



**INTERNATIONAL JOURNAL OF  
PHARMACEUTICAL SCIENCES**  
[ISSN: 0975-4725; CODEN(USA): IJPS00]  
Journal Homepage: <https://www.ijpsjournal.com>



## Research Article

# Formulation And Evaluation of Herbal Hair Dye

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## ARTICLE INFO

Published: 26 Jun. 2025

### Keywords:

Hair dye, temporary,  
Semipermanent, Permanent,  
Antioxidant.

### DOI:

10.5281/zenodo.15743077

## ABSTRACT

Hair losing its natural colour can be caused by several factors such as genetics, environmental exposure, and the use of alcohol-based products. Although permanent synthetic hair dyes are available in a wide range of shades and can maintain a natural shine, they can also cause allergic reactions in some people. This study focused on evaluating various combinations of powdered herbal ingredients like Henna, Indigo, Bhringraj, Amla, Shikakai, Giloy (Gulvel), Brahmi, for their ability to colour hair and their potential to cause allergic reactions. Among these, a combination of Henna and Indigo was found to be an effective natural hair dye. The aim of this research was to develop a powdered herbal hair dye that imparts a reddish-brown colour, closely resembling natural hair shades. It was designed to offer better colouring results and longer-lasting effects compared to commercially available herbal dyes. Notably, many of these commercial products still contain 20-25% para-phenylenediamine (PPD), a common ingredient in synthetic dyes known to cause allergic reactions in some users. In contrast, the herbal dye developed in this study was free from synthetic chemicals and was evaluated for its colouring performance. Unlike herbal hair dyes, synthetic hair dyes have been known to cause skin issues and related health concerns. The main goal of this study was to develop and compare different herbal hair dye formulations. In this research, dried alcoholic extracts of herbs like henna, indigo, amla, bhringraj, myrobalan, and a tea-based decoction were used in varying concentrations to create six different hair dye formulations. Each of these was tested for how well it could maintain a brown colour on human hair. The results showed that the colour stayed intact for up to 30 days at room temperature. Hair dye is a widely used cosmetic product, not just among women but also men. Most permanent or synthetic hair dyes are made of two main components: the colorant and the developer. These often include harsh chemicals that can cause allergic reactions and other health issues. Ingredients like hydrogen peroxide ( $H_2O_2$ ) and naphthol are known skin irritants. In the European Union, any hair dye containing potentially harmful ingredients must carry a warning label, as some of these substances can be absorbed through the skin and have been linked to cancer.

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**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



Regular use of permanent or semi-permanent hair dyes and dye shampoos may increase the risk of health concerns, including breast cancer. Extended use can also lead to local skin irritation and toxicity. The practice of coloring hair is not new. Ancient Egyptians used plant-based dyes as far back as 5000 BC. The first synthetic dye was created in 1856, and permanent hair dyes have been in commercial use for more than a century. Among natural dyes, henna has remained popular.

## INTRODUCTION

The demand for natural, herbal-based hair dyes is rapidly increasing due to their plant-based benefits and minimal side effects. In contrast, many synthetic hair dyes on the market contain a combination of ammonia and peroxide. These chemicals can alter the hair's structure, causing damage and triggering allergic reactions in some individuals. Since ancient times, nature has been a source of medicinal remedies. Various parts of plant such as bark, leaves, flowers, and seeds—have been used in the development of traditional medicines. Around 80% of the world's population relies on plant-based medicines for primary healthcare. In traditional systems like Ayurveda, Unani, Siddha, and Homeopathy, nearly 90% of treatments are based on herbs and plant-derived substances. These natural remedies are generally safe, affordable, effective, and readily available, with very few side effects. Hair graying can occur due to various factors such as genetics, stress, nutritional deficiencies, and certain diseases. Among these, heredity is considered the primary cause of premature graying. Studies suggest that by the age of fifty, around 50% of the global population will have at least 50% gray hair. This widespread issue has led to a substantial demand for hair dyes in the market. Natural dyes are derived from plant, animal, or insect sources without undergoing chemical processing. Historically, natural substances were combined with metals like copper and iron to achieve more durable and richer shades. A Given the adverse

effects of synthetic dyes, there is a growing need for a completely plant-based alternative that is safe, easy to use, and does not stain the skin or cause allergic reactions. The present study focuses on developing a natural black hair dye using a blend of various plant extracts, inspired by the experiences of individuals who have been using such herbal ingredients without facing irritation or sensitivity issues. The primary goal is to formulate a natural hair colorant that is both safe and effective.

