

FORMULATION AND EVALUATION OF HERBAL HAIR CONDITIONER

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ABSTRACT

The increasing popularity of natural and eco-friendly haircare products has led to a greater use of traditional ingredients in the development of cosmetic products. This study aimed to create and assess a conditioner made from liquorice extract, flaxseed extract, curry leaves extract, coconut oil, glycerine, and rose water. The conditioner was made using these natural extracts combined with appropriate preservatives to enhance its stability. The main goal of the research was to produce a natural hair conditioner that can improve hair smoothness, shine, moisture retention, and manageability, while reducing the harmful effects often linked to synthetic products. The formulated conditioner was tested for its physical characteristics, ease of washing, pH level, viscosity, potential for irritation, and overall stability. The herbal components

provided various benefits, including strengthening hair, improving moisture levels, reducing dandruff, and enhancing conditioning. The study concludes that herbal hair conditioners can be a safe, effective, and environmentally friendly alternative to traditional synthetic conditioners for maintaining healthy and easy-to-manage hair.

KEYWORDS: Herbal hair conditioner, liquorice extract, flaxseed extract, curry leaves extract, ecofriendly cosmetic, moisture retention.

1. INTRODUCTION

Hair is primarily composed of a tough protein called keratin. The hair bulb, located at the base of the hair follicle, contains living cells that divide and grow to form the hair shaft. Hair

covers the entire body surface. Many people face issues like dull or unruly hair, often worsened by wearing head coverings such as scarves or helmets, which can lead to dryness.

To address these issues, hair conditioners are used. They improve hair's feel, appearance, and manageability by reducing friction between hair strands, allowing smoother brushing or combing.^[1]

Hair is one amongst the vital a part of the body derived from ectoderm of the skin & its protection appendages on the body & considered accessory addition on the skin together with oil gland, sweat glands & nails. Hair is a vital a part of the general attraction of the figure. Conditioners that add shine to the hair and make it straight. After shampooing it is important to use hair conditioners to offer increased agreement to our hair, leaving it soft and glossy. Conditioner is the second step to hair washing.^[3]

Formulation of herbal cosmetics like Conditioner, using totally raw material is a thought-provoking idea. The complications occur in selection of materials that can be reasonably vindicated as natural and converting them into cosmetics which functionally comparable with their synthetic counterparts. The current study focused on formulation of completely natural conditioner and its assessment with the commercial products.

Herbal products have gained increasing popularity within the last decade, now it's utilized by 20-30% of the population herbal products are complex mixtures of organic chemicals that will come from any raw processed a part of the plant, including leaves, flowers, stems, bark and seeds, etc. Herbal preparations are finished herbal products that contain parts of the plants or other stuff as active ingredient.^[4]

Functions Of Hair

- Hair regulates body temperature
- Hair extends over sense of touch
- Hair protects over bodies from harmful objects
- Hair identifies you^[5]

1.1 STRUCTURE OF HAIR

Hair is consisted of two distinct structures

1. Hair follicle: The living part located under the skin. The hair follicle begins at the surface

of the epidermis. For follicles that produce terminal hairs, the hair follicle extends into the deep dermis, and sometimes even subcutis. Meanwhile, follicles producing vellus hairs extend only to the upper reticular dermis. There are three important segments of hair follicles found on the head: the infundibulum, the isthmus, and the lower follicle/inferior segment.^[6]

2. Hair shaft: The hair shaft which is the hard filamentous part that reaches out over the skin surface. Hair shaft has three significant parts out over the skin surface.

- Cuticle
- Cortex
- Medulla^[6]

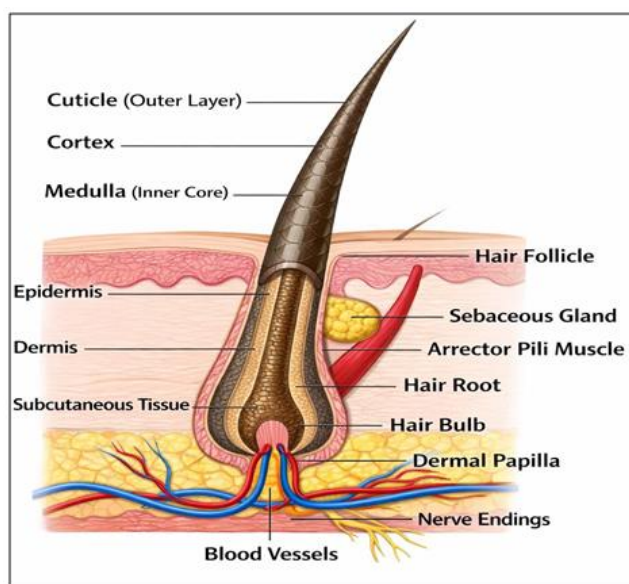


Fig. No. 1: STRUCTURE OF HAIR.

