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FORMULATION AND EVALUATION OF ARGYERIA NERVOSA LEAF BASED CREAM FOR WOUND HEALING

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ABSTRACT

Wound healing is a vital biological process involving tissue repair and regeneration. Natural healing is often slow and prone to infection, necessitating effective topical interventions. *Argyreia nervosa* is a traditional medicinal plant known for its potent antiseptic and anti-inflammatory properties. **Objectives:** This study aims to formulate and evaluate a stable Oil-in-Water (O/W) herbal cream utilizing the ethanolic leaf extract of *Argyreia nervosa* for enhanced wound management. **Methods:** The extract was prepared via cold maceration. An O/W cream was formulated using a base of beeswax, liquid paraffin, borax, and methylparaben. The formulation was evaluated for pH, spreadability, homogeneity, viscosity, and stability under accelerated conditions (40°C). **Results:** The cream demonstrated a smooth consistency, excellent spreadability, and a skin-compatible pH of 6.4. Accelerated stability studies confirmed no phase separation or physical degradation over three months. Phytochemical analysis confirmed the presence of tannins and flavonoids, which are essential for collagen synthesis and rapid epithelialization. **Conclusion:** The developed *Argyreia nervosa* cream is a stable, cost-effective, and safe natural alternative to synthetic wound care products, supporting its clinical application in dermatological therapy.

KEYWORDS: *Argyreia nervosa*, Wound healing, O/W Emulsion, Herbal Cream, Phytochemicals.

1. INTRODUCTION

When we think about the human body, we often overlook the skin, yet it's our largest organ and our first line of defense. It makes up about 15% of our total body weight and works 24/7 to protect us from chemicals, physical injuries, and bacteria. But no matter how careful we are, injuries happen. Whether it's a simple cut or a more serious wound, the body has to act fast to repair itself. This process—wound healing—is a complex "biological dance" where the body tries to restore the strength and function of the damaged tissue.

While our bodies are naturally programmed to heal, the process is usually slow. During that slow recovery time, the wound is a wide-open door for microbes and infections. If we can speed up this timeline or make the process more efficient, we don't just save time; we prevent complications that can become quite serious.

Figure 1: Observation of Wound.

How Healing Actually Happens

To understand how to help a wound heal, we first have to look at how the body does it naturally. It's not just one single event; it's a sequence of four stages that often overlap.

- **Stop the Bleeding (Hemostasis):** The second an injury happens, the body goes into "emergency mode." Blood vessels constrict, and platelets rush to

the scene to form a fibrin clot. This is basically the body's internal bandage.

- **The Cleanup (Inflammation):** Within the first 24 to 48 hours, the area usually gets red and swollen. This is actually a good sign—it means the body is sending "soldier cells" to fight off any bacteria and clean out dead tissue.
- **Rebuilding (Proliferation):** From day two up to about three weeks, the body starts building "granulation tissue." New blood vessels form (angiogenesis), and collagen begins to fill in the gaps. This is when you start to see new skin forming.
- **Strengthening (Remodeling):** This is the long-term phase. The initial "quick-fix" collagen is replaced with stronger fibers, and the wound fully closes, eventually leaving a scar.

Figure 2: Different Stages of Wound Healing.

Why We Are Moving Away from Synthetic Creams ?

In the pharmacy world, we have plenty of synthetic ointments and creams. However, as students and researchers, we have to look at the downsides. Many patients find that synthetic products cause "rebound" issues like skin irritation, hypersensitivity, or even rashes. In some severe cases, they can lead to tunneling ulcers or chronic redness (erythema).

There is also a huge socioeconomic factor. For elderly patients or those with conditions like diabetes, wounds take much longer to heal. Using expensive synthetic creams for months can be a burden, especially if those creams come with side effects that require even more treatment. This is why there is a massive shift back toward nature.

The Power of Herbal Medicine

India has an incredible history of using plants for medicine. For generations, people have used things like Neem or *Tridax procumbens* because they worked, even before we had the lab technology to explain *why*. Today, we know that these plants aren't just "home remedies"—they are packed with active phytochemicals.