Natural dyes often contain tannins, which act as natural mordants by enhancing the binding of color to the hair and improving the dye's color intensity and fastness. Current commercial natural hair dyes predominantly include henna mixed with other plant-based ingredients and are usually applied as a paste. To improve color stability, inorganic salts such as aluminum sulfate, copper sulfate, lead acetate, and potassium dichromate are sometimes added. However, these substances can cause undesirable side effects, including skin irritation, allergic reactions, hair damage, skin discoloration, unexpected hair color changes, and even carcinogenic effects. Because of the limitations associated with both synthetic and traditional natural dyes, this research aims to develop a ready-to-use herbal gel dye using plant-based extracts with proven coloring properties. This formulation seeks to provide a safer alternative, addressing health and environmental concerns associated with conventional dyes.

Synthetic dyes have been associated with various skin disorders and environmental pollution. Their production involves harmful processes that pose risks not only to the consumers but also to workers in manufacturing units. The increasing awareness of health and environmental issues has led to a decline in the use of synthetic dyes, especially among health-conscious consumers. Moreover, synthetic dyes often face strict regulatory scrutiny before being approved for sale. The demand for



natural, herbal-based hair dyes is rapidly increasing due to their plant-based benefits and minimal side effects. In contrast, many synthetic hair dyes on the market contain a combination of ammonia and peroxide. These chemicals can alter the hair's structure, causing damage and triggering allergic reactions in some individuals.

Since ancient times, nature has been a source of medicinal remedies. Various parts of plants—such as bark, leaves, flowers, and seeds—have been used in the development of traditional medicines.

Around 80% of the world's population relies on plant-based medicines for primary healthcare. In traditional systems like Ayurveda, Unani, Siddha, and Homeopathy, nearly 90% of treatments are based on herbs and plant-derived substances. These natural remedies are generally safe, affordable, effective, and readily available, with very few side effects.

### Anatomy of hair :



Figure no 1.anatomy of hair

### Types of Hair Dye :

#### 1.Temporary

- These form of hair hues used to shade the hair for Temporality.
- The colorants which are used would not penetrate into the hair or surrounding.
- Maybe without difficulty rinsed off water one shampooing.
- Temporary hair colouring some time used to use finely floor metals via a Puffer Spray.
- In rinse aqueous or hydro alcoholic solution of simple dye stuffs are used.

#### 2.Semi-Permanent:

- Semi-permanent dye includes particularly either Nitrophenylene diamines or Nitroaminophenes or both Aminoantrhaquinoes.
- Shampoo is the maximum generally used base.
- Overall performance of colorants may be enhanced by the inclusion of solvent.
- Most of them are primary dye stuffs, whose cationic person offers them a natural affinity for the hair.

#### 3.Permanent:

- Maximum popular hair dye merchandise.
- The dyes are shaped throughout the dyeing technique and aren't present, as such in the solution before application.

- They motive some hair damage.
- Permanent dye systems are capable of dye hair a lighter colour than the original.
- includes elements; Dye intermediate, Oxidizing agent

#### **Advantages :**

- Herbal appearance of use of real human hair fibre..
- Can be styled as a natural hair.
- Capable of coloration and perm.
- Movements like natural hair.
- Much less susceptible to warmth harm.
- Natural appearance of use of real human hair fibre.
- May be styled as a natural hair.
- Able to color and perm.
- Moves like natural hair.
- Less susceptible to heat damage.

#### **Disadvantages:**

- More steeply-priced.
- Want extra protection and care.
- Requires styling.
- Can be heavier in weight after applying, which may cause itching.
- More expensive.
- Need more maintenance and care.
- Requires styling.
- May be heavier in weight than synthetic wigs, which may be lead to itching.
- More susceptible to sunlight fading and environmental damage.

