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Research Paper

Formulation and Evaluation of Liquorice Jellies for Cough

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ABSTRACT

Creams for wound healing can aid in both infection prevention and healing. The kind, extent, and depth of the wound as well as the patient's characteristics determine how effective wound healing creams are. Our study investigates the formulation and evaluation of wound healing cream consisting of three major drugs namely "Tridax Procumbens Linn", "Centella Asiatica" and "Withania Somnifera" for the treatment of the wounds. Tridax Procumbens Linn commonly known as Ghamra (Hindi) is rich in alkaloids, steroids, carotenoids, flavonoids, fatty acids, phytosterols, tannins, and minerals. Centella Asiatica is commonly known as Indian pennywort contains pentacyclic triterpenoids, such as asiaticoside, madecassoside, asiatic acid, and madecassic acid and Withania Somnifera which is commonly known as Ashwagandha contains alkaloids, steroidal lactones, flavonoids, and other chemical constituents. Our cream formulation harness these properties of drugs to give effective result on wound healing properties. Through a series of experiments, including pH testing, viscosity analysis, and microbiological studies, we demonstrate the stability and efficacy of the cream. Furthermore, clinical trials reveals its effectiveness in treatment of the wound and formation of the skin and healing the wound. The cream presents the promising natural solution for the treatment of the wound.

INTRODUCTION

Wound healing is a biological process that occurs in a complex series of steps including inflammation, proliferation, and remodeling. Although many treatments are provided by modern medicine, the quest for effective and safe alternatives continues. The therapeutic potential of

various plants has been recognized by traditional medicine for wound care. This study intends to explore the wound healing potential of a novel cream formulation containing three powerful medicinal herbs: Tridax Procumbens Linn, Withania somnifera (Ashwagandha), and Centella asiatica. Tridax Procumbens Linn has been applied traditionally for wound healing and inflammatory

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conditions. *Withania somnifera* exhibits in vitro anti-inflammatory, antioxidant and immunomodulatory activities. In the literature, *Centella asiatica* is recognized in stimulating collagen synthesis and facilitating wound repair. These herbs, if added together in the form of topical cream, synergistically could aid in enhancing healing of wounds in the present protocol. This research is to prepare and characterize the herbal cream and to conduct in vitro and/or in vivo to assess its efficacy for promoting wound closure and inhibiting inflammation and rapid regeneration of tissue. The results of this study will open doors to the development of a safe herbal wound healing cream that will supplement or even supplant conventional treatments. Asiatica, also known as Gotu kola, is a herb that holds much promise in wound healing with its bioactive compounds like asiatic acid, madecassic acid, asiaticoside, and madecassoside that induce collagen synthesis, proliferation of fibroblasts, angiogenesis, and inflammation reduction, thereby promoting the healing of wounds across various stages including re-epithelialization and tissue remodeling; making it a potential natural remedy for a variety of wounds, burns, and scars.

MECHANISM OF ACTION:

- **Collagen production:** The respective protein quantity of tissue repair is found to be stimulated by *Centella asiatica* by activating fibroblasts.
- **Angiogenesis:** It encourages the growth of new blood vessels, which is essential for the delivery of oxygen and nutrients to the wound site, thereby healing faster.
- **Anti-inflammatory effects:** Bioactive compounds present in the plant can result in inflammation reduction that may further retard healing.

- **Cell proliferation:** *Centella asiatica* enhances the cell division rate, so the rate of regenerating tissues is faster.

Clinical uses:

- **Skin lesions:** Topical use of *Centella asiatica* extracts is useful for the treatment of minor cuts, abrasions, and surgical wounds.
- **Burns:** *Centella asiatica* has been reported to be useful in the healing of burns by enhancing re-epithelialization and reducing scar formation.
- **Diabetic ulcers:** *Centella asiatica* may be useful in the management of diabetic foot ulcers due to its enhanced blood circulation and wound healing activity.
- **Keloids and hypertrophic scars:** Topical application may decrease the size of the raised scars.
- Many in-vitro and animal experiments have established the healing activity of *Centella asiatica* in wounds.
- Clinical studies have also revealed excellent results on the application of *Centella asiatica* as topical to different forms of wounds.

Physiology of Skin:

The skin is the largest organ of the body, playing a critical role in protecting the internal organs, regulating temperature, and providing sensory information.

It is made of three layers:

- a) **Epidermis:** It is composed of stratified squamous epithelium and is made up of dead, keratinized cells that form a strong, impermeable barrier. Only thick skin (palms, soles) has stratum lucidum, a thin, translucent layer. The stratum granulosum is made up of cells that help the skin's barrier function by producing lipids and keratin. The Langerhans

cells, which mediate immunity, are found in the stratum spinosum. The lowest layer, the stratum base, contains stem cells to replace the epidermis and melanocytes, which produce melanin for coloration.

