues.

Inflammation is of two types:

1.Acute inflammation This is the quick, short-term reaction to an infection or injury. Usually, there is pain, swelling, heat, and redness. When you cut your finger, for instance, the body sends immune cells to the region to fight off infection and begin healing, which can cause the area to swell and turn red.

2. Chronic Inflammation: This happens when inflammation lasts for a long time without any visible signs of infection or injury. Numerous medical disorders, including autoimmune illnesses, diabetes, heart disease, and arthritis, are associated with chronic inflammation.

Mechanisms of Action:

Through a variety of inflammatory processes, topical therapies interact with nociceptive neural networks in the skin's outer layers. The stratum corneum, which can be a strong barrier, must be penetrated by these compounds after they are applied to the skin. Alongside the development of novel topical medications, substances that facilitate this penetration have also changed. Current topical treatments such as capsaicin, ketamine, local anesthetics, and nonsteroidal anti-inflammatory drugs (NSAIDs) have noteworthy prior histories that merit examination. The introduction of novel drugs that target particular pain pathways and advancements in drug penetration technology via the skin barrier may lead to an increase in topical methods of administration.

Clinical Uses:

Aloe may lessen the outward manifestations of inflammatory skin disorders due to its anti-inflammatory properties.

Burns: Aloe has been shown to improve re-epithelialization and lessen the creation of scars, which aids in the healing of burns.

Antibacterial: The bacterial infection is treated using Bauhinia racemosa.

Diabetes: A common treatment for diabetes is Bauhinia racemosa Lam. (BR).

Skin physiology:

The largest organ in the body, the skin makes up around 15% of an adult's total weight. Apart from providing defense against external physical, chemical, and biological threats, it also carries out several essential tasks, including as assisting with thermoregulation and preventing excessive water loss. The mucous membranes that cover the body's surface form a continuous layer of skin. The skin and its associated tissues make up the integumentary system. The epidermis, dermis, and subcutaneous tissue are the three layers that make up the skin. The outermost layer, or epidermis, is made up of a particular type of cell called keratinocytes, which generate the protective protein keratin, which is a long, thread-like strand. The main component of the dermis, or middle layer, is collagen, a fibrillar structural protein. The dermis is located on the panniculus, or subcutaneous tissue, which is made up of tiny fat cell lobes called lipocytes. The position of these layers inside the body's architecture has a significant impact on their thickness. For instance, the epidermal layer of the palms and soles of the feet has the thickest layer, measuring around 1.5 mm, while the eyelid has the thinnest layer, measuring less than 0.1 mm.

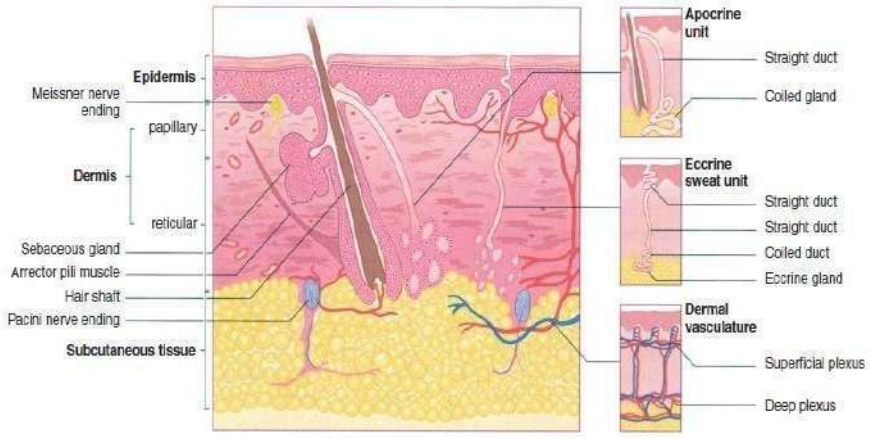

Figure 1 Cross-section of skin

Epidermis:

The skin's thin outermost layer is called the epidermis. It has three different kinds of cells: a) Squamous cells. The stratum corneum is the outermost layer that is constantly lost. b) Base cells. At the base of the epidermis, directly beneath the squamous cells, lie basal cells. c) Melanocytes. Melanocytes, which produce melanin, are also located at the base of the epidermis. The skin gets its color from this

Dermis: The skin's main layer is called the dermis. Blood vessels, lymph vessels, hair follicles, sweat glands, collagen bundles, fibroblasts, nerves, and sebaceous glands are all found in the dermis. The kind of protein that holds the dermis together is called collagen. This layer gives the skin strength and suppleness. The dermis also contains touch and pain receptors.

Subcutaneous Fat Layer: The subcutaneous fat layer is the deepest layer of the skin. It is composed of a network of collagen and fat cells. It protects

the body from injury and helps maintain body heat by acting as a shock absorber.

Physiological function of skin:

- Protection
- Thermoregulation
- Sensation
- Excretion
- Vitamin D Secretion

1. Aim and Objectives:

Aim:

The purpose of the study was to develop and evaluate a cream that would cure wounds using Bauhinia racemosa.

Objectives:

- Pharmaceutical creams can be used to treat wounds on the skin, as well as to cleanse, beautify, hydrate, and protect against bacteria and fungi.
- Almost all creams are made with a uniform composition that includes common elements like water, fats, waxes, emollients, colors, and smells.
- Creams can be evaluated using a variety of criteria, such as pH, viscosity, stability, spreadability, etc., to assist the product meet its standard quality.

4. Drug Profile:

1. Bauhinia Racemosa [1]

- **Family:** Fabaceae
- **Genus:** Bauhinia
- **Species:** B. racemosa
- **Common name**: bidi leaf tree, Aptyachi pane,
- **Active components:** methyl gallate, gallic acid, kaempferol, quercetin, quercetin 3–O–α–rhamnoside, kaempferol 3–O–β–glucoside, myricetin 3–O–β–glucoside.

2. Aloe [19]

- **Family:** Liliaceae
- **Genus:** Aloe
- **Species**: Aloe barbadensis miller.
- **Common name:** Barbados, korphad
- **Active components**: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids. Bauhinia racemosa

Bauhinia Racemosa:

This flowering plant species, which belongs to the Fabaceae family, is sometimes referred to as the Giddeh or Camel's foot. It is indigenous to tropical and subtropical areas of Southeast Asia and parts of India.[1-10]

Phytochemistry:

1. Flavonoids: One of the most significant groups of substances present in Bauhinia racemosa are flavonoids.

2.Tannins: Tannins are polyphenolic chemicals found in Bauhinia racemosa

3.Bauhinia racemosa contains saponins, which are responsible for its anti-inflammatory, blood cholesterol-lowering, and wound-healing effects

4. Alkaloids: The plant contains nitrogenous substances called alkaloids. Their pharmacological effect which may include analgesic, anti-microbial, and anti-cancer properties, are well-known.

Aloe:

Known for its therapeutic and skin-care qualities, aloe vera is a succulent plant species. Its thick, meaty leaves are filled with a material that

resembles gel. This gel's calming, hydrating, and restorative properties make it a popular ingredient in skincare products.

Phytochemistry:

1. Flavonoids
2. Saponins
3. Minerals and Vitamins
4. Vitamins
5. Minerals
6. Amino Acids
7. The Fatty Acids
8. Enzymes
9. Amylase and Lipase
10. Glycoprotein

3. Experimental Studies:

Materials Required:

Materials Needed Include:

- Methyl Paraben
- Borax
- Aloe Vera
- Bainhinia Racemosa
- Rose Oil.

Method of Extraction: A cold maceration procedure was used to carry out the extraction. Initially, the powdered plant material, Bauhinia racemosa, aloe, was macerated in a 70:30 alcohol and water mixture in a round-bottom flask (RBF) for 24 hours, shaking occasionally. The solvents were filtered after a 24-hour period, and the powdered extracts of Bauhinia racemosa and aloe were then collected.