1.2 SCALP

The scalp is that part of the skin which extends from the eyebrows to the nape of the neck. Laterally it is anchored by each ear. The details of this anatomy are important for treating scalp trauma, creating successful surgical flaps, removing scalp tumours, treating scalp pain, and describing lesions encountered on imaging studies. However, there is no unanimity in the nomenclature, and descriptions are incomplete and often contradict one another. It is divided into 2 sections.

1. The first gives clinical information on regional vascular, lymphatic, and nervous territories together with the epi cranial muscles.

2. The second discusses the traditional anatomic layers, but regroups them into 3 clinically useful coverings that are distinct on modern imaging. These are the epidermis/dermis, the subcutaneous layer, and the thin galea/subgalea/periosteum complex that normally blends with the outer table of the skull.^[7]

Functions of scalp

1. It serves as an area where hair can grow physically.
2. Acts as a barrier that defends the body from foreign irritation.

1.3 HERBAL HAIR CONDITIONER

Hair conditioner is a hair care product used after shampooing to improve the condition of your hair. It helps protect and repair your hair, making it healthier. A conditioner is a preparation designed to enhance the quality of hair. It benefits all types of hair and works by restoring moisture and smoothing the cuticles of the hair shaft. Herbal hair conditioners help prevent breakage, making the hair stronger and shinier. Hair conditioners contain ingredients like emollients and surfactants that help keep your hair hydrated.

Using a conditioner offers several benefits, such as reducing frizz, enhancing smoothness, and shielding your hair from further damage. It is important to choose a conditioner that matches your hair type. For instance, regular conditioners work well for straight and wavy hair, whereas leave-in conditioners are better suited for curly hair. Although conditioners are generally safe to use, some individuals may have adverse reactions, especially if the product has a high pH level.

Herbal hair conditioners are made with natural ingredients that strengthen and nourish the hair. The best conditioners for hair growth can protect your hair from environmental damage, restore its health, increase shine, and make hair easier to manage.^[10]

What is hair conditioner?

Hair conditioner is a product used after shampooing to enhance the hair's texture and manageability. It typically contains ingredients like silicone, oils, and emollients, along with cationic surfactants (cleansing agents) that remove excess oils from the hair. These components work together to restore moisture lost during shampooing, leaving the hair feeling softer and more manageable.^[10,11]

What does conditioner do to your hair?

Conditioner helps to hydrate and moisturize the hair, especially after shampooing, which can strip away natural oils and leave hair feeling dry and brittle. It replenishes the moisture lost during cleansing and locks in hydration, keeping the hair soft, smooth, and full of life.^[12]

Why should you use hair conditioner?

While shampoo cleans the hair and removes oils, conditioner restores moisture, making the hair smoother, shinier, and healthier. It helps improve the overall appearance and texture of the hair, leaving it soft, shiny, and manageable.^[13]

1.4 ADVANTAGES OF HERBAL CONDITIONER

- Improve hair's shine and softness.
- Decreases split ends.
- Improves hair controllability.
- Prevents from hair breakage.
- Hairsheilds from physical and chemical damage.

1.5 DISADVANTAGES OF HERBAL HAIR CONDITIONER

- It cannot be applied without shampooing.

2. DRUG PROFILE

1. LIQUORICE [API]:^[14]

Botanical Name: Glycyrrhiza glabra

Synonym: Liquorice, sweet wood, mulethi

Biological source: Licorice consists of the dried roots and stolon's of Glycyrrhiza glabra Linn

Family: Fabaceae

Chemical constituents: It contains Glycyrrhizin, flavonoids, saponins, chalcones, resins.



Fig. No. 2: LIQUORICE.

Uses

- Strengthens hair roots and prevents breakage naturally.
- Reduces dandruff and soothes scalp irritation.

- Adds shine and softness to dull, dry hair.
- Prevents premature greying and nourishes hair follicles.

2. CURRY LEAVES^[15,16]

Botanical Name: *Murraya koenigii*

Synonym: Kadi patta, Karibevu, Meetha neem

Biological source: Curry leaves are part of a small deciduous aromatic shrub scientifically named *Murraya koenigii*.

Family: Rutaceace

Chemical constituents: It contains carbazole, alkaloids, flavonoids, tannins, essential oils, vitamins A, B, C, E.



Fig. No. 3: CURRY LEAVES.

Benefits of Curry leaves for hair

- Prevent Premature Greying.
- Stimulates Hair Growth.
- Rejuvenation of Hair Follicles.
- Strengthening of Hair Shafts.
- Prevents Hair Thinning.