- b) Dermis: A thicker layer of connective tissue, providing strength and flexibility. It contains blood vessels, nerves, sweat glands, hair follicles and sebaceous glands.

Two layers:

Papillary layer: Contains dermal papillae that interlock with the epidermis, increasing surface area for nutrient exchange.

Reticular layer: Contains dense collagen and elastin fibers, providing strength and elasticity.

- c) Hypodermis: It is the deepest layer, primarily composed of adipose tissue. It provides insulation, cushioning and energy storage.

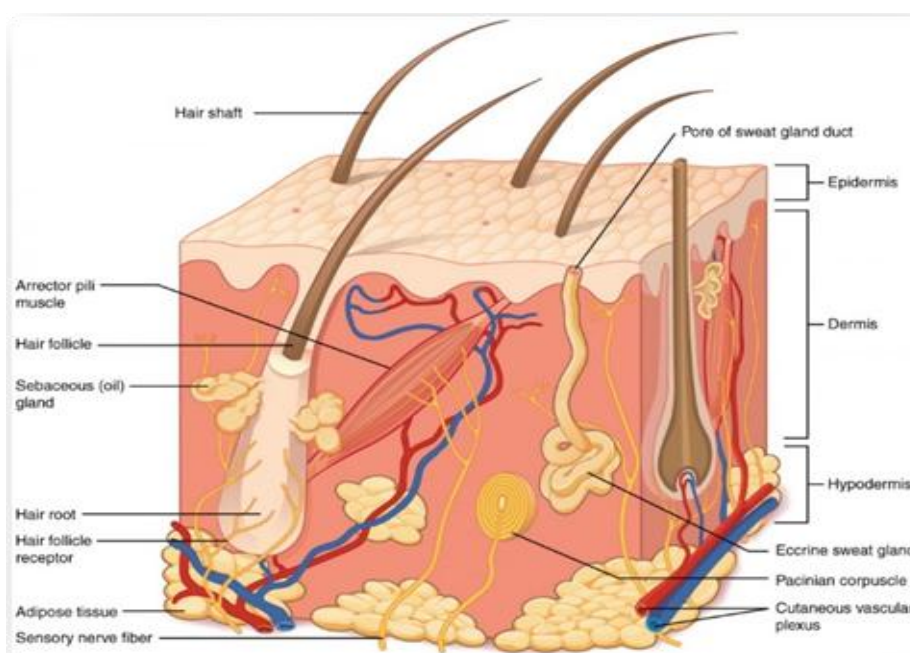


Figure 1

Physiological function of skin:

- I. Protection
- II. Thermoregulation
- III. Sensation
- IV. Excretion
- V. Vitamin D Secretion

AIM AND OBJECTIVE:

The aim of the present research work is to formulate, develop, and evaluate a herbal wound healing cream consisting of *Tridax Procumbens* Linn as the chief constituent, *Centella Asiatica*, and *Withania Somnifera*. Traditionally these plants are medicinally used to treat various ailments.

Therefore, this research aims to utilize their natural medicinal properties to produce an effective, natural, and inexpensive wound healing cream.

Specifically, the objectives are to:

- Extract active constituents from *Tridax Procumbens* Linn, *Centella asiatica* and *Withania somnifera*.
- Combine these extracts to formulate a cream base suitable for topical application.
- Evaluate the wound healing efficacy of the developed cream through in vitro (laboratory-based) and in vivo (living organism) studies.

- Compare the healing effects of the herbal cream with conventional wound healing treatments.
- Assess the cream for any potential side effects or skin irritation through dermatological testing.

This study aims at providing scientific support for the application of these traditional herbal remedies in healing of wounds, which may develop into a potential commercially viable herbal wound-healing product.

1. Drug Profile

Tridax Procumbens Linn:



Figure 2

- Family: Asteraceae
- Genus: Tridax
- Species: Tridax Procumbens Linn Linn Linn
- Common Name: Coat Buttons, Ghamara and Kansari
- Active Components: Flavonoids, Alkaloids, Carotenoids, Saponins, Tannins, Steroids, Triterpenoids

Centella Asiatica:



Figure 3

- Family: Apiaceae
- Genus: Centella
- Species: Centella asiatica
- Common Name: Gotu Kola, Indian Pennywort, Mandukaparni
- Active Components: Triterpenoids, Flavonoids, Alkaloids, Essential Oils

Withania Somnifera:



Figure 4

- Family: Solanaceae
- Genus: Withania
- Species: Withania somnifera (L.) Dunal
- Common Name: Ashwagandha, Indian Ginseng, Winter Cherry
- Active Components: Alkaloids, Flavonoids, Withanolides

Tridax Procumbens Linn Leaves:

Tridax procumbens Linn is a common medicinal plant that is a member of the Steraceae family and is used in yurvedic medicine because of its pharmacological properties. Known as "Coat buttons" or "ridax daisy" in English, this annual or perennial plant is native to Central and South America and is found as a weed throughout India. Its leaves have insecticidal, antiparasitic, and antiseptic qualities. Therefore, it might be applied to organic farming in the future to promote sustainable agriculture. Wound healing involves a complex interaction between epidermal and dermal cells, the extracellular matrix, regulated angiogenesis, and plasma-derived proteins interact

intricately during wound healing, all of which are regulated by a variety of growth factors and cytokines. Tridax counteracted the known healing suppressant agent dexamethasone's anti-epithelialization and tensile strength depressing effects without compromising the drug's anticontraction and anti-granulation properties.

