



Jatropha curcas Latex: The Study of Medicinal Properties in Burn Healing

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Abstract:

Jatropha curcas is a multipurpose, drought-resistant perennial plant belonging to the Euphorbiaceae family. Native to Central America, it has gained global attention due to its high oil content in seeds, which can be processed into biodiesel, making it a promising candidate for sustainable biofuel production. Apart from its energy potential, Jatropha curcas is also valued for its medicinal properties, soil erosion control, and use in traditional agroforestry systems. The plant grows in a variety of climates and soil conditions, often thriving in marginal lands where food crops struggle. However, its cultivation faces challenges such as variable oil yields, toxicity of certain plant parts, and the need for agronomic improvements. Ongoing research focuses on genetic improvement, pest and disease management, and enhancing oil extraction techniques to make Jatropha curcas a viable crop for green energy and rural development.

Key words: Jatropha curcas, Burn Healing, Wound, Cream, Bio-Active , Excipients , Skin

1.INTRODUCTION

Topical burn heal creams are antimicrobial chemicals or semisolid dosage forms that are administered to living tissue to lesser the risk of infection and sepsis. The 20th and 21st century witness the creation of numerous varieties of herbal antiseptic creams due to advancements in formulation technology and study into herbal medicine. These treatments, which combine old wisdom with current science, are a gentle and effective approach to heal minor wounds, cuts, burns, and skin irritations. Natural components with antibacterial, anti-inflammatory, and anticoagulant qualities are used to produce herbal antiseptic lotions. To make a calming and nourishing cream, the natural elements are frequently mixed with a base of moisturizing substances, like shea butter or beeswax.

Overview on *Jatropha curcas* plant:



Fig.1: *Jatropha curcas* plant

Jatropha curcas, a perennial shrub native to tropical regions has garnered attention in recent years for its diverse applications, ranging from biofuel production to medicinal use. One notable aspect of this plant is its latex, a milky fluid extracted from its bark. This latex contains a myriad of bioactive compounds, making it a promising candidate for pharmaceutical and therapeutic purposes. The aim of the present study is formulation and evaluation of a burn healing cream utilizing the potential of *Jatropha curcas* latex. The aim is to develop a safe and effective treatment for burns, addressing a critical need in healthcare. This research seeks to explore the healing properties of *Jatropha curcas* latex and its potential contribution to the field of dermatology and wound care.

Structure of skin

The skin is the largest organ of the human body, serving as a protective barrier between the internal organs and the external environment. It consists of multiple layers of tissue that work together to perform various functions essential for overall health and well-being.

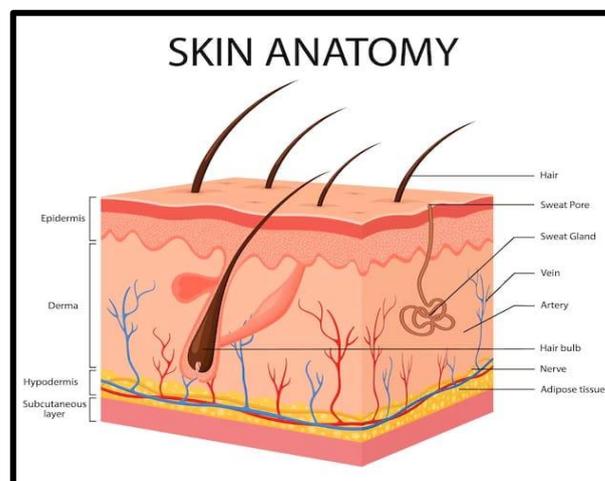


Fig.2: structure of skin

Structure: The skin is composed of three main layers:

1. Epidermis:

The outermost layer of the skin, primarily consisting of epithelial cells called keratinocytes. The epidermis acts as a protective barrier against physical, chemical, and microbial threats.

2. Dermis: The middle layer of the skin composed of connective tissue containing collagen and elastin fibers, blood vessels, nerves, and appendages such as hair follicles and sweat glands. The dermis provides structural support, elasticity, and nourishment to the skin.

3. Hypodermis (Subcutaneous Tissue): The innermost layer of the skin consisting of adipose tissue (fat cells) and loose connective tissue. The hypodermis serves as insulation, energy storage, and cushioning for the body.