As a dosage form, creams are great because they are easy for patients to use, they bypass the liver (avoiding "first-pass metabolism"), and they put the medicine exactly where it's needed. By using an Oil-in-Water (O/W) emulsion, we can create a cream that isn't too greasy but still keeps the wound moist—which is the ideal environment for cells to re grow.

Why *Argyreia nervosa*?

Argyreia nervosa (Elephant Creeper), It's a plant that is traditionally known for its antiseptic and anti-inflammatory properties. When it break down in the lab.

- **Alkaloids and Flavonoids:** These help speed up the "closing" of the wound and encourage new skin cells to grow.
- **Tannins:** These act like natural astringents, helping to "toughen" the tissue and fight off bacteria.
- **Antioxidants:** These reduce the oxidative stress in the wound area, which can otherwise slow down the healing process.

Figure 3: Plant of *Argyeria nervosa.*

The aim of this research isn't just to make "another herbal cream." It's about taking a traditional plant like *Argyreia nervosa*, extracting its most potent components through proper maceration, and formulating it into a stable, scientifically-backed cream. By evaluating its pH, spreadability, and stability, we want to prove that herbal pharmacy can provide a safer, cheaper, and more effective way to help the body heal itself. Through this study, we hope to bridge the gap between ancient botanical wisdom and modern pharmaceutical science.

MATERIALS AND METHODS

The primary active ingredient used in this study is the leaf extract of *Argyreia nervosa* (Family: Convolvulaceae). Traditionally known as Elephant Creeper, the plant contains key chemical constituents such as alkaloids, steroids, and flavonoids. These compounds are recognized for their medicinal uses in wound healing, anti-inflammatory activity, and antimicrobial effects.

Plant Material and Chemicals

- The study utilizes the leaves of **Argyreia nervosa** (Elephant Creeper), selected for its potent wound-healing, anti-inflammatory, and antimicrobial properties.
- The cream formulation requires pharmaceutical-grade excipients including **Stearic acid**, **Cetyl alcohol**, **Glycerine**, **Potassium hydroxide**, **Methyl paraben**, **Propyl paraben**, and **Distilled water**.

Preparation of Extract

- Fresh leaves were washed, shade-dried, and ground into a coarse powder.
- Approximately 50g of the powder was placed in a thimble and extracted with 250ml of Ethanol in a Soxhlet apparatus for 18–24 hours.
- The resulting extract was concentrated using a water bath at to obtain a thick, dark green semi-solid residue.
- The extract was stored in an airtight container in a refrigerator for further use.

Formulation of Herbal Cream (O/W Emulsion)

- **Oil Phase:** Stearic acid and Cetyl alcohol were melted in a water bath.
- **Aqueous Phase:** Potassium hydroxide, Glycerine, and preservatives were dissolved in distilled water and heated.
- **Emulsification:** The aqueous phase was added slowly to the oil phase with continuous stirring until a smooth cream base was formed.
- **Incorporation:** The *Argyreia nervosa* extract was added to the cream base when the temperature and mixed thoroughly.

Formulation Table

Table 1: Ingredient and their activity.

Sr. No	Ingredient	Quantity (%)	Activity
1	Argyreia nervosa Extract	5.0 %	Active (Wound healing)
2	Stearic Acid	12.0 %	Emulsifier, Thickener
3	Cetyl Alcohol	2.0 %	Emollient, Opacifier
4	Potassium Hydroxide	0.5 %	Neutralizing Agent
5	Glycerine	5.0 %	Humectant, Skin softener
6	Methyl Paraben	0.02 %	Preservative (Antifungal)
7	Propyl Paraben	0.01 %	Preservative (Antibacterial)
8	Distilled Water	q.s. 100 ml	Vehicle / Solvent

Formulation of Cream

The formulation of the O/W emulsion cream was carried out using the emulsification method, beginning with the separate heating of the oil and aqueous phases to in a water bath. The oil phase consisted of oil-soluble ingredients such as beeswax and liquid paraffin, while

the aqueous phase was prepared by dissolving water-soluble components and preservatives, specifically borax and methylparaben, in distilled water. Following the heating process, the aqueous phase was added gradually to the oil phase and subjected to continuous trituration in a mortar and pestle until a characteristic "clicking sound" was produced, signifying the successful formation of a stable emulsion. Finally, the concentrated *Argyreia nervosa* leaf extract was incorporated into the freshly prepared base and mixed thoroughly to achieve a uniform distribution of the active medicinal constituents throughout the formulation.