Though not as much as whole plant extract, aqueous extract was also successful in raising lysyl oxidase. Additionally, in a dead space wound healing model, it has been demonstrated that an extract from the leaves of this plant also promotes wound healing in both normal and immunocompromised (steroid-treated) rats. The plant increases the amount of protein and nucleic acids in the granulation tissue in addition to lysyl oxidase, most likely due to an increase in glycosaminoglycan content^[1-8].

Centell Asiatica:

The herbaceous plant *Centella asiatica*, popularly referred to as gotu kola, has a lengthy history of traditional use in Ayurvedic medicine. Known as "Brahmi" or "Mandookaparni" in India, it has long been used as an adaptogen. The leaves and stem are used for the wound healing activity.

Phytochemistry: Triterpenoids make up the majority of the bioactive substances found in *C. asiatica*. These consist of triterpene acids like asiatic acid and madecassic acid, as well as triterpene glycosides like asiaticoside, madecassoside, and centelloside. These substances add to the plant's varied pharmacological characteristics.

Skin Health Benefits: *C. asiatica* has drawn a lot of interest due to its possible advantages for skin health. Research has indicated that it might. **Encourage wound healing:** *C. asiatica* may hasten wound closure and enhance tissue regeneration by inducing the synthesis of collagen and fibronectin. **Increase skin elasticity:** According to certain studies, it may increase skin elasticity and lessen

the visibility of wrinkles. **Reduce inflammation:** *C. asiatica* may have antioxidant and anti-inflammatory qualities that can help reduce inflammation in skin conditions like psoriasis and eczema^[9-16].

Withania Somnifera Roots:

"Indian ginseng," or *Withania somnifera*, is a significant medicinal plant found on the Indian subcontinent. Since ancient times, Indian systems of medicine have used it extensively, either alone or in conjunction with other herbs, to treat a wide range of illnesses. It has a wide range of biological implications because it contains a variety of phytochemicals. It has been shown to lower reactive oxygen species, improve endothelial function, control apoptosis, modify mitochondrial activity, and lessen inflammation. *W. somnifera* is a promising drug candidate to treat a variety of clinical conditions, especially those pertaining to the nervous system, because of these pharmacologic characteristics. The pharmacologic properties of the plant and its active ingredients are outlined in this review, along with their mechanisms of action and possible therapeutic uses. In a number of disease models, *Withania somnifera* has demonstrated notable anti-inflammatory properties. By eliminating neutrophil infiltration, edema, and necrosis in inflammatory bowel disease caused by trinitrobenzyl-sulfonic acid (TNBS), its root extract demonstrated anti-inflammatory and mucorestorative properties. In a mouse model of lupus, powdered root extract was found to have a strong inhibitory effect on inflammatory markers like cytokines like interleukin (IL)-6 and tumor necrosis factor (TNF)- α , nitric oxide (NO), and ROS, as well as proteinuria and nephritis^[19-21].

2. Experimental Studies

METHODOLOGY:



Materials Required:

- *Centella Asiatica* Extract
- *Tridax Procumbens* Extract
- *Withania Somnifera* Extract
- Beeswax
- Liquid Paraffin
- Borax
- Methyl Paraben
- Rose Oil

I. Preparation of Extract:

- Cold maceration method was used for the extraction.
- First, the powdered plant material, *Tridax Procumbens* Linn, *Centella Asiatica* and *Withania Somnifera* was macerated for 24 hours, shaking periodically, in a 70:30 mixture of alcohol and water in a round-bottom flask (RBF).
- Following a 24-hour period, the solvents underwent filtration, following which the powdered *tridax procumbens* extracts were gathered.

II. Preparation of Herbal Cream:

- Every ingredient was precisely weighed.
- Heat beeswax and liquid paraffin in a borosilicate glass beaker at 75 °C and maintain that heating temperature. (Oil phase).
- In another beaker, dissolve borax, methylparaben in distilled water and heat this beaker to 75 °C to dissolve borax and methylparaben and to get a clear solution. (Aqueous phase).
- Then slowly add aqueous phase in heated oily phase.
- Then add a measured amount of tridax procumbens extract, ashwagandha roots extract and centella asiatica and stir vigorously until it forms a smooth cream. Rose oil is added as a fragrance.
- Put this cream on the slab and add few drops of distilled water and mix the cream on the slab to give a smooth texture to the cream and to mix all the ingredients properly^[22].

