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Formulation and Evaluation Herbal Hair Dye

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ABSTRACT :

The formulation and evaluation of a herbal hair dye were undertaken using a blend of natural ingredients including henna, coffee, indigo, glycerine, Aloe vera gel, lemon juice, sodium benzoate, and water. The aim was to create a safe, effective, and eco-friendly alternative to synthetic hair dyes. Henna and indigo served as the primary colorants, while coffee enhanced the depth and richness of the dye. Aloe vera gel and glycerine provided nourishment and moisture to the hair, promoting its health and shine. Lemon juice helped in adjusting the pH of the formulation, and sodium benzoate acted as a preservative to ensure product stability. The final product was evaluated for its coloring efficiency, ease of application, hair conditioning properties, and shelf-life. Results demonstrated that the herbal dye not only provided a satisfactory color outcome but also improved hair texture and maintained its natural shine. The formulation offers a natural alternative to chemical hair dyes with added benefits of hair care and conditioning.

Keywords : Herbal hair dye, henna, coffee, indigo, glycerine, Aloe vera gel, lemon juice, sodium benzoate, water, natural colorants, hair conditioning, formulation, evaluation, eco-friendly, chemical-free, hair care, pH adjustment, preservation.

Introduction :

Hair dyeing is a widely practiced cosmetic treatment used to alter or enhance the natural color of hair. While conventional synthetic dyes offer quick and vibrant results, they often contain harsh chemicals that can damage hair and have adverse effects on scalp health. This has led to a growing demand for natural and eco-friendly alternatives that are both safe and effective. Herbal hair dyes, which are made from plant-based ingredients, have gained popularity due to their natural composition and minimal side effects.[1]

This study focuses on the formulation and evaluation of a herbal hair dye using a combination of henna, coffee, indigo, glycerine, Aloe vera gel, lemon juice, sodium benzoate, and water. Henna and indigo are well-known for their natural coloring properties, providing rich brown to black hues without harmful chemicals. Coffee acts as an enhancer, deepening the color and adding a subtle tint. Glycerine and Aloe vera gel are included for their moisturizing and nourishing effects, promoting healthy hair. Lemon juice is used to adjust the pH balance, ensuring optimal color development, while sodium benzoate serves as a preservative to extend shelf-life.[2]

This formulation aims to provide an alternative to chemical hair dyes that not only offers vibrant and long-lasting color but also nourishes and conditions the hair, improving its texture and overall health. The evaluation of this herbal hair dye includes assessing its color efficacy, ease of use, conditioning properties, and stability, with a focus on providing a safe and natural solution for hair coloring.[3]

Objectives:

1.To formulate a herbal hair dye using natural ingredients, including henna, coffee, indigo, glycerine, Aloe vera gel, lemon juice, sodium benzoate, and water, with the goal of creating a safe, effective, and eco-friendly alternative to synthetic hair dyes.

2. To evaluate the coloring effectiveness of the herbal hair dye, assessing the depth, richness, and longevity of the color produced by the combination of henna, indigo, and coffee.3.To assess the conditioning and nourishing properties of the herbal hair dye by evaluating its impact on hair texture, shine, and overall health, considering the moisturizing effects of glycerine and Aloe vera gel.

4.To determine the stability and shelf life of the formulated hair dye by examining the preservative effects of sodium benzoate and ensuring the product's safety for prolonged use.

5.To evaluate the ease of application of the herbal hair dye, ensuring that the formulation is user-friendly, easy to mix, apply, and rinse out without causing irritation or discomfort.

6.To investigate the pH balanceof the formulation, determining the role of lemon juice in adjusting the pH to enhance the dye's performance and improve the hair color adhesion.

7.To compare the herbal hair dye's performance with conventional synthetic hair dyes in terms of color result, hair condition, and safety, emphasizing the benefits of using natural ingredients for hair care.