#### **Aim and objectives :**

**Aim :**The present work is based on preparation and evaluation of henna based herbal dye.

#### **Objectives :**

- To carry out comprehensive literature survey and selection of crude drugs.
- To study the plant profile of different plants.
- To prepare herbal hair dye and evaluation of its various parameters such as organoleptic, physio-chemical, and phytoconstituents.
- To study the adverse effect of chemical based hair dyes.
- To study how different colours are produced.
- To make herbal based hair dye as an alternative for high cost synthetic dyes.
- To spread awareness about herbal based hair dyes and give info about how to make herbal hair dye at home.
- List of reasons people color their hair.
- Explain how the hair's porosity affects hair color.
- Understand the types of melanin found in hair.
- Define and identify levels and their role in formulating hair color.

#### **Literature review :**

1.Vijendra Singh, Mohammad Ali, and Sukriti Upadhyay in their study on topic entitled "Study of colouring effect of herbal hair formulation on greying hair" on 12/09/2015 The main objective of this study is to screen the hair colouring properties of hair colorant/herbal hair colouring formulations. The herbal drugs are used as hair colorants, (24)

2. Shubham Randad, Maya Mahadik, Dr. L.D. Hingane, et. al in their study on topic entitled "Formulation and Evaluation of Herbal Hair Dye" on 12/12/21 they concluded that, the herbal dye was formulated by using whole plant of aloe vera, leaves of henna, seeds of guava, flowers of nilika, amla, bhringraj, fenugreek, black catechu and reetha. The Ayurvedic cosmetics are very helpful and it is less prone any side effects. This herbal hair dye not only colours the hair, prevents the hair



fall but also prevents excess sebum secretion results in preventing scalp itchiness and hair damage due to any condition or problem occurred in hairs.<sup>71</sup>

3. Simone Paramecia da França, Michelli Ferrera Dario, Victoria Brigatto Esteves. et. al in their study on topic entitled "Types of hair dye and their mechanism of action" on 22/04/2015 in their study they state that, Hair dyes are classified, according to color resistance, into temporary, semi-permanent, demi permanent and permanent. Temporary dyes act through dye deposition on cuticles, but semipermanent may penetrate a little into the cortex and so the color resists up to six washes.

4. Rashmi Saxena Pal, Yogendra Pal, A.K Rai, et. al in their study on topic entitled "Synthesis and evaluation of herbal based hair dye" on 18/10/2018 study that, the herbal based hair dyes are being preferred on large scale, due to the vast number of advantages it exerts to overcome the ill-effects of a chemical-based hair dye. We have attempted to prepare and standardize this preparation to ensure its quality as well as stability aspects. The current research was aimed at the preparation of herbal hair dye and the evaluation of its various parameters as organoleptic, physico-chemical, phytoconstituents, rheological aspects, patch test and stability testing for its efficacy and shelf life.<sup>221</sup>

5. J. Uttara, B. Swapnali, U. Mohini in their study on topic entitled "Formulation and preliminary evaluation of natural hair colorant" on 19/01/2010, In the present investigation the formulations are developed using different combinations of Henna and indigo with other herbs, the loss of colours in hair is due to various reasons like genetic influence, effect of environmental factors, use of alcoholic preparations etc. A need was felt to formulate a dye containing only plant products

which is safe for use and does not have the problems of staining skin during use and hypersensitive reactions,<sup>128</sup>

6. Phadatare suvarna P, Pesari tanuja N. Pokharkar Deepak and Pingle R.P., (2015) reported preparation, evaluation and hair dyeing activity of herbal hair oil and comparison with marketed dye the usage of herbal cosmetics has been increased to many folds in personal care system and there is a great demand for herbal cosmetics that offer multifunctional effects.

### PLAN OF WORK:

- Literature Review
- Collection of crude drugs.
- Preparation of Formulation
- Evaluation of Formulation
- Blog Writing
- Result and Discussion
- Conclusion

### Role of ingredients in herbal hair dye :

#### 1. Henna :

Henna helps slow down premature greying of hair because it's rich in tannins natural compounds also found in tea that give color. It also contains vitamin E, which softens the hair. The plant's leaves are packed with proteins and antioxidants that nourish and strengthen your hair



**Fig .Henna**



- **Synonyms** : Mehandi, Amber, Chestnut.
- **Biological source**-Lawsonia inermis L. commonly known as Heena family-Lythraceae
- **Geographical source**-native to North Africa and South-West Asia
- **Chemical constituent** : The main chemical constituent is Lawsone The Lawsone level in dried drug is 1%. Heena leaf also contains Flavonoids, Caumarine & Xanthones.