Evaluation Parameters

1. Organoleptic Properties: The organoleptic properties such as color, odor and appearance was observed.
2. Determination of PH: The pH value of freshly formulated emulsion was determined using a pH paper.

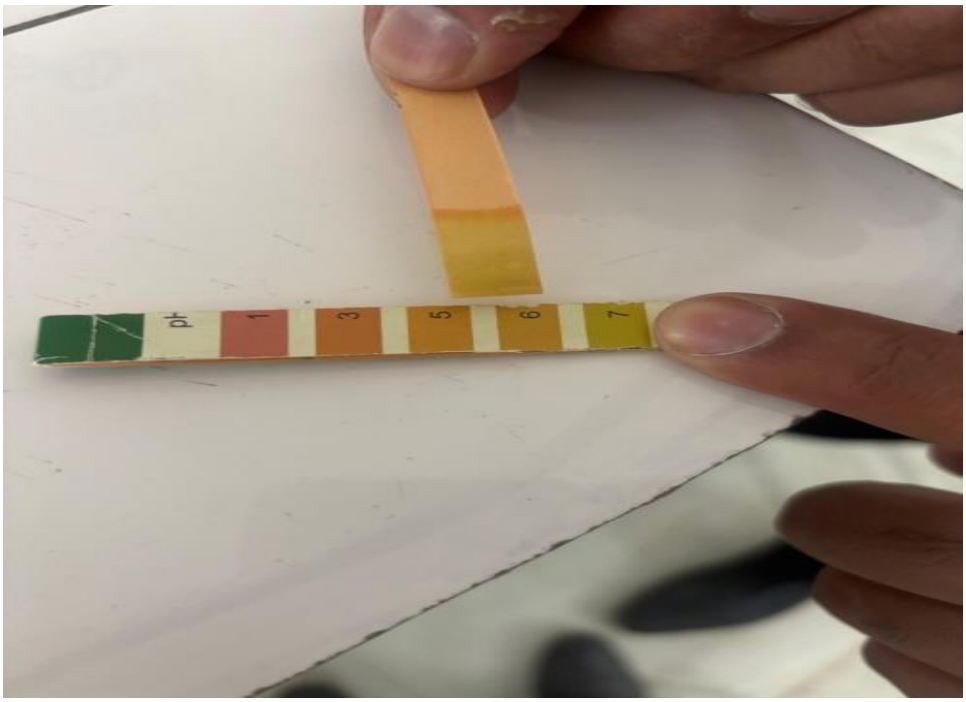

Figure 4 – Evaluation Parameters.

3. Determination of homogeneity: The homogeneity of the herbal preparation was observed by visual appearance and by touch.
4. Determination of spread ability: The area to which the topical application spreads after being administered to the skin's afflicted area is referred to as the spread ability. The herbal formulation's therapeutic effectiveness also depends on how widely it spreads.

Determining the developed formulation's spreading capacity is therefore necessary. A thin film of consistent thickness was created for the measurement by pressing roughly 3 gm of cream between the two glass slides. For five minutes, a weight of five gm was place dover the top slide to exert the necessary pressure. The upper slide was then pulled with the aid of a thread linked to a hook after the addition of around 10 gm of weight to a pan. Under a particular force, it was noted how long it took the two slides to glide across one another by a distance of 10 cm. The spread ability of the prepared formulation can be determined using the formula listed below.

