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FORMULATION AND EVALUATION OF HERBAL BURN HEAL CREAM FROM *JATROPHA CURCAS LATEX*

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ABSTRACT

Burn injuries continue to be a significant global health concern, often resulting in severe morbidity and mortality. Traditional herbal remedies have long been utilized for wound healing, with Jatropha curcas emerging as a promising candidate due to its reported anti-inflammatory, antimicrobial, and wound healing properties. In this study, we aimed to formulate and evaluate herbal burn healing cream using Jatropha curcas latex. The cream formulation was developed using a combination of Jatropha curcas latex extract, along with compatible excipients to optimize stability, texture, and therapeutic efficacy. The formulated cream was subjected to various physicochemical, rheological, and pharmacological evaluations to assess its suitability for burn wound management.

Physicochemical analysis revealed the cream to be stable with desirable pH, viscosity, spreadability, and consistency. Rheological studies demonstrated indicating ease of application and spreadability on the skin. Furthermore, in vitro antimicrobial assays exhibited significant inhibition of common wound pathogens by the formulated cream. It has been reported that this latex has several biological activities such as antibacterial, antioxidant, anti-inflammatory, and wound healing.

KEYWORDS: *burn healer, Herbal cream, Jatropha curcas latex, Formulation, Evaluation, etc.*

INTRODUCTION

Burn injuries represent a significant public health challenge worldwide, causing substantial morbidity and mortality, particularly in developing countries where access to advanced medical care may be limited [1].Despite advancements in burn management, including surgical techniques, wound dressings, and pharmaceutical interventions, effective treatment options remain elusive, often leading to prolonged healing times, increased risk of infection, and impaired quality of life for affected individuals. In recent years, there has been a growing interest in the utilization of natural remedies, particularly herbal therapies, for wound healing and burn management[2].Traditional medicinal plants have been valued for their therapeutic properties for centuries, offering potential advantages such as cost-effectiveness, accessibility, and fewer adverse effects compared to synthetic pharmaceuticals. Among these medicinal plants, *Jatropha curcas L*., commonly known as physic nut or Barbados nut, has gained attention for its diverse pharmacological activities, including anti-inflammatory, antimicrobial, and wound healing properties.

Jatropha curcas is a perennial shrub belonging to the Euphorbiaceae family, indigenous to tropical and subtropical regions [3,4]. Various parts of the plant, including the leaves, seeds, and latex, have been traditionally used in folk medicine for the treatment of various ailments, including wounds, ulcers, and skin disorders. The latex obtained from the plant has been reported to possess significant wound healing potential, attributed to its rich phytochemical composition, which includes alkaloids, flavonoids, tannins, and saponins [6,7]. In light of the therapeutic properties attributed to *Jatropha curcas latex*, there is a growing interest in exploring its potential application in the development of novel formulations for burn wound management [5]. The present study aims to formulate and evaluate a herbal burn healing cream utilizing *Jatropha curcas latex* extract, along with compatible excipients, with the goal of harnessing its therapeutic potential for enhanced wound healing and tissue regeneration.

Advantages of herbal burn heal cream

1. Anti-inflammatory Properties

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2. Antimicrobial Activity
3. Wound Healing Effects.
4. Analgesic Effects.
5. Natural Source.
6. Availability
7. Cost-Effectiveness.
8. Cultural and Traditional Use.

MATERIAL AND METHODS

Materials

Collection, identification and processing of plant:

The *Jatropha curcas* plant latex was collected from Amolak Botanical Garden, Kada, Beed, Maharashtra. The botanical identification and authentication of the plant material were conducted by Dr. Sayyad I.G., Head of the Department of Botany at Gandhi College, Kada, Ashti, Beed, Maharashtra, India.

Jatropha curcas

Jatropha curcas could be a small tree or shrub belonging to family Euphorbiaceae. Medic. *J. curcas Linn*. The different types plant name are present like parsa erand,mogli Erand aratanjot .The leaf and latex extracts of *J. curcas* contained appreciable amounts of secondary metabolic compounds a loss or breaking of cellular and anatomic or function a process that's initiated by trauma and infrequently occurs in numerous phases like coagulation, epithelization, granulation, collegenation from this plant are reported to own remarkable anti [6,7] hemostatic [8], antioxidant, and anticancer formation of latest tissue and other is protections from microbial invasion during the healing process. On the physiology of wound healing, the injuries antibiotic compounds are utilized in heavy untoward effect like carcinogenesis compounds are alkaloids, saponins, flavonoids, and tannins the process of wound healing that affects migration and proliferation of fibroblast cells accelerate the method of repair of epithelial surfaces promote restoration .Unfortunately, there's a these growth factors [11,12]. The bioactive. Flavonoids, saponins, and tannins play a job within burn heal property.