### Plant profile of Henna :

Kingdom	Plante
Division	Magnoliophyta
Class	Magnoliopsida
Sub - class	Rosidae
Order	Myrtales
Family	Lythraceae
Genus	Laoosonia.L
Species	Laoosonia Inermis. L.

### Uses :

1. Antibacterial
2. Antifungal
3. Prevents premature hair balancing pH of scalp, fall by RIIE

### 2.Amla :

Amla powder helps the body absorb calcium better, which supports stronger bones, teeth, nails, and hair. It also helps maintain natural hair color, prevents premature greying, and strengthens hair follicles. Amla is one of the richest natural sources of Vitamin C, and it's also packed with tannins. The Vitamin C in amla binds with tannins, which helps protect it from being destroyed by heat or sunlight. Amla powder is also rich in minerals like calcium, phosphorus, iron, and amino acids. This powerful fruit promotes hair growth and helps reduce hair loss. Thanks to its antibacterial and antioxidant properties, amla can support the growth of healthy, shiny hair.

### Plant profile of amla :

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Sub-class	Rosidae
Order	Euphorbiales
Family	Euphorbiaceae
Genus	Phyllanthus. L
Species	Phyllanthus emblica. L



Figure. amla

- **Synonym**- Indian gooseberry, Embelic.
- **Biological Source**: Phyllanthus emblica L. belonging to the family Euphorbiaceae
- **Geographical Source**- Amla fruits are edible and are mainly found in regions of India, Southeast Asia, China, Iran, and Pakistan.
- **Chemical Constituents**- Glucogallin, Punigluconin, emblicaninA, Chebulagic acid, Corilagin. Pedunculagin.

### Advantages :

1. Upgrades the retention of calcium.
2. Assisting with making better bones, teeth, nails
3. It keeps up with the hair tone and forestall untimely turning grayed.

**Uses** : Amla has antibacterial and antioxidant houses that could assist promote the increase of wholesome and lustrous hair. It maintains the hair color and stops untimely graying, strengthens the hair follicles.



### 3.Reetha :

Reetha, also known as soapnut, is rich in vitamins A, D, E, and K, as well as saponins, natural sugars, unsaturated fats, and certain sticky compounds. It has been traditionally used to promote healthy hair growth and reduce dandruff. The outer layer of the fruit contains natural cleansing agents, which is why it's often included in herbal shampoos. Thanks to its high saponin content, Reetha acts as a gentle, natural cleanser that strengthens the hair, making it look shiny and healthy when used regularly.



Figure.Reetha

#### Plant profile of reetha:

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Sub-class	Rosidae
Order	Sapindales
Family	Sapindaceae
Genus	Sapindus.L
Speices	Sapindus mukorossi.L

- **Synonyms :** Soapberry, Arsitha, Washnut
- **Biological source** - Sapindus mukorossi belongs to Family Sapindaceae
- **Geographical source** :Reetha is found in the hilly regions of the Himalayas in India.
- **Chemical constituent:** The main chemical constituent are saponins, sugars and mucilage.

#### Advantages:

1. Cleansing the scalp naturally
2. Preventing hair loss
3. Promoting stronger hair
4. Reducing dandruff

### 4.Bhrigraj:

Bhringraj is a low-growing herb that can reach up to 3 meters in height. It has long stems and small, white, daisy-like flowers about 6 to 8 mm wide. The leaves are narrow, pointed, and grow in pairs on opposite sides of the stem. Its roots are gray and cylindrical in shape. Research has shown that applying a 5% petroleum ether extract of Bhringraj can stimulate the formation of more hair follicles. Traditionally, oil made from Bhringraj leaves has been used to promote hair growth and naturally darken grey hair. Today, Bhringraj is commonly found in hair oils, shampoos, dyes, and other hair care products.