8.To promote awareness and acceptance of natural hair dyeing alternatives, highlighting the advantages of using herbal ingredients in terms of reducing chemical exposure and supporting sustainable beauty practices.[4]

Drug Profile :

1.Henna :

Synonym – Lawsonia inermis

Biological source - Henna comes from the dried leaves of the Lawsonia inermis plant, a flowering shrub native to Asia and Africa.

Family : Lythraceae

Use –

1. Henna coats the hair shaft, locking in moisture and making hair soft and smooth.
2. It reduces dryness and frizz, giving hair a natural shine.
3. Strengthens Hair and Reduces Hair Fall
4. Rich in natural proteins and antioxidants, henna strengthens hair follicles.
5. It prevents breakage, split ends, and hair thinning.[5]

2.Indigo Powder:

Botanical Name: Indigofera tinctoria

Biological Source: Indigo Powder is obtained from the leaves of the Indigofera tinctoria plant.

Family: Fabaceae (Legume family)

Uses:

1. Natural Dye: Indigo Powder is used as a natural dye for fabrics, giving a blue color.

2. Hair Dye: Indigo Powder is used as a natural hair dye, giving a dark blue or black color.

3. Medicinal Uses: Indigo Powder is used in traditional medicine to treat various ailments, such as fever, rheumatism, and skin conditions[6]

3.Coffee:

Botanical Name: Coffea arabica L. or Coffea canephora Pierre ex A.Froehner (Robusta coffee)

Biological Source: Coffee is obtained from the seeds of the Coffea arabica or Coffea canephora plant.

Family: Rubiaceae (Madder family)

Uses: Coffee can be a natural and effective ingredient in hair dye and hair care routines. Here are some ways coffee is used in hair dye applications:

1.Natural Hair Dye: Coffee is often used as a natural, gentle dye to darken hair. It works well for brunettes looking to enhance or deepen their color. Brewing strong coffee and applying it to the hair can provide a subtle, temporary darkening effect. It’s ideal for those who want a natural way to enhance their hair color without harsh chemicals.

2.Enhancing Brown or Black Tones: Coffee can add richness and depth to brown or black hair, making the color appear more vibrant and glossy. It's often used to refresh or enhance the natural color without permanent dye.

3.Temporary Color Boost: Coffee is used for those seeking a temporary color boost. It doesn't provide a long-lasting color change like traditional hair dye but can offer a temporary darkening effect that lasts a few washes.[7]

4.Aloe Vera:

Synonyms: Aloe barbadensis

Biological source: Aloe is the dried juice collected by incision, from the bases of the leaves of various species of Aloe.

Family: Asphodelaceae

Uses:

1.Natural Hair Dye Conditioner: Aloe vera can act as a natural conditioner, helping to moisturize the hair and soothe the scalp. When used alongside natural hair dyes like henna or indigo, it can keep the hair hydrated and prevent dryness.

2.Pre-Dye Treatment: Before applying dye, Aloe vera gel can be massaged into the scalp and hair to create a barrier. This can help prevent irritation from the dye chemicals and also soften the hair to allow the color to absorb better.[8]

5.Lemon juice :

Lemon juice can be used in hair dyeing and hair care for several reasons, mainly due to its natural acidic properties and ability to lighten hair. Here are some ways lemon juice is used in hair dyeing:[9]

6.Glycerin:

Glycerin is a crucial component in herbal hand sanitizers, offering skin protection, hydration, and formulation stability. Its natural origin and compatibility with herbal ingredients make it an excellent choice for maintaining hand hygiene while preventing dryness.

Uses:

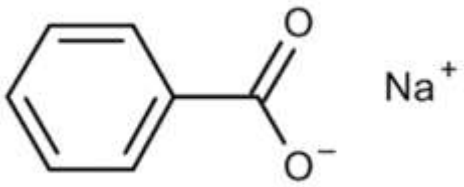
a. Acts as a thickening agent, giving the sanitizer a smooth consistency.

b. Improves the spreadability of the product, ensuring even application.

c. Reduces the harsh effects of alcohol and other antimicrobial agents.

d. Helps maintain the natural softness of the skin.[10]

7.Sodium Benzoate:



1.Preservative: Sodium benzoate is primarily used as a preservative to prevent the growth of bacteria, fungi, and molds in hair dye products. It helps extend the shelf life of the dye and ensures the product remains safe and effective for longer.