Preparation of Herbal Cream:

- Each component was weighed accurately.
- In a borosilicate glass beaker, heat liquid paraffin and beeswax to 75 °C and keep it there. (Phase of oil).
- To dissolve borax and methylparaben and obtain a clear solution, dissolve them in distilled water in a different beaker and heat it to 75 °C. (phase of water).
- Next, gradually incorporate this aqueous phase into the heated oily phase.
- After that, add a measured amount of aloe and Bauhinia racemosa extract, and stir vigorously until a creamy cream develops. Then, for aroma, add a few drops of rose oil.
- To give the cream a smooth texture and ensure that all the components are properly mixed, place the cream on the slab, add a few drops of distilled water if needed, and mix the cream in a geometric patter.

Formulation Table for Preparation of Cream:

Table: 01

Sr. No.	Content	Formulation		
		F1	F2	F3
1	Bauhina racemosa	8 gm	10 gm	12 gm
2	Aloe	4 gm	5 gm	6 gm
3	Bees wax	1.2 gm	1.6 gm	2.0 gm
4	Borax	0.3 gm	0.4 gm	0.5 gm
5	Methyl Paraben	0.06 gm	0.08 gm	0.1 gm
6	Liquid Paraffin	1.5 gm	2 gm	3 gm
7	Rose oil	0.6 gm	0.8 gm	1 gm
8	Distilled Water	Q. S	Q. S	Q. S
	Total	15 gm	20 gm	25 gm

4. **Evaluation of the Cream:**

To evaluate the quality of the created formulation, several quality control tests were conducted,

including visual inspection and physiochemical and conditioning performance testing.

- **Organoleptic Properties**

Table: 02

Parameters	Bauhinia racemosa	Aloe
Texture	Leaves are smooth, slighthly laethery.	The gel inside the slightly bitter with a midly sweet.
Smell	Mild and slightly aromatic	Aloevera has a mild ,slightly,herbal and neutral odor
Taste	Bitter,slighthly astringent	The taste is slightly bitter with a mildly sweet.
Color	The leaves are green, and flowers are typically white or light pink	The gel inside the leaves is typically clear to slightly yellow while the outer leaf is green.

- **Screening Of Cream Formulation Phytochemically**

Table: 03

Phytoconstituent	Bauhinia Racemosa
Tannins	Present
Protein	Present
Fats	Present
Alkaloids	Present

- **Procedure Of Phytochemical Tests**

Table: 04

Phytochemical Test	Reagent / Procedure	Observation / Interpretation
Flavonoids	Add Mg turnings and conc. HCl.	Pink red colour.
Saponins	Shake 5ml extract with water.	Stable forth formation.
Phenols	Add few drops Lead Acetate Solution to extract or cream.	White Precipitate.
Tannins	Add 1% Ferric Chloride Solution to extra ct.	Blue Black colour
Alkaloids	Add few drops of Dragendroff's reagent to cream.	White or Creamy Precipitate.
Essential Oils	Heat small amount of cream containing Calendula and Cinnamon extract.	Characteristic Cinnamon or Calendula scent confirms presence of essential oils.

5. Herbal Drug Extraction:

Maceration has been used as a chemical extraction method for antiquity. The basic concept is to extract the soluble components of a solid by soaking it in a liquid. Usually, the sample is prepared by drying and grinding it to increase the surface area between it and the liquid solvent. An alternative technique is to constantly extract the desired components of a mixture using a rotavapor. The rotary evaporator uses a spinning flask that is submerged under vacuum and in a heated water bath. The vaporized solvent condenses and is collected in a separate container during a continuous extraction process. The condensed solvent is subsequently used in the subsequent extraction cycle. This method allows for a continuous and efficient process because the solvent can be reused. The low temperatures prevent heat-sensitive products from degrading.