Figure.bhrigraj

#### Plant profiles of bhringraj:

Kingdom	Plantae -plant
Division	Magnoliophyta
Class	Magnoliopsida
Sub-class	Asteridae
Order	Asterales
Family	Asteraceae/Compositae
Genus	Eclipta. L.
Species	Eclipta prostrata. L.

- **Synonyms:** Trailing Eclipta or False Daisy.
- **Biological source:** Eclipta alba (syn. Eclipta prostrata) plant leaves



- **Geographical source :** China , India , Nepal , Brazil, Thailand ,srilanka etc
- **Chemical constituents:** Eclipta prostrate contains phytochemicals such as coumestans, polypeptides, polyacetylenes, thiophene derivatives, steroids, sterols, triterpenes, and favonoids. The plant carries the alkaloid ecliptine. Other chemical substances identified are wedelolactone, wedelic acid, apigenin, luteolin, b-amyryn and so forth.
- **Uses :** It saves you from hair fall and untimely graying. It also stimulates hair growth.

## 5.Hibiscus :

Hibiscus is highly effective in promoting hair growth. It's naturally rich in nutrients like calcium, phosphorus, iron, vitamins B1 and C, riboflavin, and niacin—all of which support thicker, healthier hair and help prevent premature graying. This flower is also commonly used to manage dandruff. Additionally, hibiscus has antioxidant properties thanks to compounds like anthocyanins and other phenolics. It helps restore hair health by deeply conditioning and nourishing the strands.



figure. Hibiscus flower

## Plant profiles of hibiscus flower :

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Sub-class	Dilleniidae
Order	Malvales
Family	Malvaceae

Genus	Hibiscus.L
Species	Hibiscus lunariifolius Wild

- **Synonym-** Hibiscus boryanus DC
- **Family:** malvales
- **Geographical source :** India ,China, Thailand, Malaysia, Sri Lanka, Philippine, Hawaii and other Pacific Islands etc .
- **Chemical Constituents:** Anthocyanin, Anthoquinones. Tannins,
- **Use:** Antioxidants. Demulcent.

## 6.Fenugreek :

Fenugreek seeds are packed with beneficial nutrients like trigonelline (a key active compound), mucilage, proteins, flavonoids, saponins, healthy fats, vitamins, iron, and minerals such as manganese, silicon, calcium, and phosphorus. Thanks to their rich protein and nicotinic acid content, these seeds are especially helpful in reducing hair fall and dandruff. They also support overall scalp health by addressing issues like dryness, thinning hair, and even baldness. Additionally, fenugreek seeds help hydrate the hair, restoring its natural shine, softness, and bounce.

- **Synonyms:** Trigonella foenum-graecum , methi .
- **Geographical source :** India (largest producer and exporter) ,Pakistan, Nepal, China, Egypt, Turkey, Iran



figure . Fenugreek



**Plant profiles of Fenugreek:**

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Trigonella
Species	T. foenum-graecum

**Uses :** Hair care: Helps reduce hair fall, dandruff, and scalp dryness; promotes hair growth and adds shine.

**7.Indigo :**

Indigo powder helps nourish and strengthen the roots of the hair, making each strand healthier and more resilient. It also helps prevent scalp infections. When mixed with coconut oil, indigo provides essential nutrients to the scalp, promoting stronger, shinier, and healthier hair overall. Indigo powder is made by crushing the leaves of the indigo plant and is commonly used as a natural dye not just for hair, but also for coloring fabrics. Historically, indigo was highly prized and even called “blue gold” because of its rich, deep color and value. When used on hair, indigo powder helps nourish the roots and strengthens each strand, promoting healthier hair overall. It also supports scalp health by preventing infections. When combined with coconut oil, it delivers essential nutrients to the scalp, helping to improve hair strength, shine, and texture.

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae (Leguminosae)
Genus	Indigofera
Species	Indigofera Tinctoria

**Plant profile of Indigo:****Figure. Indigo**

- **Synonyms :-** Azure, Beryl, Navy
- **Biological source :** extracted from the small, green leaves of the Indigofera plant belongs to Family – Fabaceae
- **Geographical Source :** Mesopotamia, Egypt, Britain, Mesoamerica, Peru, Iran, and West Africa
- **Chemical Constituent –** interurban, isatin, isoindigo, hydroxyindirubin, 2-hydroxy-1,4-benzoxazin-3-one, tryptanthrine, quinazoline-2,4-dione.etc.