4. Introduction to the Epidermis: The epidermis is the outermost layer of the skin, serving as a protective barrier against external factors such as pathogens, UV radiation, and chemical irritants. Composed mainly of specialized cells called keratinocytes, the epidermis undergoes constant renewal and regeneration to maintain skin health and integrity.

Introduction to the Hypodermis:

The hypodermis, also known as the subcutaneous tissue or superficial fascia, is the deepest layer of the skin located beneath the dermis. While technically not part of the skin itself, the hypodermis plays a crucial role in supporting and connecting the skin to the underlying muscles and bones. Understanding the hypodermis is essential for comprehending the body's overall structure and function.

Function:

skin performs several vital functions, including:

1. Protection:

The skin acts as a physical barrier, protecting the body from mechanical trauma, pathogens, UV radiation, and chemical exposure.

2. Sensation: The skin contains sensory receptors that detect touch, pressure, temperature, and pain, allowing us to perceive and respond to stimuli from the environment.

3. Thermoregulation: The skin helps regulate body temperature by producing sweat to cool the body through evaporation and by dilating or constricting blood vessels to release or retain heat.

4. Excretion: The skin excretes small amounts of metabolic waste products, salts, and water through sweat glands, contributing to the body's detoxification process.

5. Synthesis of Vitamin D: The skin produces vitamin D in response to UV radiation from sunlight, which is essential for calcium absorption and bone health.

6. Immune Defence: The skin is part of the body's immune system and contains specialized immune cells that help protect against infections and foreign invaders. Overall, the skin plays a

crucial role in maintaining homeostasis, protecting the body from external threats, and supporting overall health and well-being.

Topical dosage forms:

- Topical dosage forms are categorized into various types based on their physical state and application method. Solid forms include dusting powder, poultices, and plasters. Liquid forms encompass lotions, solutions, suspensions, colloid ions, and emulsions. Semi-solid forms comprise ointments, creams, pastes, gels, and suppositories. Additionally, miscellaneous topical dosage forms include transdermal delivery systems, rubbing alcohol, gauzes, and surgical or medical tape.

2.DRUG PROFILE

Local name- Mogali Erand



Fig.3: Jatropha curcas

- **Kingdom-** Plantae
- **Phylum-** Spurges
- **Class-** Angiosperm
- **Order-** Malpighiales
- **Family-** Euphorbiaceae
- **Genus-** Jatropha
- **Species-** curcas
- **Scientific name** –*Jatropha curcas L.*

Chemical constituents –

- a.phenolic acids
- b.lignans
- c.flavonoids
- d.coumarins plant
- e.alkaloids
- f. terpenes,etc.

Chemical properties –

- a . Antioxidant
- b. Cytotoxic
- c. anti-cancer
- d. antimicrobial

Iodine content – 104.90 mg/g

Saponification value – 203.36 mg/g

3. MATERIALS AND METHODS**Materials****Collection, identification and processing of plant:**

The *Jatropha curcas* plant latex were collected from garden, The Ashti ,Beed region of Maharashtra.

Materials for cream formulation are as follows:

Table 1: Materials for cream formulation jatropha curcus

Ingredients	Quantity taken	use
Wool fat	1gm	Emollient
Hard paraffin	1gm	Lubricant
Cocoa butter	13gm	Ointment base
Jatropha plant latex	5ml	Active ingredients
Triethanolamine	0.5ml	Maintain the pH hair & skin
Methyl paraben	0.02gm	Prevent fungal growth
Water	Q.S	Vehicle

METHOD OF PREPARATION

- a. **Collection of Latex:** The latex was collected in the morning with a bark of stems, latex at capacity into a sterile bottle.
- b. **J.curcus latex cream:** Made with a base of oil in water (O/W) according to methods used in the Formulation.
- c. Accurately weight all the ingredients and prepared the two phase first is oil phase and second is water phase.
- d. In oil phase take steric acid, wool fat hard paraffin and cocoa butter. add all ingredients in beaker for melting.
- e. Water phase included methyl paraben, triethanolamine and water. added all ingredients in beaker for melting.
- f. Then added water phase in oil phase and also added jatropha plant latex with continuous stirring until cooling of emulsifier in china dish.
- g. Prepared the cream and store in container and performed evaluation test.