VI. Formulation Table for preparation of cream: Table No :1

Sr. No	Content	Composition		
		F1	F2	F3
1.	Centella Asiatica Extract	0.9 gm	1.2 gm	1.5 gm
2.	Tridax Procumbens Extract	0.6 gm	0.8 gm	1 gm
3.	Withania Somnifera Extract	0.6 gm	0.8 gm	1 gm
4.	Bees Wax	1.2 gm	1.6 gm	2 gm
5.	Borax	0.3 gm	0.4 gm	0.5 gm
6.	Methyl Paraben	0.06 gm	0.08 gm	0.1 gm
7.	Liquid Paraffin	1.5 gm	2 gm	3 gm
8.	Rose Oil	0.6 gm	0.8 gm	1 gm
9.	Distilled Water	qs	qs	qs
	Total	15 gm	20 gm	25 gm

3. Evaluation of The Cream

A number of quality control tests, such as physiochemical, visual evaluation and conditioning performance tests, were carried out to assess the prepared formulation's quality.

➤ Organoleptic Properties**Table No: 2**

Parameters	Centella Asiatica	Tridax Procumbens	Withania Somnifera
Texture	Leaves are rough and hairy, stem are slender and hairy	Leaves are smooth and slightly fleshy, stems are thin and delicate	Leaves are soft and velvety, roots are thick and fleshy.
Smell	Mild Grassy Scent	Mild, Grassy and Earthy Smell	Slightly bitter, pungent and earthy
Taste	Slightly bitter and Astringent	Slightly bitter and Slightly sweet	Bitter and slightly astringent
Tongue Sensation	Rough	Smooth and Slightly Slippery	Sticky

Table No: 3

➤ **Screening of Cream Formulation
Phytochemically**

Phytoconstituent	Centella Asiatica	Tridax Procumbens	Withania Somnifera	Cream Formulation
Carbohydrate	Present	Present	Present	Present
Protein	Present	Present	Present	Present
Fats	Present in small amount	Present in small amount	Present in small amount	Present
Alkaloids	Present	Present	Present	Present

➤ **Procedure of Phytochemical Test:**

Table No: 4

I. Test for Carbohydrate:

Test	Observation			Inference
	Tridax Procumbens	Withania Somnifera	Centella Asiatica	
Molisch test: In a test tube 2 ml of carbohydrate solution is mixed with 5 ml of Molisch reagent and about 2ml of conc H ₂ SO ₄ to form bottom layer	Formation of purple or reddish-purple ring at the interface	Formation of purple or reddish-purple ring at the interface	Formation of purple or reddish-purple ring at the interface	Presence of Carbohydrate
Solubility: Compound + water	Partially Soluble	Partially Soluble	Partially Soluble	Presence of both polar and non-polar compounds
Iodine test: Add 1-2 drop of N/50 Solution to about 2ml suspension or solution of polysaccharides.	No Significant colour change	No Significant colour change	No Significant colour change	Absence or very low concentration of starch

II. Test for Protein:

a) Solubility Test:

Add 0.5 grams of casein to 2 milli-liters of 0.1 N NaOH, 2 milli-liters of 0.1 N HCL, and 2 milli-liters of distilled water separately to test the

solubility of the protein. Casein dissolves entirely in 0.1N NaOH, after soaking the tubes in water for ten minutes, remove them.

b) Preparation of sample solution:



To create a solution, breakdown 100 milliliters of 0.1N NaoH and add 1 gram of casein.

c) Biuret Test:

Mix with 2 ml of protein solution, add 2 ml of 10% NaoH solution, and add three to four drops of 1% copper sulfate solution. Purple is created when a bond of peptides is present and the sample being analyzed is a protein.

III. Test for Alkaloids

Every single extract (0.5 g) was shaken in a steam bath with 5 mL of 1% HCL. After filtering the resulting solution, one milliliter of the filtrate was mixed with a few drops of Mayer's reagent. The turbidity of the filtrate following the addition of Mayer's reagent indicated the existence of alkaloids in the extract.

IV. Test for Glycosides

After adding a milliliter of pyridine and a few drops of sodium nitropruside solution, the hydrolysate was made alkaline by adding sodium hydroxide solution. Glycosides are indicated by a pink to red appearance.

