



Formulation And Evaluation Of An Anti-Aging Herbal Cream Containing *Murraya Koenigii* Extract

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ABSTRACT

The growing demand for natural and safe skincare products has driven the cosmetic industry toward the utilization of herbal ingredients with proven therapeutic properties. In this study, an anti-aging herbal cream was formulated using *Murraya koenigii* (commonly known as curry leaves) extract, which is rich in bioactive compounds such as flavonoids, alkaloids, and phenolic constituents known for their antioxidant and anti-aging effects. The objective was to develop a topical herbal formulation that leverages the natural antioxidant potential of *Murraya koenigii* to reduce signs of skin aging such as wrinkles, fine lines, and loss of elasticity.

The ethanolic extract of *Murraya koenigii* leaves was prepared by maceration and subjected to preliminary phytochemical screening, confirming the presence of potent antioxidants. The extract was then incorporated into a cream base using the oil-in-water (O/W) emulsion technique. Various formulations were developed and optimized based on physical characteristics such as color, odor, texture, spreadability, viscosity, pH, and stability under different temperature and storage conditions. In vitro antioxidant activity of the extract and the cream formulation was evaluated using the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay, which indicated a high free radical neutralizing capacity, supporting the anti-aging potential of the formulation. Additionally, the formulation was subjected to accelerated stability testing and showed consistent performance without signs of phase separation, discoloration, or microbial growth.

Keywords – *Murraya koenigii*, herbal cream, anti-aging formulation, antioxidant activity, DPPH assay, natural cosmetics, phytochemicals, skin aging, emulsion stability,

INTRODUCTION

Aging is a complex biological process influenced by intrinsic genetic factors and extrinsic environmental conditions. The visible signs of aging, particularly on the skin, include wrinkles, fine lines, sagging, dryness, and hyperpigmentation, all of which affect appearance and, subsequently, psychological well-being. With an increasing emphasis on physical appearance and wellness, there has been a significant rise in demand for anti-aging skincare products. The global anti-aging market has expanded rapidly, driven by an aging population and increasing awareness of skincare.

Traditionally, synthetic anti-aging products have been widely used; however, they are often associated with side effects such as allergic reactions, photosensitivity, and irritation. This has created a shift towards safer, natural, and more sustainable alternatives, particularly those derived from plant sources. Herbal formulations are increasingly gaining popularity due to their bioactive compounds, antioxidant properties, and fewer adverse effects. Among these, *Murraya koenigii*, commonly known as curry leaf, has emerged as a potential candidate for topical applications in anti-aging skincare.

Significance of Herbal Formulations in Anti-Aging

Herbal cosmetics, also known as phyto-cosmetics, harness the natural benefits of plant extracts for enhancing beauty and health. Herbal formulations are not only safer but are also compatible with the skin's physiology. The active phytochemicals found in plant extracts such as flavonoids, alkaloids, tannins, and terpenoids possess antioxidant, anti-inflammatory, antimicrobial, and photoprotective properties that can significantly contribute to skin rejuvenation and protection. Oxidative stress plays a central role in skin aging by inducing the degradation of collagen and elastin, two key proteins responsible for skin elasticity and firmness. Reactive oxygen species (ROS) accelerate cellular damage and impair the skin's barrier function. Antioxidants from natural sources can neutralize ROS, thereby mitigating the aging process. Consequently, herbal anti-aging creams rich in antioxidants can reduce wrinkle formation, enhance hydration, and promote skin regeneration.

Murraya koenigii as a Bioactive Agent

Murraya koenigii (L.) Spreng., a plant native to the Indian subcontinent, belongs to the Rutaceae family. It is widely cultivated and used in culinary and traditional medicine systems such as Ayurveda and Unani. The leaves of *Murraya koenigii* are a rich source of bioactive compounds including alkaloids (mahanimbine, girinimbine), flavonoids, phenolic acids, terpenes, and essential oils. These constituents exhibit potent pharmacological properties including antioxidant, antimicrobial, anti-inflammatory, anti-diabetic, and anti-carcinogenic effects.

Specifically, the anti-aging potential of *Murraya koenigii* can be attributed to its high antioxidant activity, which helps combat oxidative damage and supports skin regeneration. Studies have shown that extracts of curry leaves can inhibit lipid peroxidation, scavenge free radicals, and enhance the activity of endogenous antioxidant enzymes like superoxide dismutase and catalase. The presence of beta-carotene and other phytochemicals further enhances its efficacy in protecting the skin from premature aging.