fig.1: ***Jatropha curcas shrub***

Chemical constituents

a) phenolic acids
b) lignans
c) flavonoids
d) coumarins
e) alkaloids
f) terpenes

Medicinal uses

a) Antioxidant activity
b) Cytotoxic activity
c) anti-cancer activity
d) antimicrobial activity
e) antifungal activity

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f) Anti-inflammatory activity

Following are the excipients used in the formulation of the herbal burn heal cream:

EXCIPIENTS

Steric acid

Chemical Structure: Stearic acid is a long-chain carboxylic acid. Its molecular structure consists of a straight-chain hydrocarbon with 18 carbon atoms bonded to a carboxyl group (COOH) at one end.

Physical Properties:

Appearance: Stearic acid appears as a white, waxy solid at room temperature.

Melting Point: It has a relatively high melting point of around 69-71°C (156-160°F), which makes it useful in various applications.

Solubility: Stearic acid is insoluble in water but soluble in organic solvents like ethanol, ether, and chloroform.

Occurrence: Stearic acid naturally occurs in various animal and vegetable fats and oils. It's particularly abundant in fats like cocoa butter, shea butter, and palm oil.

Industrial Production: Stearic acid can be produced through the hydrolysis of fats and oils. It's often derived from vegetable oils such as palm oil, coconut oil, or soybean oil. The process involves the saponification of the oil to form soap, followed by acidification to separate the fatty acids. Stearic acid is then purified through processes like distillation or crystallization.

Uses:

- **Cosmetics and Personal Care:** Stearic acid is commonly used in cosmetics and personal care products as an emulsifier, emollient, and thickening agent. It helps stabilize emulsions and provides a smooth, creamy texture in products like lotions, creams, and soaps.
- **Pharmaceuticals:** It's used in the production of various pharmaceutical formulations, including ointments, creams, and suppositories.
- **Candles:** Stearic acid is often added to candle wax to increase hardness and improve burn time.
- **Food Industry:** In the food industry, stearic acid and its salts are used as emulsifiers, stabilizers, and thickeners in various food products.
- **Plastics and Rubber Industry:** It's used as a lubricant and release agent in the production of plastics, rubber, and other materials.
- **Textile Industry:** Stearic acid is used as a softening agent and lubricant in the textile industry during the manufacturing process of fabrics and yarns.

Safety: Stearic acid is generally considered safe for use in cosmetics, food, and pharmaceuticals when used in accordance with regulations. It's non-toxic and non-irritating to the skin. However, like any chemical, it should be handled with care, and exposure to large amounts may cause irritation.

Fig.2: Steric acid

Wool fat

Wool fat, also known as lanolin, is a natural substance derived from sheep's wool. It's a complex mixture of esters, fatty acids, and alcohols that serves various purposes industries ranging from cosmetics to pharmaceuticals.

Composition: Wool fat primarily consists of esters of high-molecular-weight lanolin alcohols and fatty acids. It also contains small amounts of free lanolin alcohols, lanolin acids, and lanolin hydrocarbons.
Extraction: Lanolin is obtained as a byproduct of wool washing. After shearing sheep, the wool is washed to remove impurities like dirt, sweat, and grease. During this process, lanolin is extracted from the wool fibers.
Properties:
Emollient: Lanolin has excellent emollient properties, meaning it softens and moisturizes the skin by forming a protective barrier that prevents moisture loss.
Occlusive: It forms a protective barrier on the skin's surface, which helps retain moisture and protect the skin from environmental factors like wind and cold.
Water-in-Oil Emulsifier: Lanolin can act as a stabilizer and emulsifier in cosmetic formulations, particularly in water-in-oil emulsions.
Hydrophilic-Lipophilic Balance (HLB): Lanolin has a relatively high HLB value, making it suitable for formulating water-in-oil emulsions and oil-in-water emulsions.
Applications:
- Cosmetics
- Pharmaceuticals
- Baby Care Products
- Industrial Applications
- Textiles

Safety: Lanolin is generally considered safe for topical use, although some individuals may be allergic to it. It's important to use lanolin products from reputable sources to ensure purity and minimize the risk of impurities or contaminants.