6. Beneficial Qualities of "Powder of the Drugs"

a. An alcohol-soluble extractive:

100 milliliters of 90% alcohol were added to a Stoppard conical flask containing five grams of properly weighed powdered medication. After being continually shaken for six hours in an electrical shaker, the mixture was allowed to macerate overnight. The weight and percentage of the extractive were then calculated after the filter was gently evaporated until it was dry. Alcohol-Soluble Extractive Weight of extractive / Weight of drug X 100 equals Water-Soluble Extractive.

b. Extractive Soluble in Water

A Stoppard conical flask containing 5 grams of precisely weighed powdered drug was filled with 100 milliliters of chloroform water. The flask was then shaken continuously for 6 hours in an electrical shaker and left overnight to macerate. The extractive was then carefully filtered and evaporated until it was completely dry. The weight of the extractive was then determined, and the percentage was computed using

Weight of extractive / Weight of drug X 100 equals Water-Soluble Extractive.

c. Total Ash

A China dish was used to weigh three grams of the drug, burn it at a temperature of no more than 450 degrees Celsius until the carbon was gone, let it cool, and then weigh it again till it stayed the same for three readings. The air-dried medication was used to calculate the percentage of ash. Weight of Ash / Weight of Drug x 100 = Total Ash

d. Acid Insoluble Ash

The full amount of ash was achieved after boiling it for five minutes with 25 milliliters of weak hydrochloric acid. After that, the insoluble substance was collected in a Gooch crucible, washed with hot water, and burned until its weight remained constant. The percentage of acid-insoluble ash was calculated in relation to the medication that had been allowed to air dry.

Table: 05

Test	Result	
	Bauhinia racemosa	**Aloe**
Total Ash Content	5.5%	3.3%
Alcohol Soluble Content	3.5%	2.1%
Water Soluble Content	5.8%	3.1%

7. CONCLUSION:

The Bauhinia racemosa wound healing cream study's conclusion emphasizes how well it works to promote wound healing. In tests of stability, antibacterial activity, spreadability, viscosity, and phytochemical screening, the cream formulation incorporating Bauhinia racemosa leaf extract demonstrated favorable outcomes. Its antibacterial activities and enhanced tissue regeneration were facilitated by the presence of triterpenoids (lupeol) and flavonoids (quercetin, kaempferol). The cream was also acceptable for topical use due to its adequate pH level and outstanding durability. Its potential application in the treatment of wounds and skin diseases is further supported by its

antibacterial action against oral microorganisms. Because of their complementing qualities, aloe vera and Bauhinia racemosa seem to work quite well together in a wound-healing lotion. According to studies, aloe vera promotes wound healing by boosting the production of collagen, lowering inflammation, and warding off infection. It frequently works better than traditional therapies like petroleum jelly dressings and silver sulfadiazine for burns, ulcers, and wounds from surgery. In the meanwhile, Bauhinia racemosa is well-known for its anti-inflammatory, antibacterial, and antioxidant qualities, which support skin regeneration and wound healing. These two plant extracts working together in a cream formulation probably has a synergistic effect that speeds up the healing process while preserving the protection and hydration of the skin. Aloe vera-based formulations are also said to be light-textured, quickly absorbed, and calming for skin that is inflamed. All things considered, a wound healing cream derived from Aloe vera and Bauhinia racemosa may be a useful substitute for synthetic therapies, encouraging a quicker recovery while lowering infection risk and irritation. Aloe vera and Bauhinia racemosa together provide substantial therapeutic advantages when used as a wound-healing lotion. Bioactive substances including flavonoids, tannins, and terpenoids, which are abundant in Bauhinia racemosa, have potent antibacterial, anti-inflammatory, and antioxidant qualities. These characteristics promote better tissue regeneration, increased collagen synthesis, and quicker wound contraction. Known for its calming and hydrating properties, aloe vera also speeds up wound healing by lowering inflammation, encouraging cell division, and warding off microbial infections.

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