**Advantages-**

1. Help avert excessive dryness & itchiness on the scalp
2. Lowers the risk of all kinds of fungal

**Uses :**

1. Natural dye: Used for dyeing textiles and hair
2. Hair care: Promotes hair strength and helps in natural hair coloring

**8.Neem :**

- **Synonym :** Arsitha.
- **Family:** Mellaceae.
- **Chemical Constituents:** Nimbin.  
Nimbinene,
- **Use :**Antibacterial.

## MATERIALS AND PREPARATION :

Sr.no	Ingredients	Quantity	Use / function
1	Henna	25gm	Natural hair dye
2	Amla	3gm	Promote hair growth
3	Reetha	2gm	Darking hair and shine
4	Bhrinjraj	2gm	Prevent hair fall
5	Gulvel	2gm	Natural conditioner
6	Neem	2gm	Antibacterial
7	Fenugreek	2gm	Reduce dandruff
8	Hibiscus powder	2gm	Hair growth booster
9	Indigo	15gm	Natural hair dye



Ingredients

## Method of preparation:

### 1.Selection Of Herbs:

The herbs which are used in this hair dye formulations was selected on the basis of documental literature.

### 2.Collection and Authentification of Plant:

Herbs used in hair dye formulation was collected from the garden. The leaves of Neem leaves were collected and dried under shades. Indigo powder, Hibiscus flower were collected, dried and powdered.

### Formulation :

Preparation of herbal hair dye, we have selected different herbal ingredients such as Henna, Reetha, Amla, Shikakai, Bhrinjraj, neem , Fenugreek , Gulvel, Indigo powder, Brahmi and Hibiscus powder etc.

1. This all ingredients were collected from the authorized stores of the local market in the powdered form.
2. Collected ingredients were mixed and made into fine powder using mortar and pestle.
3. The all the ingredients were weighed and passed through Sieve no. 24.
4. Then all ingredients were mixed uniformly to prepare homogenous mixture of a powder form of dye.
5. The homogenous mixture was weighed and packed in a plastics bag .



Herbal hair dye

### 3.Equipment :

Sr.no	Equipment
1	Mortar & pestle
2	pH meter



**Fig. mortar & pestle**

### **Evaluation parameters of herbal hair dye:**

#### **A. Organoleptic evaluation of hair dye:**

1. Colour of formulation
2. Odor of Formulation
3. Appearance
4. Texture

#### **B. Physio-chemical evaluation:**

The physical and chemical features of the herbal hair dye were evaluated to determine the pH, its moisture content. for the purpose of stability, compatibility and the amount of inorganic matter present in it.

#### **C. Phytochemical evaluation :**

##### **1.Molisch test:**

- Take 1 gm of sample in dry test tube
- Take 2 ml of distilled water in a sample
- Add 2 to 3 drops of Molisch's reagent to solution
- Observe colour change at junction of two layers

##### **2. Volatile oil test:**

- Sample + alcoholic solution of Sudan III
- Observe the colour

#### **3.Mayer's test (For alkaloid):**

- Sample Mayer's reagent
- Observe the colour

#### **d. Rheological evaluations:**

##### **Bulk Density:**

Weight accurately 5gm of powdered dye and transfer in 100ml of measuring cylinder. Carefully level the powder blend without compacting, and read the unsettled apparent value.

Bulk density = Bulk mass/Bulk volume

##### **Tapped Density:**

Weigh accurately 5gm of powder dye and transfer in 100ml measuring cylinder. Then precisely tap the chamber containing the sample by raising the chamber and permitting it to drop under its own weight utilizing mechanical tapped thickness analyzer at ostensible pace of 300 drops each moment.

Tapped Density = Mass/Tapped volume

##### **% Carr's index-**

$$\frac{(\text{Tapped density} - \text{Bulk density})}{\text{tapped density}} \times 100$$

##### **Housner's Ratio =**

Tapped density/Bulk density

##### **Patch test:**

This normally include spotting the limited quantity of watery arrangement of hair color behind the ear on or internal elbows in space 1sq.cm and passing on it to dry. The indication of disturbance or feeling of non-health is noted, if any. Estimated and little amounts of the pre-arranged hairpack were applied

to the region for the proper time. Irritancy, redness, and enlarging were checked and notice for standard stretch as long as 24 hours if any.