$S = m \times L/T$

Where,

S- Solubility

m- Weight tied to upper glass slide

L- Length moved on glass slide

T- Time taken. The results were carried out in a triplicate manner and the average of these readings were noted

7. Irritancy test: The formulated cream shows no redness, edema, irritation and inflammation during studies. The formulated cream is safe to use.
6. Phase Separation: Prepared cream is kept in tightly closed container at room temperature away from sunlight and observed for 24 hours for phase.

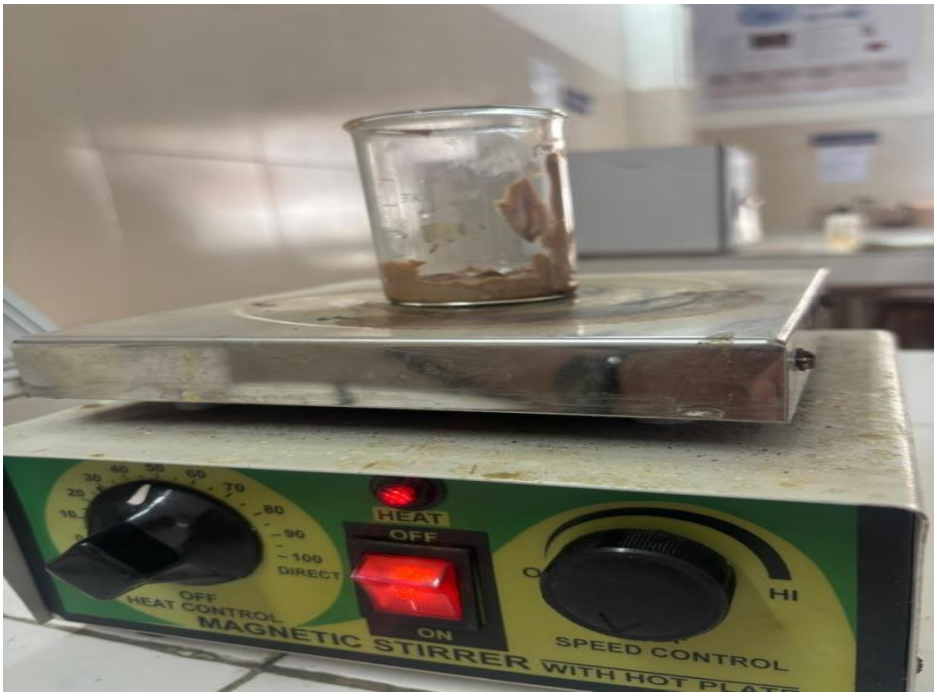

Figure 7: Evaluation Parameters.

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

RESULTS

Table 2: Organoleptic Character.

Sr. No	Parameter	Observation
1	Color	Dark Green
2	Odor	Characteristic
3	State	Semi-solid
4	Texture	Smooth

Table 3: Physical Parameters.

Sr. No	Parameter	Result	Limit
1	Homogeneity	Uniform	Passes test
2	Appearance	Glossy	Passes test
3	Washability	Good	Easily washable
4	Grittiness	Absent	No coarse particles

CONCLUSION

The formulation and evaluation of the topical herbal cream were successfully executed by integrating the leaf extract of *Argyreia nervosa* into a stable oil-in-water (O/W) emulsion system. The process began with the separate heating of the oil phase, consisting of beeswax and liquid paraffin, and the aqueous phase, containing borax, methylparaben, and distilled water, to a controlled temperature of 75°C. These phases were combined through gradual addition and continuous trituration in a mortar and pestle until the characteristic "clicking sound" signaled the formation of a stable base, into which the concentrated herbal extract was thoroughly incorporated to ensure a homogenous distribution of bioactive markers like flavonoids and tannins. Physicochemical assessment confirmed that the resulting formulation possessed a skin-compatible pH, excellent spreadability, and high physical stability, maintaining its integrity throughout accelerated stability testing. Ultimately, this study demonstrates that *Argyreia nervosa* can be transitioned from traditional ethnobotanical use into a standardized, cost-effective pharmaceutical product that offers a safer, natural alternative to synthetic wound-healing agents for dermatological recovery.

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