4. EXPERIMENTAL WORK

1. Collection of latex

Collecting latex from *Jatropha curcas* involves following steps -

2. **Selecting the Plant:** A mature *Jatropha curcas* plant with well-developed seeds was chosen by ensuring that the plant is healthy and free from diseases.
3. **Preparation:** appropriate protective gear such as gloves and goggles were worn to prevent direct contact with the latex, to avoid skin irritation.
4. **Harvesting:** The latex was obtained by cutting the leaf stalk and the collected latex was immediately stored at 4 °C until further use
5. **Collection :** Suitable containers was selected such as small buckets or bowls, beneath the incisions to collect the latex as it drips out by ensuring that the containers were cleaned and free from any contaminants.
6. **Allowing Latex to Drip:** The incisions were left open to allow the latex to drip freely. The time required for latex collection varies depending on factors such as the weather, plant health, and the size of the incisions. Latex collection took several hours to a day.
7. **Processing:** The latex was collected, carefully removed the container without spilling the latex and transferred the collected latex to a suitable storage container for further processing or use.
8. **Cleaning Up:** The harvesting tools and equipment were cleaned thoroughly to prevent contamination and ensure their longevity by disposing of any leftover latex properly according to local regulations.



Fig. 10: Collection of latex

5. FORMULATION TABLE

Table 2: Formulation table of curcus *Jatropha curcas* Cream

Ingredients	F1	F2	F3
Wool fat	1gm	2 gm	3gm
Hard paraffin	1gm	2gm	3gm
Steric acid	0.48 gm	-	0.48gm
Cocoa butter	13gm	14gm	12gm
Jatropha plant latex	5ml	5ml	5ml
Triethanolamine	0.5ml	0.8ml	0.5ml
Methyl paraben	0.02gm	0.02gm	0.02gm
Water	Q.S	Q.S.	Q.S.

A. Formulation of herbal burn healing cream

The latex of *Jatropha curcas* has been used in traditional medicine to alleviate various conditions. It has been reported that this latex has several biological activities such as antibacterial, antioxidant, anti-inflammatory, wound healing and burn healing.

B. Preparation of oil phase and water phase

- Steric acid, wool fat, hard paraffin and white soft paraffin were melted to make oil phase and methyl parabens, triethanolamine and water were also melted to make water phase.

- After making both phases, water phase was added in the oil phase with introduction of *Jatropha curcas* latex with constant stirring until cooling of emulsifier in the china dish.



Fig. 12: Preparation of oil phase and water phase.

- C. **.Prepared formulation:** Prepared the cream stored in the container and performed evaluation tests.



Fig.13: prepared formulation

6. Performance of evaluation tests

1. Phytochemical Screening

Phytochemical screening was carried out to determine the secondary metabolites contained in the 96% ethanol extract. These secondary metabolites that have been qualitatively tested include alkaloids, flavonoids, saponins, tannins.

- a. **Flavonoid Test:** A total of 0.5 grams of sap is dissolved in 2 ml of 96% ethanol and 3 drops of NaOH solution are added. A change in the intensity of the colour to yellow with the addition indicates the presence of flavonoid compounds.

b. Saponin Test: A total of 0.5 grams of sap dissolved in 20 ml of aquades gives rise to foam of up to 1 cm indicating the presence of saponin compounds.

c. Tannin Test: A total of 0.5 grams of sap is dissolved in 2 ml of 96% ethanol, simmered in 10 mL of aquades in a test tube then filtered. 3 drops of 0.1% ferric chloride solution were added and the formation of a brownish-green or bluish- black colour was observed, indicating the presence of tannins.



Fig. 14: Phytochemical screening

2. Evaluation Tests

a. Physical Properties: The Cream was observed for colour and odour cream in white colour observed

- **Appearance:** The appearance of the cream was judged by its colour, pearlscenceaan Roughness and graded.
- **After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.
- **Type of smear:** After application of cream, the type of film or smear formed on the skin were checked.
- **Ease of Removal:** The ease of removal of the cream applied was examined by washing the applied part with tap water.
- **Irritancy test:** Mark an area (1sq.cm) on the left hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs. and reported.

b. Organoleptic Test-

Organoleptic testing carried out includes observation of the colour, aroma, and texture of gel preparations. The criteria for a good organoleptic gel preparation are the soft, colour and aroma of the gel according to the extract used