### Stability test:

Solidness testing for the pre-arranged plan was performed by putting away at various temperature condition for the hour of time of one month. The pressed glass vials of definition were put away at various temperature condition for the actual boundaries like tone, smell, pH, surface and smoothen.

### Result and discussion :

#### A. organoleptic evaluation :

Sr.no	Parameters	Result
1.	Colour	Green
2.	Odor	Characteristics
3.	Texture	Fine
4.	Apperance	Powder

#### B. physio-chemical evaluation :

Sr.no	Parameters	Result
1.	pH	7
2.	L. O.D	1.7



Figure. pH meter

#### C. phytochemical evaluation:

1 .Molisch's Test: Appearance of purple colour indicates the presence of carbohydrates.



2.Volatile Oil test : It gives red colour Indicates Volatile oils are present.



3.Mayer's Test : It gives yellow precipitation, indicates alkaloids are present



#### Phytochemicals evaluation

Sr.no	Parameters	Result
1.	Molisch's test	Carbohydrates present
2.	Volatile oil test	Volatile oil present
3.	Mayer's test	Alkaloids present

#### D.Rehological evaluation :

##### 1.Patch test :

Sr.no	Parameters	Result
1.	Swelling	Negative
2.	Redness	Negative
3.	Irritations	Negative



**2.stability test :**

Sr.no	Parameters	Room temperature	35°C
1.	Colour	No change	No change
2.	Odor	No change	No change
3.	pH	6.5	6.7
4.	Texture	Fine	Fine
5.	Smoothness	Smooth	Smooth

**CONCLUSION:**

An herbal hair pack offers a very gentle way to color hair naturally. One of the main benefits of using herbal-based beauty products is that they are non-toxic and safe. This type of hair treatment nourishes both the scalp and the hair, helping to maintain overall hair health. It provides essential nutrients, supports scalp care, and helps manage dandruff by removing excess oil. With regular use, this herbal pack can lead to smoother, frizz-free, naturally colored hair. External factors such as pollution, aging, stress, and harsh weather conditions can negatively impact hair quality. In our research, we observed promising effects of this herbal hair pack, though further studies are needed to fully understand its potential benefits. Natural remedies are becoming increasingly popular because they tend to have fewer side effects compared to chemical-based products. Herbal formulations are gaining attention in global markets due to their safe and effective nature. This work represents an effort to develop a herbal hair pack using a blend of plant-based powders known for their beneficial properties for hair care.

An herbal-based hair dye has been successfully formulated, which can also be used as a gentle, home-made hair pack. One of the key advantages of this product is its natural, non-toxic composition, making it safe for both the scalp and hair. It provides essential nourishment to the scalp, helps reduce dandruff by removing excess oil, and with regular use, results in smooth, frizz-free, naturally colored hair. Factors like aging, stress,

pollution, and harsh environmental conditions can greatly affect hair quality. In our study, the herbal hair pack demonstrated promising properties. However, more research is needed to explore its full potential and additional benefits. Today, natural remedies are widely accepted due to their safety and minimal side effects, especially when compared to chemical-based alternatives. Herbal formulations are increasingly in demand in global markets, and this work represents a valuable step toward developing a natural hair care solution using the beneficial properties of various plant powders known for their effectiveness in hair treatment.

**REFERENCES**

1. Jayaganesh Sankar, Mridula Kini, Sudhakar Mhaskar, Neha Sathe, Evaluation of Herbal Henna Based Hair Colour Retention Study through Chromo Meter, Hair Therapy & Transplantation, Vol.11 Iss.3 No:1000165, Pg No.1-4.
2. Mane A. G., Aswar A.R., Hingane L.D. Formulation and Evaluation of Herbal Hair Dye, International Journal of Creative Research Thoughts (JCRT), Volume 9, Issue 12 December 2021 | ISSN: 2320-2882. Pg No. 454-475:
3. Natural colorants and dye In Pharmacognosy and phytochemistry. 1<sup>o</sup> Ed. India Career publication 2004, 1 pp. 98-117.
4. Kumar S, Akhila A, Naqvi AA, Farooqi: AHA, Singh Ak, Singh D, et al. Medicinal plants in skin care. Luncknow: CIMAP Publisher, 1994.P.51-62.
5. Nadkarni; KM, Indian Materia Medica, Popular Prakashan, Mumbai, India, 1976.p.630, 680,1202.
6. Anonymous. The Wealth of India - A directory of Indian raw materials and industrial products New Delhi: CSIR publisher, 2005.p.286-336.