4. Extraction of Herbal Drug

For ages, maceration has been employed as a technique for compound extraction. The fundamental idea is to soak a solid in a liquid to extract its soluble components. In order to enhance the surface area between the sample and the liquid solvent, the sample is typically prepared by drying and grinding it. Using a rotavapor to continuously extract the desired components of a mixture is an other method. A spinning flask immersed in a heated water bath and under vacuum is used in the rotary evaporator. A thin layer of the mixture is produced by the rotation, and heat causes it to evaporate. In contrast to my pressure cooker, the vacuum has the opposite effect. The vacuum

lowers the boiling point rather than raising it as a result of increased pressure. As a result, the solvent can evaporate at lower temperatures. Even more intricate tasks, such continuous extractions, can be completed by contemporary rotary evaporators. In a continuous extraction procedure, the vaporized solvent condenses and is gathered in a different container. The following extraction cycle then makes use of the condensed solvent. Because the solvent can be used again, this approach enables an effective and continuous procedure. Heat-sensitive materials do not deteriorate due to the low temperatures.

5. Beneficial Properties of “Powder of The Drugs”

An extractive soluble in alcohol:

100 milli-litters of 90% alcohol were added to a Stoppard conical flask containing five grams of precisely measured powdered medication. After being continuously 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 cautiously evaporated until it was dry.

Alcohol Soluble Extractive: $\frac{\text{Extractive Weight}}{\text{Drug Weight}} \times 100$

Extractive Soluble in Water

One hundred milli-litters of chloroform water were added to a Stoppard conical flask that held five grams of accurately measured powdered medication. After six hours of constant shaking in an electrical shaker, the flask was kept overnight to macerate. After that, the extractive was meticulously filtered and dried completely by evaporation. After determining the extractive's weight, the percentage was calculated using

Water-Soluble Extractive: $\frac{\text{Weight of extractive}}{\text{Weight of drug}} \times 100$ equals



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 until it stayed the same for three readings. To calculate the percentage of ash the air-dried drug was used.

$$\text{Total Ash} = \text{Wt. of ash} / \text{Wt. of drug} \times 100$$

Acid Insoluble Ash

The ash was obtained after boiling it for five minutes with 25 milli-liters of diluted hydrochloric acid in it. After that, the insoluble substance was collected in a Gooch Crucible, cleaned with hot water, and burned until its weight remained constant. The amount of acid-insoluble ash was calculated with respect to the drug that had been allowed to air dry.

Table No: 5

Test	Result		
	<i>Tridax Procumbens</i>	<i>Centella Asiatica</i>	<i>Withania Somnifera</i>
Total Ash Content	12.5 %	21.22	5.78
Acid Insoluble Ash Content	3.07	0.53	0.7
Alcohol Soluble Content	7.18	6.9	8.16
Water Soluble Content	2.19	1.30	2.93

6. Therapeutic Uses

Tridax Procumbens:

Coat Buttons, or *Tridax procumbens*, is a medicinal plant that has a variety of therapeutic uses. It can help lessen inflammation in diseases like arthritis because of its strong anti-inflammatory qualities. Antioxidants, which are abundant in the plant, help scavenge dangerous free radicals, lowering oxidative stress and avoiding cell damage. *Tridax procumbens* is frequently used to promote quicker tissue regeneration and prevent infection in wound healing. Additionally, it has antimicrobial qualities that make it effective against a variety of bacteria and fungi, which makes it beneficial for treating digestive problems and skin infections. Because of its hemostatic qualities, the plant helps stop bleeding from wounds and cuts. It has also been used historically to treat fever and malaria, with some success against these illnesses. Its potential anti-diabetic qualities can help control blood sugar levels, and its hepatoprotective effects aid in liver

detoxification. According to certain research, it might also have anticancer properties by preventing the growth of cancer cells. *Tridax procumbens* has anti-epileptic properties that help control seizures and is used for respiratory health, alleviating the symptoms of coughing and asthma. Lastly, it promotes digestive health by curing ailments like diarrhea and indigestion. Although some scientific studies and traditional uses support these therapeutic benefits, more research is required to fully confirm their efficacy^[1-8].

Centella Asiatica and *Withania Somnifera* :

Withania somnifera also known as ashwagandha, and *Centella asiatica* known as gotu kola, are well-known medicinal plants with a range of therapeutic benefits. Because of its neuroprotective qualities, *Centella asiatica* is well known for its capacity to support brain health, improve memory, and improve cognitive function. By increasing skin elasticity, decreasing scars, and boosting collagen synthesis, it is also used to aid in wound healing. The plant's potent antioxidant and

anti-inflammatory qualities aid in the body's fight against inflammation and oxidative stress. *Centella asiatica* is also frequently used to reduce stress and anxiety; research has indicated that it may also lessen the symptoms of anxiety and depression, making it a mental health adaptogen. Ashwagandha, or *Withania somnifera*, on the other hand, is mainly recognized for its adaptogenic qualities, which support general vitality and assist the body in managing stress. It helps the body reduce oxidative stress and inflammation by having anti-inflammatory and antioxidant properties. Because it increases muscle mass and stamina, ashwagandha is frequently used to improve physical strength and endurance. By promoting immune function and preventing the growth of cancer cells, it has also been demonstrated to have anti-cancer effects. Furthermore, because of its calming effects on the nervous system, *Withania somnifera* is useful for promoting better sleep patterns, lowering anxiety, and elevating mood. It is also helpful for maintaining hormonal balance and controlling thyroid function, which makes it an important herb for treating ailments. Both plants have been used for many years in traditional medicine to treat a variety of ailments, and research is still being done to fully understand their therapeutic benefits^[9-21].