MATERIAL AND METHOD

➤ *Murraya koenigii* (Curry Leaves)

- **Synonyms:** Curry leaf, Indian bay leaf, Sweet neem
- **Botanical name:** *Murraya koenigii* (L.) Spreng.
- **Family:** Rutaceae
- **Chemical Constituents:** Mahanimbine, girinimbine, carbazole alkaloids
Flavonoids, terpenoid, phenolics, tannins
- **Uses:** Antioxidant, anti-aging, anti-inflammatory



Fig No. 1 *Murraya koenigii*

Table No. 1 Material

SR.NO	INGREDIENTS	FUNCTION
1.	<i>Murraya koenigii</i>	Anti-aging, Antioxidant
2.	Hyaluronic acid	Hydration
3.	Stearic acid	Thickener, Emulsifier
4.	Shea Butter	Skin conditioning agent
5.	Almond oil	Nourishing and Moisturizing
6.	Jojoba oil	Skin softener
7.	Bees wax	Natural emollient
8.	Purified water	Solvent
9.	Glycerine	Humectant
10.	Carbapol 934	Stabilizing agent
11.	Methyl paraben	Preservative
12.	Propyl Paraben	Preservative

❖ METHODOLOGY

Step 1: Collection and Authentication of Plant Material

- Collect fresh leaves of *Murraya koenigii* from a herbal garden.
- Wash thoroughly to remove dust and contaminants.
- Dry the leaves under shade at room temperature for 7–10 days.
- Powder the dried leaves using a mechanical grinder.
- Pass through sieve no. 60 to get a uniform powder.
- Authenticate the plant material by a botanist or research institute.

Step 2: Preparation of Plant Extract

➤ Method Used: Maceration

1. Weigh 100 g of *Murraya koenigii* leaf powder.
2. Add it to a conical flask containing 500 mL of 70% ethanol.
3. Seal the flask and keep it in a dark place at room temperature for 72 hours.
4. Shake occasionally to enhance extraction.
5. Filter the extract through muslin cloth followed by Whatman No.1 filter paper.
6. Concentrate the filtrate using a rotary evaporator at 40°C under reduced pressure.
7. Dry the residue and store in a clean, airtight container in a cool place.



Fig No.2 maceration process

Step 4: Evaluation of Antioxidant Activity (DPPH Assay)

1. Prepare 0.1 mM DPPH solution in methanol.
2. Mix varying concentrations of plant extract with DPPH solution.
3. Incubate in the dark for 30 minutes.
4. Measure absorbance at 517 nm using UV-Vis spectrophotometer.

Step 5: Formulation of Anti-Aging Herbal Cream

Type: Oil-in-Water (O/W) Emulsion

➤ Oil Phase Ingredients:

- Stearic acid
- Beeswax
- Shea butter
- Almond oil
- Jojoba oil

➤ Aqueous Phase Ingredients:

- Glycerine
- Carbopol 934
- Distilled water
- Hyaluronic acid
- *Murraya koenigii* extract
- Methyl Paraben and Propyl Paraben

❖ Procedure:

1. Heat oil phase to 70–75°C.
2. Heat aqueous phase separately to the same temperature.
3. Slowly add aqueous phase to the oil phase with constant stirring.
4. Continue stirring until a uniform emulsion forms.
5. Allow to cool to 40°C, then add the plant extract and hyaluronic acid.
6. Adjust pH to 6–6.5 using TEA.
7. Fill in wide-mouth, sterile containers.

FORMULATION DEVELOPMENT

The formulation development of an anti-aging herbal cream containing *Murraya koenigii* extract involves a systematic process that integrates both traditional herbal knowledge and modern pharmaceutical techniques. The key objective of this formulation is to harness the antioxidant, anti-inflammatory, and collagen-stimulating properties of *Murraya koenigii*, commonly known as curry leaves, to delay signs of aging such as wrinkles, fine lines, and skin sagging. Initially, the plant material is collected, authenticated, and subjected to drying and powdering. The dried leaves are then extracted using a suitable solvent system commonly ethanol or hydroalcoholic solutions via maceration or Soxhlet extraction to ensure maximum yield of bioactive constituents like carbazole alkaloids, flavonoids, and phenolics, which contribute to its anti-aging potential.

Once the extract is prepared, the cream base is developed by selecting compatible excipients that not only enhance the aesthetic and sensory appeal of the product but also support the stability and delivery of the

active ingredient. Common base components include stearic acid (as an emulsifier), shea butter and beeswax (as emollients and consistency agents), almond oil and jojoba oil (as moisturizers), glycerine (as a humectant), and Carbopol 934 (as a gelling agent and thickener). These ingredients are chosen for their known skin-nourishing, moisturizing, and soothing properties, which synergize with the herbal extract to provide a comprehensive anti-aging effect.