C. pH test

Done by dipping the pH meter electrode into each gel preparation that has previously been dissolved with aqua destilata. After the electrode is dipped, it is then allowed to stand until the screen on the pH meter shows a stable number. The pH requirement for topical preparations is between 5-10, or gel preparations must match the skin pH of 4.5- 6.5

d. Viscosity Test

The viscosity test is carried out by means of the rotor mounted on the test equipment, arranged until the rotor is immersed in the gel. The tool is activated; the indicated scale is read until it shows a stable number. Gel viscosity measurements were performed using a Brookfield Viscometer using spindles 5 and 4 at a speed of 50 rpm. Spread Power Test Dispersion testing is carried out to determine the speed at which the gel spreads on the skin when applied to the skin. A total of 1 gram of gel preparation is carefully placed on a glass measuring 20x20 cm. then covered with another glass and used ballast on it until the weight reaches 125 grams and measured in diameter after 1 minute. The dispersion requirement is between 5-7 cm.

7. RESULT & DISCUSSION

A. RESULT

a. Phytochemical Investigation

A series of chemical tests was conducted to identify various compounds within a sample, using specific reagents that yield distinct indicators for each substance.

- In the Saponin test, distilled water (Aquades) was used. Shaking the sample with Aquades produced stable foam, indicating the presence of saponins due to their surfactant properties.
- For the Tannin test, ethanol and ferric chloride (FeCl_3) were employed. The sample turned brownish-green, confirming the presence of tannins, which react with FeCl_3 to produce this colour.
- The Flavonoids test used ethanol and sodium hydroxide (NaOH). A yellow colour appeared, indicating the presence of flavonoids, which show this colour change in alkaline conditions.
- In the Alkaloids test, hydrochloric acid (HCl) and Mayer's reagent were used. A yellow precipitate formed, confirming the presence of alkaloids, which react with Mayer's reagent to produce this precipitate.

Table 3: Phytochemical Investigation of *Jatropha curcas*

Sr. No	Test	Reagent	Inference	Result
1	Saponin test	Aquades	Formed Foam (+)	Present
2	Tannin test	Ethanol + FeCl_3	Brownish green colour (+)	Present
3	Flavonoids test	Ethanol + NaOH	Yellow colour (+)	Present
4	Alkaloids test	HCl + Mayer Reagent	Yellow Precipitate (+)	Present

b. Organoleptic Evaluation

. Table 4: Organoleptic Evaluation of *Jatropha curcas*

Sr. No.	Test	F1	F2	F3
1	Smell	Characteristics smell	Characteristics smell	Characteristics smell
2	phase	semisolid	semisolid	semisolid
3	colour	White	White	white

a. pH test

Table 5: pH test of *Jatropha curcas* formulations

Cream Dosage Formulation	pH
F1	6.1
F2	6.9
F3	6.7

b. Spreadability test

Table 6: Spreadability test of *Jatropha curcas* formulations

Load imposed	F1	F2	F3
Glass only	5.74	5.84	6.2
100 gr	6.11	6.43	6.81
200 gr	6.87	7.09	7.87
300 gr	7.11	7.12	7.89
Average	6.45	6.62	7.12

c. Viscosity test Table 7: Viscosity of *Jatropha curcas* formulations

Formulation	Viscosity
F1	0.4 Pa. s
F2	0.2 Pa. s
F3	0.3 Pa s

B. DISCUSSION

formula. The preformulation studies had been done to choose the most proper formula according to the physiochemical properties of the *Jatropha curcas* belonging to the family Euphorbiaceae. The main goal of this study was to formulate a simple, effective, compatible, and inexpensive Traditionally used in various cultures for treating skin conditions i.e the burn healing.

8. CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that *Jatropha curcas* can be formulated as a cream preparation using additives such as steric acid as a binder, hard paraffin as a lubricant, white soft paraffin as a ointment base, methyl paraben as anti-fungal agent, triethanolamine as pH maintainer for hair and skin and wool fat as a emollient.

There are some characteristic and physical properties of *Jatropha curcas* plant latex cream formulation with semisolid dosage form having characteristic smell but there are some colour differences with differences in concentrations like white, creamy white, etc. The pH test showed that 6.8, 6.9 and 7.2 of the 1st, 2nd and 3rd formulation respectively.

There is an effectiveness of *Jatropha curcas* cream with the best burn healing effect given by cream with 25% of latex of *Jatropha curcas* plant gives 100% of bioavailability within 10-12 days.

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