2. Stabilizing Agent: In hair dye formulas, sodium benzoate helps to stabilize the mixture by preventing the degradation of other ingredients. This ensures that the dye maintains its potency and performance over time.

3.Enhancing Shelf Life By preventing microbial contamination, sodium benzoate helps maintain the integrity and effectiveness of the hair dye. This is especially important for products that contain water, as they are more prone to bacterial growth.[11]

Formula Of Herbal Hair Dye :

Sr.No	Ingredient	Weight (30gm)
1	Henna powder (Lawsoniainermis)	15 gm
2	Indigo powder (Indigoferatinctoria)	10 gm
3	Coffee	2 gm
4	Glycerine	0.5 gm
5	Aloe Vera Gel	2g
6	Lemon juice	0.5 gm
7	Sodium Benzoate	0.1g
8	Warm water	(q.s)

Formulation Method Of Herbal Hair Dye :

Step 1: Preparation of Powdered Ingredients :

- Weigh & Sieve the dry ingredients (henna, indigo, coffee) separately to remove coarse particles.
- Mix thoroughly in a clean, dry bowl.

Step 2: Mixing Liquid Ingredients

- In another container, mix glycerine, aloe vera gel, and lemon juice until uniform.
- Add sodium benzoate to this mixture and stir well.

Step 3: Paste Formation

- Gradually add warm water (~10 mL) to the dry mix while stirring continuously.
- Add the prepared liquid mixture slowly and mix thoroughly until a smooth, lump-free paste is obtained.

Step 4: Maturation (Dye Release)

- Cover the paste and let it sit for 2-3 hours at room temperature to allow the dye to release properly.
- If using immediately, warm the mixture slightly before application.[12]

Evaluation Tests for Herbal Hair Dye :

Physical Evaluation :

1. **Appearance & Texture**:
    - The dye should be smooth, uniform, and free from lumps.
    - No phase separation should occur in the paste.[13]
2. **Colour & Odour :**
    - The dye should have a consistent colour based on the formulation.
    - It should have a pleasant or neutral odour without any signs of spoilage.[14]
3. **pH Determination**:
    - The pH of the dye should be measured using a pH meter or pH strips.
    - Ideal pH range: 4.5 – 6.0 (scalp-friendly and non-irritating).[15]
4. **Storage Stability Test**:

- Store the dye under different conditions (room temperature, warm conditions, and refrigeration).[16]

Result :

Herbal Hair Dye Were Prepared By Containing Ingredients Like Indigo, Heena, coffee, etc.

Physical Appearance/Visual Insection :

The various sensory characters like color, taste, odour, and special features, like touch, texture and appearance, etc., was carefully identified.

Sr. No.	Parameter	Observation
1	Colour	Greenish
2	Odour	Characteristics
3	Texture	Smooth
4	Appearance	Paste

Conclusion :

According to study findings, an appropriate black colour for hair may be obtained by varying the proportions of Henna and Indigo. Hair colourant absorption was greatest at a pH of 6.5 - 6.9 and moreover, the use of the Henna and Indigo increased the colour intensity. This natural hair dye has the benefit of causing no skin damage. It is made entirely of water-soluble plant elements, and as a result, it has no unpleasant odour. As well, both the raw components and the finished product are 100 % biodegradable and theses compositions are stable at room temperature. This natural herbal hair colourant is excellent for people of all age group and the formulation and processing methods are Eco sustainable. Hence, discovered the beneficial qualities of the

natural herbal dye in our study; however, an additional research is needed to discover more helpful advantages of this herbal hair pack. Thus, the herbal formulations are in popular to satisfy the expectations of an expanding global market

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