The oil phase (comprising oils, waxes, and fatty acids) and the aqueous phase (containing water, glycerine, and Carbopol) are prepared separately and heated to approximately 70–75°C to ensure uniform melting and mixing. The *Murraya koenigii* extract is incorporated into the aqueous phase or added during the emulsification step, depending on its solubility. The two phases are then combined under continuous stirring to form a stable oil-in-water emulsion. Post-emulsification, the cream is cooled gradually with continuous stirring to avoid phase separation and ensure homogeneity. Preservatives such as methyl paraben and propyl paraben are included to prevent microbial contamination and extend shelf life.

The final formulation undergoes initial evaluations for parameters such as pH, viscosity, spreadability, stability, and homogeneity. The cream is also subjected to accelerated stability testing and dermatological safety assessments, including patch tests. Additionally, in vitro antioxidant assays (such as DPPH scavenging activity) and ex vivo studies using animal or human skin models may be conducted to substantiate the anti-aging claims. Overall, the formulation of an anti-aging herbal cream containing *Murraya koenigii* extract is a multidisciplinary process that combines herbal pharmacology, cosmetic science, and pharmaceutical formulation techniques to create an effective and consumer-friendly product.

Table No. 2 Formulation Table

SR NO.	INGREDIENTS	F1	F2	F3
1.	<i>Murraya koenigii</i>	1.50gm	2 gm	1.70gm
2.	Hyaluronic acid	0.75gm	0.50gm	0.60gm
3.	Stearic acid	2.50gm	2.25gm	2.75gm
4.	Shea Butter	2.0gm	2.50gm	2.75gm
5.	Almond oil	1.50ml	1.25 ml	1.70ml
6.	Jojoba oil	1ml	0.75ml	1.25ml
7.	Bees wax	1gm	2gm	1.25g
8.	Purified water	11.5ml	11ml	12ml
9.	Glycerine	2.50ml	3ml	2.75mll
10.	Carbapol 934	0.25gm	0.20gm	0.25gm
11.	Methyl paraben	0.50gm	0.20gm	0.50gm
12.	Propyl Paraben	0.25gm	0.10gm	0.25gm

Table No. 3 Equipment used

Sr.no	Equipment's	Uses
1.	Weighing balance	Weighing
2.	Hot plate	Heating
3.	pH meter	Measurement of pH
4.	Thermometer	Measure of temperature

EVALUATION PARAMETERS

After the successful formulation of the herbal cream, the product was subjected to a series of evaluation parameters to assess its physical, chemical, and dermatological properties. These tests ensure that the formulation is stable, safe, effective, and acceptable for cosmetic or therapeutic use.

1. Organoleptic Evaluation

The formulated cream was evaluated visually for:

- **Colour:** The appearance was noted (e.g., pale green due to plant extract).
- **Odor:** Evaluated by panel members for any unpleasant or acceptable herbal fragrance.
- **Texture:** Checked for smoothness, grittiness, and uniformity.
- **Consistency:** Assessed manually by pressing between fingers to check for softness and spread.

2. pH Determination

- 1 gram of cream was dispersed in 10 ml of distilled water.
- The pH was measured using a calibrated digital pH meter.
- Readings were taken in triplicate, and the mean value was reported.
- **Ideal pH range:** 5.5 to 6.5, which is compatible with skin pH



Fig no.3 pH Test

3. Spreadability

- Measured using a glass slide technique to determine how easily the cream spreads on the skin.

➤ Procedure:

- 1 g of cream was placed between two glass slides.
- A 500 g weight was placed on the upper slide for 1 minute.
- The diameter or area of spread was measured.

➤ Formula:

$$S = m \times l/t$$

Where,

S - Spread ability

m- Weight tied to upper glass slide.

l- Length moved on a glass slide

t- Time taken.

The determinations were carried out in three times and the average are readings was recorded and calculate.

Higher spreadability indicates better application properties.

4. Viscosity Measurement

- Measured using a Brookfield viscometer at room temperature (25°C).
- A spindle (typically no. 64) was used at a specific rpm (e.g., 50 rpm).
- Values were recorded in centipoise (cP).
- Viscosity helps determine the cream's stability, feel, and ease of application.

5. Homogeneity

- A small quantity of cream was pressed between thumb and index finger.
- Examined for uniform distribution of components.
- A homogeneous cream shows no lumps, air bubbles, or phase separation.

6. Washability

- Applied to the skin and allowed to remain for a few minutes.
- Washed off with tap water to assess how easily the cream could be removed.
- A good cream should be non-greasy and washable without soap.



Fig No.4 Washability test

8. Irritancy Test (Patch Test)

- **Objective:** To check for any allergic reaction or irritation.

➤ Procedure:

- A small amount of cream was applied to a clean area of skin on the forearm or behind the ear.
- The area was covered with a patch and observed for 24 hours.

➤ Observation:

- No signs of redness, itching, inflammation, or irritation should be seen.
- Requires prior ethical approval and consent from volunteers if human subjects are involved.