Fig.3: Wool fat

Hard Paraffin
Hard paraffin, also known as paraffin wax, is a type of wax derived from petroleum or other natural sources. It's a versatile substance with various industrial, cosmetic, and therapeutic applications.
Composition: Paraffin wax is a mixture of hydrocarbon molecules, primarily straight-chain alkanes. The carbon chain length typically ranges from about 20 to 40 carbon atoms.

Production
Petroleum-derived Paraffin: The most common method of producing paraffin wax involves refining crude oil. Crude oil is distilled to separate various fractions, and paraffin wax is obtained from the heavier fractions through a process called solvent dewaxing or by crystallization.
Natural Sources: Paraffin wax can also be derived from other natural sources, such as shale oil or coal.

Physical Properties
Appearance: Paraffin wax typically appears as a white or colorless, odorless solid at room temperature.

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Melting Point: Paraffin wax has a relatively low melting point, usually between 46°C to 68°C (115°F to 154°F), depending on the grade and purity.
Hardness: Paraffin wax can vary in hardness, ranging from relatively soft to hard and brittle, depending on factors such as the molecular weight distribution and additives.

Applications
- Candle Making:
- Cosmetics and Personal Care
- Food Industry
- Industrial Applications

Safety: Paraffin wax is generally considered safe for its intended uses.

Fig.4: Hard paraffin

Cocoa butter
Cocoa butter, derived from the cocoa bean, is a versatile and beneficial ingredient for formulating burn healing creams. Its unique properties make it a popular choice in skincare products, especially those designed to treat burns. Here's a detailed breakdown of cocoa butter and its role in burn healing cream formulations:

Composition
Cocoa butter is primarily composed of fatty acids, including oleic acid, stearic acid, and palmitic acid. These fatty acids give cocoa butter its solid texture at room temperature.
It also contains natural antioxidants, such as vitamin E, which can help protect the skin from oxidative stress and promote healing.

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Moisturizing Properties
Cocoa butter is a highly effective moisturizer. It forms a protective barrier over the skin, locking in moisture and preventing dehydration, which is crucial for burn healing. The emollient properties of cocoa butter help to soften and smooth the skin, reducing dryness and discomfort associated with burns.

Skin Repair and Regeneration
Cocoa butter contains compounds that support skin repair and regeneration. These compounds enhance the skin's natural healing process, promoting faster recovery from burns.

Anti-inflammatory Effects
Burn injuries often result in inflammation, which can exacerbate pain and delay healing. Cocoa butter possesses anti-inflammatory properties that help reduce swelling and discomfort associated with burns. By calming inflammation, cocoa butter creates a more favorable environment for the skin to repair itself.

Enhanced Formulation Stability
In burn healing cream formulations, cocoa butter can improve the stability and consistency of the product. Its solid texture at room temperature contributes to the cream's thickness and spreadability.

Compatibility with Other Ingredients
Cocoa butter is compatible with a wide range of other skincare ingredients, including soothing agents like aloe vera and chamomile, as well as antimicrobial agents like honey or silver sulfadiazine. By combining cocoa butter with complementary ingredients, burn healing creams can offer multifaceted benefits, such as pain relief, infection prevention, and scar reduction.

Application
- Moisturizing Agent
- Skin Softening and Smoothing
- Skin Conditioning
- Healing and Soothing Properties
- Antioxidant Benefits
- Fragrance and Aesthetic Appeal

Fig. 5: Cocoa butter

Triethanolamine
Triethanolamine, often abbreviated as TEA, is an organic compound that belongs to the class of ethanolamines. It is a colorless to pale yellow viscous liquid with a mild ammonia odor. Triethanolamine is widely used in various industrial, cosmetic, and pharmaceutical applications.

Chemical Structure: Triethanolamine has the chemical formula $C_6H_{15}NO_3$ and molecular weight of 149.19 g/mol. It consists of a tertiary amine group ($-N(CH_2CH_2OH)_3$) attached to three hydroxyethyl groups.

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Synthesis: Triethanolamine is typically synthesized through the reaction of ethylene oxide with ammonia, followed by the addition of ethylene oxide to ammonia to form monoethanolamine, then diethanolamine, and finally triethanolamine.