3. FLAXSEED^[17,18]

Botanical Name: *Linum usitatissimum*

Synonym: Linseed, flaxseed

Biological source: Linseed is dried, ripe seed of *Linum usitatissimum*

Family: Linaceae

Chemical constituents: It contains mucilage, polysaccharide, lignans, omega-3-fatty acid,

proteins & phenolic compounds.



Fig. No. 4: FLAXSEED.

Benefits of Flaxseed for hair

- Strengthens Hair Strands
- Adds Shine and Softness
- Help condition your hair

4. ROSE WATER^[19]

Synonym: Gulab Jal

Biological source: Rose water is extracted from the flowers of *Rosa damascene*

Family: Rosaceae

Chemical constituents: Rose flowers are rich in biologically active compounds, such as phenolics, flavonoids, anthocyanins, and carotenoids. Rose absolute contains chemicals such as phenyl ethyl alcohol, farnesol, stearoptene, α -pinene, β -pinene, citronellol, geraniol, nerol, linalool, terpinene, limonene, eugenol, methyl eugenol, rose oxide, neral, citronellyl acetate and geranyl acetate.



Fig. No. 5: ROSE WATER.

Uses

- Help with irritated scalp; reduce stress
- Diminish shine and tone of hair

5. GLYCERINE^[20]

Synonym: Glycerine, Glycerol, 1,2,3- Propanetriol

Biological source: Glycerine is produced from the hydrolysis of fats and oils, and is a by-product of biodiesel production. It can be obtained either from animal fats or botanical sources such as palm, coconut, or soybean oil.



Fig. No. 6: GLYCERINE.

Uses

- Moisturizes skin
- Deep hydration
- Improve appearance

6. COCONUT OIL^[21]

Synonym: copra oil, Vegetable oil, Edible oil, Nariyal tel.

Biological Source: Coconut oil is the oil expressed from the dried solid part of endosperm of Coconut, *Cocos nucifera* L.

Family: Arecaceae

Chemical Composition: Copra contains 65-68% fat, 15-20% carbohydrates, 9.0% proteins, 4-9% crude fibres. Carbohydrates contain glucose, fructose and raffinose. Copra oil contains Trimyristine, trilaurin, tripalmetin, tristearin, and many other glycerides.



Fig. No. 7: COCONUT OIL.

Uses

- Provides moisture to your hair.
- It is more easily absorbed than other oils and is more effective at healing dry hair.
- Hair will be condition.

3. FORMULATION OF HERBAL HAIR CONDITIONER

1. Preparation of Extracts

- **Liquorice Extract**^[22]

For extraction, 10 g of powdered Liquorice root powder was combined with 100 mL of distilled water. The amalgamation was heated to 50 °C and agitated for 60 min. The resultant solution was filtered with Whatman No. 1 filter paper.

- **Flaxseed Extract**^[17]

Boil 2 tbsp flaxseeds in 1 cup water until it forms a gel. Strain using muslin cloth.

- **Curry leaves Extract**^[23]

Curry leaves and were washed thoroughly under running water and cut into small pieces using a knife. About 10 g of leaves was mixed with 25 ml boiled distilled water and left for 1 h in a water bath (60°C). The extract was filtered using a clean sterile muslin cloth.

2. Preparation of Conditioner^[17]

Preparation of Oil Phase: Take coconut oil, emulsifying wax and cetyl alcohol in a beaker and dissolve it at suitable temperature.

Preparation of Aqueous Phase: Add glycerine and rose water in another beaker and mix it well and heat at suitable temperature.

Combine the both phases with continuous stirring add aqueous phase into oil phase dropwise in it until it becomes thick.

After mixing of both phases add liquorice, flaxseed and curry leaves extract. After mixing it

properly add methyl paraben to it.

3. Transfer Conditioner into a Container

Transfer the mixture to suitable container and label it.

Table No. 1: Formula of Conditioner.

INGREDIENTS	FUNCTION	F1	F2	F3	F4	F5	F6
Liquorice Extract	Promotes hair health	7 ml	5 ml	4 ml	5 ml	4.5 ml	4.5 ml
Flaxseed Extract	Conditioning & Hair smoother	5 ml	5 ml	6 ml	7 ml	5 ml	5.5 ml
Curry Leaves Extract	Strengthens Hair	2 ml	3 ml	2 ml	2.5 ml	4 ml	3 ml
Coconut oil	Emollient	1 ml	1.5 ml	1 ml	1 ml	1 ml	1.5 ml
Emulsifying wax	Emulsifier	1 gm	1.5 gm	2 gm	1.5 gm	2 gm	1.5 gm
Cetyl alcohol	Thickener, improves texture	0.9 gm	0.8 gm	0.9 gm	1 gm	0.9 gm	0.9 gm
Glycerine	Humectant	5 ml	5 ml	4 ml	4.5 ml	5 ml	3.5 ml
Methyl Paraben	Preservative	0.5 gm	0.5 gm	0.5 gm	0.5 gm	0.5 gm	0.5 gm
Rose water	Aqueous base, fragrance	8 ml	8 ml	9.5 ml	7 ml	7 ml	9 ml



Fig. No. 8: Formulation of Conditioner F1 to F6 Batch.