7. Toxicity:

• **Tridax Procumbens**

Traditional medicine makes extensive use of the plant *Tridax procumbens*. Like many medicinal plants, its toxicity can change based on how much is taken, how it is prepared, and how it is consumed.

Toxic Components: Depending on the quantity ingested, the flavonoids, alkaloids, and saponins found in *Tridax procumbens* may have both positive and negative effects. When taken in

excess, these substances can cause liver damage and gastrointestinal issues.

Hepatotoxicity: According to certain research, high or prolonged dosages of *Tridax procumbens* can result in liver toxicity, which can raise liver enzyme levels and possibly cause hepatomegaly, or liver enlargement.

Toxicological Studies: Although more research is required to determine the precise human toxicity thresholds, some animal models exhibit both reproductive toxicity and renal damage.

Allergic Reaction: It has occasionally been connected to allergic reactions or skin irritation, especially when applied topically.

Contraindication: People who already have liver or kidney disease, as well as those who are pregnant or nursing, should use it with caution^[1-8].

• **Withania Somnifera:**

One of the most widely used herbs in Ayurvedic medicine is *Withania somnifera*, also referred to as ashwagandha. Its adaptogenic qualities make it a popular choice for managing stress, anxiety, and overall health. However, when used improperly, it can also be toxic.

Toxic Components: Steroids, alkaloids, and withanolides are found in *Withania somnifera*; these substances are believed to have therapeutic properties but can have negative side effects if taken in excess.

Liver Toxicity: Although usually thought to be safe at standard therapeutic dosages (300–500 mg/day), prolonged or excessive use has occasionally been linked to hepatotoxicity. Liver function may be impacted by withanolides.

Gastrointestinal Problems: Excessive dosages may cause nausea, vomiting, and diarrhea.



Particularly if taken with other herbs or supplements or on an empty stomach, these symptoms may appear.

Endocrine Disruption: Thyroid hormone levels are significantly impacted by ashwagandha. If taken excessively, it can cause hyperthyroidism, particularly in people who already have a thyroid condition.

Effects on Sleep: Ashwagandha is an adaptogen that helps lower stress and anxiety, but it can also make you feel sleepy. Excessive sleepiness, lethargy, and cognitive impairment can result from overuse.

Contraindications: Due to the possibility of complications, it should be used with caution in patients with thyroid issues, autoimmune diseases, and pregnant or lactating women. Overdosing may also affect a man's ability to conceive^[9-16].

- **Centella Asiatica**

Gotu kola, also known as Centella Asiatica, is frequently used for its ability to improve cognition and heal skin. When taken in moderation, it is generally considered safe; however, excessive or inappropriate use can pose certain risks.

Toxic Components: Triterpenoid saponins, which are found in Centella Asiatica, are advantageous in moderation but may be toxic in excess.

Liver and Kidney Toxicity: Excessive or long-term use of gotu kola has been associated with the possibility of kidney damage and liver toxicity, particularly when high doses are taken over an extended period of time.

Gastrointestinal Problems: Excessive use may result in headaches, nausea, and light headedness, as well as diarrhea in certain cases. Those who are sensitive to the herb are more likely to experience these effects.

Skin Reactions: Although it has a reputation for healing skin, sensitive people may experience allergic reactions or skin irritation from overuse, especially when applied topically.

Neurotoxic Effects: A mild sedative effect at high doses is suggested by the sporadic reports of drowsiness, lethargy, or confusion with prolonged use.

Contraindications: Avoid the herb, especially at high doses, if you have liver disease, kidney problems, or are pregnant or nursing. Additionally, using gotu kola with other sedatives or substances that affect the liver should be done with caution^[17-21].

General Points to Remember About All Three Plants:

Dosage and Purity: The dose has an enormous effect on the risk of toxicity. The concentration of herbal supplements, particularly those derived from whole plants, can vary greatly. To prevent accidental overdosing, the herbal products must be pure and standardized.

Drug Interactions: Sedatives, blood pressure medications, and immunosuppressants are among the medications that these plants may interact with. For example, Centella Asiatica and Withania somnifera may interact with anticoagulants and thyroid medications, respectively, raising the risk of bleeding.