7. Kapoor VP. Herbal cosmetics for skin and hair care. *Nat Prod Rad* 2005;4(4):306-14.12
8. Kumar K. Sudheer, Begum Afreen, et al., Formulation and Evaluation of 100% Herbal Hair Dye, Dept. of pharmacology, International Journal of Advanced Research in Medical & Pharmaceutical Sciences (IJARMPS-ISSN:2455-6998), Volume 1, Issue 2, March 2016.
9. Ganpat Ashwini, A.R Aswar, L.D. Hingane, Formulation and Evaluation of Herbal Hair Dye, International Journal of Creative Research Thoughts (IJCRT), Volume 9, Issue 12 December 2021 ISSN: 2320-2882.
10. Rashmi Saxena Pal, Yogendra Pal, A.K Rai, Pranay Wal and Ankita Wal, Synthesis and Evaluation of Herbal Based Hair Dye, The Open Dermatology Journal (Bentham Open), DOI: 10.2174/1874372201812010090, 2018, 12, 90-98.
11. Madhav Amle, Review on: Formulation and Evaluation of Herbomineral Hair Dye, Journal of Research in Pharmaceutical Science Volume 7 Issue 12(2021) pp: 01-11 ISSN(Online): 2347-2995.
12. Williamson EM. Major herbs of ayurveda 2002:126-8.
13. Lachman L, Lieberman HA, Kanig JL-The Theory and practice of industrial pharmacy 3rd 1987
14. Khandelwal KR. Practical pharmacognosy 12th Ed. 2004
15. Kumar KS. Begum A, Shashidhar B, et al. Formulation and evaluation of 100% herbal hair dye. International Journal of Advanced Research in Medicinal and Pharmaceutical Science 2016.
16. Chandhary G, Lawsonia inermis Linnaeus : A phytopharmacological review. *Int J Pharm Sci.* 2016;(6):630-48
17. Haircare: Include amala, reetha and Shikakai and healthy hair NDTV FOOD. Anusha Singh uptated: May 10,2018 Available from <http://food.ndtv.com/beauty/haircare-include-amala-reetha-and-shikakai-for-healthy-hair-1848507>.
18. Natural colorants and dye In Pharmacognosy and pytochemistry 1st Ed. India Career publication 2004:1:PP 98-117.
19. Vijendra Singh, Mohammed Ali, Sukirti Upadhyay, Study of colouring effect of herbal hair formulations on graying hair, Pharmacognosy Research, July-September 2015, Vol 7, Issue 3, Pg. No. 256-262.
20. Brown Keith, Hair colourants, *J Soc Cosmetic Chem*, 1982, 33, 375-383.
21. Patel MM Solanki R, Gaurav NC, Patel Pit Verma SS Method development for Lawsone estimation in Trichap herbal hair powder by high performance thin layer chromatography 1 Addy Pharm Techool Res 2013; 43: 1603
22. Grabley S, Thiericke R. Bioactive agents from natural sources: Trends in discovery and application. *Adv Biochem Eng. Biotechnology* 1999; 64: 101-54. 5.
23. Chaudhary G. Lawsonia inermis Linnaeus: A phytopharmacological review. *Int J PharmSci Drug Res* 2013; 2(2): 91-8.
24. Pal RS, Pal Y. Wal P. In-house preparation and standardization of herbal facepack. *Open Dermatol J* 2017; 11: 72-80.
25. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 42nd ed. Pune: India: [8]. Nirali Prakashan 2008; 6: pp. 1-A1

**HOW TO CITE:** Kalyan Chandel, Formulation And Evaluation of Herbal Hair Dye, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 6, 4367-4380. <https://doi.org/10.5281/zenodo.15743077>