4. EVALUATION PARAMETER

- Physical Evaluation:**^[24] Physical evaluation such as colour, odour and texture was detected manually.
- Washability:**^[24] Formulations were applied to the hair and then the ease and extend of washing with water is checked manually.
- Irritancy Test:**^[24] 1-2 ml of formulation was applied on dorsal side surface of left hand and observed for 2 hrs, for any signs of redness, irritancy and inflammation.
- pH of Formulation:**^[24] The pH of the formulation was measured by using pH meter. Ideal range: 4.5 – 5.5

5. **Viscosity:**^[24] Viscosity is measured by pouring the formulation from one beaker to another and its flowability and pourability was measured.

Ideal range: 3000 – 7000 cps

6. **Stability:**^[24] Stability at room temperature is checked by keeping the product at room temperature for 3 months.

5. RESULT

Table No. 2: Physical Evaluation.

Sr No.	Formulation	Colour	Odour	Texture
1.	F1	Dark Creamy	Pleasant	Smooth
2.	F2	Dark Creamy	Pungent	Smooth
3.	F3	Light Creamy	Pleasant	Smooth
4.	F4	Creamy	Pleasant	Smooth
5.	F5	Creamy	Pleasant	Smooth
6.	F6	Whitish Creamy	Pleasant	Smooth

Table No. 3: Washability.

Sr No.	Formulation	Washability
1.	F1	Washable
2.	F2	Washable
3.	F3	Easily Washable
4.	F4	Washable
5.	F5	Easily Washable
6.	F6	Easily Washable

Table No. 4: Irritancy.

Sr No.	Formulation	Irritation
1.	F1	No Irritation
2.	F2	Irritation
3.	F3	Slightly Irritation
4.	F4	Irritation
5.	F5	No Irritation
6.	F6	No Irritation

Table No. 5: pH of Formulation.

Sr No.	Formulation	PH	Observation
1.	F1	5.5	Pass
2.	F2	6	Fail
3.	F3	4	Fail
4.	F4	4.3	Fail
5.	F5	5	Pass
6.	F6	5	Pass

Table No. 6: Viscosity.

Sr. No	Formulation	Viscosity
1.	F1	4650
2.	F2	5200
3.	F3	4300
4.	F4	5500
5.	F5	4900
6.	F6	4800

Table No. 7: Stability Test.

Sr. No	Formulation	Observation
1.	F1	Stable
2.	F2	Stable
3.	F3	Stable
4.	F4	Slightly Stable
5.	F5	Stable
6.	F6	Stable

DISCUSSION

The present study was carried out to formulate and evaluate a herbal hair conditioner using natural ingredients such as liquorice extract, flaxseed extract, curry leaves extract, coconut oil, glycerine, and rose water. Six formulations (F1–F6) were prepared and evaluated for various parameters including colour, odour, texture, washability, irritancy, pH, viscosity, and stability. All formulations showed smooth texture and acceptable appearance. Formulations F3, F5, and F6 exhibited easy washability, while F1, F5, and F6 showed no signs of irritation, indicating better skin compatibility. The pH values of F1, F5, and F6 were found to be within the suitable range for hair application. Viscosity studies indicated good consistency of the conditioner formulations. Stability studies revealed that most formulations remained stable during storage, with F5 and F6 showing better overall performance. The herbal ingredients provided conditioning, moisturizing, strengthening, and nourishing effects on hair, making the formulation effective and safe for hair care use.

6. CONCLUSION

The study successfully formulated and evaluated an herbal hair conditioner using natural plant-based ingredients. The prepared formulations demonstrated satisfactory physical characteristics, good washability, acceptable pH, suitable viscosity, and stability. Among all batches, formulations F5 and F6 showed better overall evaluation results with good conditioning effect and no irritation. Among the F5 and F6 batches, F6 showed the most satisfactory performance and overall evaluation results with good conditioning effect and no

irritation. The herbal conditioner helped in improving hair softness, smoothness, shine, and manageability while reducing the possibility of harmful effects associated with synthetic products. Hence, the formulated herbal hair conditioner can be considered a safe, effective, and economical alternative for maintaining healthy hair naturally.

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