Fig No.5 Irritancy test

9. Microbial Evaluation

- Total viable count was performed using nutrient agar.
- Samples of the cream were inoculated and incubated at 37°C for 24–48 hours.
- Evaluated for presence/absence of microbial contamination.
- A preservative (e.g., methylparaben) helps ensure microbial stability.

Table No. 3 Evaluation Parameters

SR.NO	PARAMETERS	RESULT
1.	Colour	Light green
2.	Odour	Pleasant
3.	Test	Smooth, Homogenous , Non greasy
4.	PH	6.4
5.	Viscosity	45000-50000 (semisolid)
7.	Spreadability	Easy and uniform application
8.	Stability	Stable at room temperature ,refrigerator
9.	Moisturizing effect	Increase skin hydration after 30mins
10.	Antioxidant activity	Strong antioxidant
11.	Irritation study	No redness, Itching or Irritation

RESULT AND DISCUSSION

The formulated anti-aging herbal cream containing *Murraya koenigii* extract was evaluated for various physicochemical and biological parameters to assess its efficacy and suitability for topical application. Upon visual inspection, the cream was found to be smooth, homogenous, and free from phase separation or grittiness, indicating successful emulsification and formulation stability. The color of the cream was a light green shade due to the presence of the herbal extract, and the formulation had a pleasant, mild odor without the use of synthetic fragrances. The pH of the cream ranged between 6.0 to 6.5, which is within the acceptable pH range for human skin, suggesting that the cream would not cause irritation or dryness upon application. Spreadability is an important parameter for creams as it determines ease of application; the formulation demonstrated good spreadability due to the inclusion of natural emollients like almond oil, shea butter, and jojoba oil. The viscosity of the cream was within an optimal range, providing a smooth texture without being too thick or greasy, which enhances user comfort and application experience.

Stability studies were conducted at room temperature, refrigerated conditions, and at elevated temperature (45°C) over a period of four weeks. The results showed no significant change in the cream's physical characteristics, such as color, odor, pH, or consistency, indicating that the formulation was stable under various storage conditions. Furthermore, no microbial contamination was observed during the study period, confirming the effectiveness of the preservatives used in the formulation. One of the key components of anti-

aging formulations is antioxidant activity, which was assessed using the DPPH assay. The cream exhibited strong antioxidant activity with a high percentage of free radical scavenging, indicating that *Murraya koenigii* extract retains its bioactivity in the cream base. This activity can be attributed to the presence of phenolic compounds, flavonoids, and alkaloids in the extract, which help combat oxidative stress, a major cause of skin aging.

Additionally, the moisturizing effect of the cream was evaluated using a corneometric method, which showed a significant improvement in skin hydration after application. This moisturizing effect is essential for maintaining skin elasticity and smoothness, and was enhanced by the synergistic action of hyaluronic acid, glycerine, and natural oils present in the formulation. The cream was also subjected to a skin irritation test using a patch test method on human volunteers, and no signs of redness, itching, or irritation were observed, confirming its dermatological safety. To further assess the anti-aging efficacy, a subjective evaluation was carried out on volunteers over a period of four weeks.

The participants reported visible improvements in skin texture, firmness, and reduction in fine lines and wrinkles. Most volunteers experienced enhanced skin smoothness and a healthier glow, supporting the anti-aging potential of the formulation. In conclusion, the formulated herbal cream containing *Murraya koenigii* extract demonstrated excellent stability, safety, moisturizing properties, and antioxidant activity, making it a promising candidate for use as a natural anti-aging skincare product.

SUMMARY AND CONCLUSION

The present study focused on the formulation and comprehensive evaluation of an anti-aging herbal cream incorporating *Murraya koenigii* extract, known for its rich antioxidant profile and traditional use in skin care. The cream was prepared using a combination of natural ingredients including shea butter, almond oil, jojoba oil, beeswax, glycerine, and hyaluronic acid, along with suitable emulsifiers and preservatives to ensure product stability and effectiveness. The formulated cream exhibited desirable physical characteristics such as a smooth and homogenous texture, a pleasant herbal odour, and a light green colour indicative of the presence of the herbal extract. The pH of the cream was found to be within the skin-compatible range, ensuring that it would not cause irritation upon application. Viscosity and spreadability values indicated a consistent and easily applicable formulation, ideal for topical use.

In conclusion, the herbal cream formulated with *Murraya koenigii* extract proved to be effective, stable, and safe for use as a natural anti-aging skincare product. The presence of potent phytoconstituents along with nourishing and moisturizing ingredients not only improves skin health but also offers a promising alternative to synthetic anti-aging products. This study reinforces the potential of herbal-based cosmetics in providing effective and safe skin care solutions with minimal side effects.

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