Physical Properties
Appearance: Triethanolamine is a clear to slightly yellow viscous liquid at room temperature.
Odor: It has a characteristic ammonia-like odor.
Solubility: Triethanolamine is miscible with water and soluble in alcohol and ether.
Uses:

- Pharmaceuticals
- Cleaning Products
- Textiles
- Metalworking Fluids
- Pesticides

Safety Considerations
Prolonged or repeated exposure to triethanolamine vapor or mist may cause irritation to the respiratory tract, eyes, and skin. Triethanolamine should be handled with care, and proper ventilation should be provided when working with it in enclosed spaces.

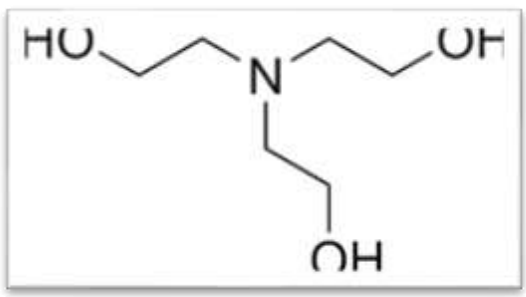

Fig. 6: triethanolamine

Methyl Paraben
Methyl paraben is a commonly used preservative in the cosmetic, pharmaceutical, and food industries. It belongs to the group of chemicals known as parabens, which are esters of para-hydroxybenzoic acid. Methyl paraben specifically is the methyl ester of para-hydroxybenzoic acid.

Chemical Structure: Methyl paraben has the chemical formula C8H8O3 and the IUPAC name methyl 4-hydroxybenzoate. Its molecular structure consists of a para-hydroxybenzoic acid molecule with a methyl group (-CH3) attached to the ester functional group (-COO).

Synthesis: Methyl paraben is typically synthesized through the esterification reaction between para-hydroxybenzoic acid and methanol in the presence of an acid catalyst.

Physical Properties:
Appearance: Methyl paraben is usually a white crystalline powder or colorless crystals.
Odor: It is odorless or may have a faint odor.
Solubility: Methyl paraben is soluble in alcohol, ether, and other organic solvents, but only sparingly soluble in water.

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Preservative Properties
Methyl paraben is widely used as a preservative in cosmetics, personal care products, pharmaceuticals, and food products. It inhibits the growth of bacteria, yeast, and mold by disrupting their cellular functions and metabolism, thereby extending the shelf life of products and preventing spoilage. Methyl paraben is effective over a wide pH range and is compatible with a variety of formulations.

Applications
- Cosmetics and Personal Care Products
- Pharmaceuticals
- Food Industry

Safety Considerations
Methyl paraben has been extensively studied for its safety and is generally recognized as safe (GRAS) for use in cosmetics and food products by regulatory authorities such as the U.S. Food and Drug Administration (FDA) and the European Food Safety Authority (EFSA).

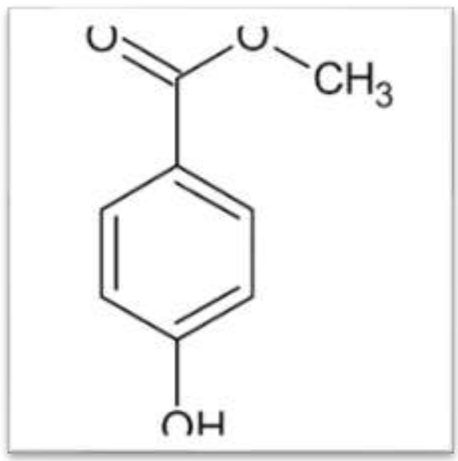

Fig. 7: Methyl paraben and Structure of methyl paraben

Water
Water is a key ingredient in many cream formulations, serving as a solvent, diluent, and vehicle for active ingredients. Creams are semisolid emulsions consisting of water and oil phases stabilized by emulsifiers.

METHOD OF PREPARATION

Collection of latex
Collecting latex from *Jatropha curcas* involves following steps -
Selecting the Plant: A mature *Jatropha curcas* plant with well-developed seeds was choosen by ensuring that the plant is healthy and free from diseases.
Preparation: appropriate protective gear such as gloves and goggles were weared to prevent direct contact with the latex, which can cause skin irritation.
Harvesting: The latex was obtained by cutting the leaf stalk and the collected latex was immediately stored at 4 °C until further use
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.
Allowing Latex to Drip: The incisions were leaved 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.
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.
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. 8: Collection of latex

FORMULATION TABLE

Table 1: Formulation table of curcus *Jatropha curcas* Cream

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

Formulation of herbal burn heal 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.

a) Accurately weighing all the ingredients

Fig. 9: Weighing of ingredients

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.