Long-term Effects: prolonged consumption of any herbal remedy should be examined by a healthcare professional, specifically when used over prolonged periods.

RESULT AND DISCUSSION

Evaluation studies of prepared formulations:



The prepared three formulations were evaluated by observing the appearance and consistency. Further formulations were evaluated by conducting pH measurement, spreadability, viscosity, washability and foamability

I. Physical Appearance:

The formulated wound healing cream was visually inspected for their colour, odour and consistency.

Formulation	Colour	Odour
F1	Light Green	Slightly Bitter
F2	Greenish Yellow	Slightly Bitter
F3	Greenish Yellow	Slightly Bitter

II. Determination of pH:

The ph. of prepared formulation was determined using ph. paper and the ph value are shown below

Formulation	pH
F1	6.8
F2	6.9
F3	7

The ph. of formulated cream that is F1, F2 and F3 was found to be 6.8, 6.9 and 7 respectively and the ph. of the formulated cream was almost equal to the ph. of the skin which prevents the irritation of the skin.

III. Determination of Spreadability:

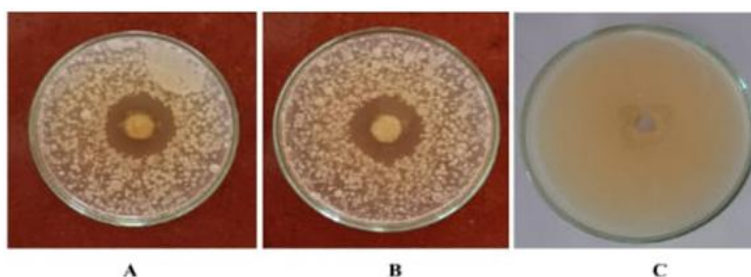
Spreadability plays an important role in patient compliance and ensures uniform application of the cream. Good spreadability can ensure the distribution of the cream when applied to the skin.

Formulation	Spreadability (gm.cm/sec)
F1	4.8
F2	5.2
F3	5.9

The spreadability of the F3 formulation is 5.9 gm.cm/sec which is more than the other formulation. This shows that formulation F3 has better spreadability than the other formulations.

IV. Antimicrobial Studies:

Formulation	Zone of Inhibition
Standard	13
F3	12.8



CONCLUSION

Since herbal formulations are safe, effective, and have fewer side effects than synthetic alternatives, they have become more and more popular as the trend toward natural skincare products continues to grow. In this case, herbal extracts of *Tridax procumbens*, *Withania somnifera*, and *Centella Asiatica* were used to create a herbal cream. These plants are perfect candidates for a skincare formulation because of their many therapeutic qualities, which have been thoroughly investigated. These include anti-inflammatory, anti-aging, antioxidant, wound repair, and skin regenerating effects. The cream used in this study was created by adjusting the amounts of plant extracts and additional chemical components. A thorough assessment of various formulations (F1, F2, and F3) was conducted, taking into account factors like color, texture, consistency, spreadability, extrudability, pH, skin irritancy, and stability. *Centella Asiatica* is well-known for its capacity to increase collagen production and encourage skin healing, *Withania somnifera* for its anti-aging and stress-relieving qualities, and *Tridax procumbens* for its antimicrobial and wound-healing qualities. These herbs work in concert to enhance the health of the skin. The evaluation's findings demonstrated that every formulation was safe for use because it didn't cause skin irritation. F3 was the most successful formulation among the others, showing the best texture, spreadability, and overall performance. In terms of improving skin hydration, encouraging wound healing, lowering aging symptoms, and offering anti-inflammatory properties, this formulation showed the best results. The herbal cream, especially formulation F3, showed considerable efficacy and promise as a safe and natural substitute for synthetic creams, according to the study's findings. In the cream formulation, the combination of *Tridax procumbens*, *Withania*

somnifera, and *Centella Asiatica* demonstrated their advantageous skincare qualities, emphasizing their roles in promoting wound healing, enhancing skin health, and offering anti-aging advantages. The potential of these herbal ingredients to create comprehensive and successful skincare products is further supported by this research.