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Fig. 10: Preparation of oil phase and water phase.

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

Fig.11: Prepared formulation

Performance of evaluation tests

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 color 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 color was observed, indicating the presence of tannins.

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Fig. 12: Phytochemical screening

Evaluation Tests

a. Physical Properties: The Cream was observed for color and odor cream in white color observed

- **Appearance:** The appearance of the cream was judged by its color, pearlescence 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 color, aroma, and texture of gel preparations. The criteria for a good organoleptic gel preparation are the soft, color 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 aquadestilata. 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.

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 (Aquadest) was used. Shaking the sample with Aquadest 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 color.
- The Flavonoids test used ethanol and sodium hydroxide (NaOH). A yellow color appeared, indicating the presence of flavonoids, which show this color 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 2: Phytochemical Investigation of *Jatropha curcas*

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

The phytochemical analysis of *Jatropha curcas* was confirmed by different tests. These tests confirmed the presence of saponins, tannins, flavonoids, and alkaloids in the sample, each identified by specific color changes or precipitate formation with the respective reagents.

Organoleptic Evaluation

The table 3 outlines the results of organoleptic tests conducted on *Jatropha curcas* cream preparations, assessing sensory characteristics such as smell, phase, and color. For the smell test, all three formulations (F1, F2, and F3) exhibited a characteristic smell, suggesting consistency across the preparations in terms of olfactory properties. In terms of phase, all formulations appeared as semisolid, indicating uniformity in texture and consistency. Additionally, for color evaluation, all three formulations exhibited a white hue, further indicating consistency in appearance across the samples. Overall, these organoleptic tests indicate that the cream preparations share similar sensory attributes, including smell, phase, and color, suggesting uniformity and standardization in their preparation process.

Table 3: 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	color	White	White	white

pH test

The table 4 presents the pH values obtained from pH testing conducted on *Jatropha curcas* different cream formulations. Formulation F1 exhibited a pH of 6.1, while F2 and F3 had pH values of 6.9 and 6.7, respectively. These pH measurements are crucial as they indicate the acidity or alkalinity of the cream preparations. The pH values fall within a slightly acidic to neutral range, which is typically desirable for skin care products to maintain compatibility with the skin's natural pH. These results suggest that all formulations are within acceptable pH ranges, ensuring their suitability for topical application without causing irritation or discomfort to the skin.

Table 4: pH test of *Jatropha curcas* formulations

Cream Dosage Formulation	pH
F1	6.1
F2	6.9
F3	6.7

Spreadability test

The table 5 presents the results of a spreadability test conducted on different cream formulations, assessing their ability to spread under varying loads. The load imposed, ranging from "Glass only" to "300 gr," represents the weight applied to the cream during the test. For each load level, the spreadability measurements (in millimeters) are recorded for formulations F1, F2, and F3. As the load increases, indicating greater pressure applied to the cream, the spreadability measurements generally increase across all formulations. The average spreadability values for F1, F2, and F3 are calculated as 6.45 mm, 6.62 mm, and 7.12 mm, respectively. These results suggest that formulation F3 exhibits the highest spreadability among the three formulations, making it more conducive to application and distribution on the skin's surface.

Table 5: 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

Viscosity test

The table 6 provides the results of viscosity tests conducted on different cream formulations, measuring their resistance to flow. Formulations F1, F2, and F3 exhibited viscosity values of 0.4 Pa. s, 0.2 Pa. s, and 0.3 Pa. s, respectively. These viscosity measurements are crucial indicators of the consistency and thickness of the creams. Lower viscosity values, such as those seen in F2, suggest a thinner consistency, allowing for easier spreading and absorption into the skin. Conversely, higher viscosity values, as observed in F1, indicate a thicker consistency, which may provide greater moisturizing and protective properties. Formulation F3 falls between the other two formulations in terms of viscosity, offering a balance between spreadability and richness. Overall, these viscosity tests help assess the texture and application characteristics of the cream formulations, aiding in determining their suitability for various skin care needs.

Table 6: Viscosity of *Jatropha curcas* formulations

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

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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 ointment base, methyl paraben as anti-fungal agent, triethalonamide 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 color 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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