REFERENCES

1. Aboh, A. B., Olaafa, M., Dossou-Gbété, G. S. O., Dossa, A. D., & Djagound, N. (2002). Ingestion volontaire et digestibilité apparente d'une ration à base de la farine de grains de *Mucuna pruriens* var. utilis complétée de fourrages chez les lapins. *Tropiculture*, 20(4), 165-169.
2. Kumar, L., Prasad, A., Iyer, S., & Vaidya, S. (2012). Pharmacognostical, phytochemical and pharmacological review on *Tridax procumbens*. *International Journal of Pharmaceutical & Biological Archives*, 3(4), 747-751.
3. Manjamalai, A., & Grace, V. M. B. (2004). Effect of essential oil of *Tridax procumbens* Linn on in-vivo antioxidant level in cancer model and in-vitro free radical scavenging activity. *International Journal of Pharmaceutical Analysis*, 37(10), 261-271.
4. Chaney, S.G., 2006b. Principles of Nutrition II: Micronutrients. In: Devlin, T.M. (ed.), *Textbook of Biochemistry, with Clinical Correlation*, 6th ed. John Wiley and sons, New York, pp: 1091-1120. ISBN 10 0-471-67808-2.
5. Farnsworth NR, Akerele O, Bingel AS, Soejarto DD, Guo Z. Medicinal plants in therapy. *Bull World Health Organ*. 1985; 63(6): 965.
6. Hemalatha R. Anti-hepatotoxic and antioxidant defense potential of *Tridax procumbens*. *Int J Green Pharm*. 2008; 2(3): 164.



7. Sureshkumar J, Silambarasan R, Ayyanar M. An ethnopharmacological analysis of medicinal plants used by the Adiyar community in Wayanad district of Kerala, India. Eur J Integr Med. 2017; 12: 60-73.
8. Bhagwat DA, Killedar SG, Adnaik RS. Anti-diabetic activity of leaf extract of *Tridax procumbens*. Int J Green Pharm. 2008; 2(2).
9. Brinkhaus B, Lindner M, Schuppan D, Hahn EG. 2000. Chemical, pharmacological and clinical profile of the East Asian medical plant *Centella asiatica*. Phytomedicine 75: 427–448.
10. Gohil KJ, Patel JA, Gajjar AK. 2010. Pharmacological Review on *Centella asiatica*: A Potential Herbal Cure-all. Indian J Pharm Sci 72: 546–556.
11. Shetty BS, Udupa SL, Udupa AL, Somayaji SN. 2006. Effect of *Centella asiatica* L. (Umbelliferae) on normal and dexamethasone suppressed wound healing in Wistar Albino rats. Int J Low Extrem Wounds 5: 137–143.
12. Armstrong, G.D.; Meyr, A.J. Basic Principles of Wound Management. In Atlas of Small Animal Wound Management and Reconstructive Surgery; John Wiley & Sons: Hoboken, NJ, USA, 2018; pp. 33–52.
13. Brinkhaus, B.; Lindner, M.; Schuppan, D.; Hahn, E.G. Chemical, Pharmacological and Clinical Profile of the East Asian Medical Plant *Centella Asiatica*. Phytomedicine 2000, 7, 427–448.
14. James, J.T.; Dubery, I.A. Pentacyclic Triterpenoids from the Medicinal Herb, *Centella Asiatica* (L.) Urban. Molecules 2009, 14, 3922–3941.
15. Shukla, A.; Rasik, A.M.; Jain, G.K.K.; Shankar, R.; Kulshrestha, D.K.K.; Dhawan, B.N. In Vitro and in Vivo Wound Healing Activity of Asiaticoside Isolated from *Centella Asiatica*. J. Ethnopharmacol. 1999, 65, 1–11.
16. Hashim, P. The Effect of *Centella Asiatica*, Vitamins, Glycolic Acid and Their Mixtures Preparations in Stimulating Collagen and Fibronectin Synthesis in Cultured Human Skin Fibroblast. Pak. J. Pharm. Sci. 2014, 27, 233–237.
17. Abhyankar, G.A. and G.S. Chinchani. 1996. Response of *Withania somnifera* Dunal leaf explants in vitro. Phytomorphology, 46(3): 249- 52.
18. Agarwal R, Diwanay S, Patki P, Patwardhan B. 1999 Studies on immunomodulatory activity of *Withania somnifera* (Ashwagandha) extracts in experimental immune inflammation. J Ethnopharmacol. 67(1):27-35. 4.
19. Anand L.V., Kuttan G., 1995. Use of *Withania somnifera* as an adjuvant during radiation therapy. Amla Research Bulletin 15: 83-87.
20. Bhattacharya, S.K., Satyam Kulkunte, S., and Ghosal, Shibnath., 1997. Antioxidant activity of glycowithanolides from *W. somnifera* in rat brain frontal cortex and striatum. Indian J. Experimental Biology, 35, 236-239.
21. V. E. Kagan, N. V. Konduru, W. Feng, B. L. Allen, J. Conroy, Y. Volkov, I. I. Vlasova, N. A. Belikova, N. Yanamala, A. Kapralov, Y. Y. Tyurina, J. Shi, E. R. Kisin, A. R. Murray, J. Franks, D. Stolz, P. Gou, J. Klein-Seetharaman, B. Fadeel, A. Star and A. A. Shvedova, Nat. Nanotechnol., 2010, 5, 354.
22. Nikhil Nitin Navindgikar, K.A. Kamalapurkar, Prashant.S.Chavan, 2020. Formulation and evaluation of multipurpose herbal cream.

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