



## Research Paper

# Formulation and Evaluation of Herbal Hair Dye

Nikita Tangde\*, Arti Khamat

Dr. Vedprakash Patil Pharmacy College, Chhatrapati Sambhajinagar.

### ARTICLE INFO

Published: 20 June 2026

**Keywords:**

Kapoor kachri , Arapu powder, Ratanjot, Bhingraj, Heena ,Chia seeds ,Flax seed powder, Amla powder, Hibiscus powder

**DOI:**

10.5281/zenodo.20773191

### ABSTRACT

Herbal products are being preferred due to the advantages in contrast to the synthetic one which has adverse effects on human health because of chemicals. Herbal based hair dyes are being preferred on large scale, due to vast number of advantages it exerts to overcome the ill effects of a chemical-based hair dye. The word “Herbal” is a symbol of safety. Loss of colour in hair is because of shifted reasons like hereditary impact, impact of ecological variables, utilization of alcoholic arrangements, and so forth. Hair dyes encompass dyes modifiers, antioxidants, alkalizers, ammonia, wetting sellers, fragrance, and a ramification of different chemical substances used in small amounts that impart unique qualities to hair along with softening the texture or supply a desired movement to the dye. The ratio of melanin, eumelanin and pheomelanin that determines our natural hair shade. Thus, our current research was aimed to prepare the herbal hair dye using the herbal extract from the diverse powders of herbals such as, Ratanjot, Kapoor kachri, Arapu powder, Chia seeds, Fenugreek powder, Amla, Henna. They have good anti-bacterial, anti-oxidant properties. The prepared herbal hair dye was evaluated by various parameters such as organoleptic evaluation, physico-chemical evaluation, dying effect, patch test was observed

### INTRODUCTION

Hair coloring, or hair dyeing, is the exercise of converting the hair colour. The primary reasons for this are cosmetic: to cover grey or white hair, to trade to a color regarded as extra elegant or ideal, or to repair the original hair colour after it's been discolored with the aid of hairdressing procedures or solar bleaching. This gives a look of thicker, voluminous hair. In this situation it's miles

continually an awesome concept to head for semi-everlasting hair color, it provides strength in your hair and makes them look healthier.

In the current scenario, the world is shifting more towards natural resources for beautification and medicinal purposes. The chemical-based synthetic and semisynthetic hair dyes, herbal hair dyes are the best option. People nowadays are very conscious of their beautiful lifestyles, and hair plays a vital role in these lifestyles. Herbal

**\*Corresponding Author:** Nikita Tangde

**Address:** Dr. Vedprakash Patil Pharmacy College, Chhatrapati Sambhajinagar..

**Email** ✉: shevgenikita@gmail.com

**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.



resources that are free of side effects are frequently used to promote healthy hair. Almost 70% of people over the age of 50 face the problem of balding and graying hair. To maintain their personality, people keep on coloring their hair to prevent graying of hair. To fulfill this need, people use chemical-based hair dyes that are synthetic and semisynthetic. The use of chemical-based hair dyes regularly causes hair damage. It sometimes also causes skin infections, irritation, and other skin-related problems. A need was felt to form an item containing just plant items which is safe for use and does not have the issues of staining skin during use and easily affected responses.

Graying of hair is attributed to reasons like genetics, stress, nutritional deficiency, and disease. The primary reason of premature graying is hereditary, and it is reported that by the age of fifty, half of the world's population will have fifty percent gray hair. Hence there is a huge demand for hair dyes in the market. Natural dyes also act as mordants because they contain tannins. Tannins create affinity between dyes and hair and thus improve color and fastness of dye. Natural hair colorants that are currently marketed mainly contain henna along with plant components that need to be used in the paste form. Use of chemicals like aluminum sulphate, copper sulphate, lead acetate and potassium dichromate in hair dye result in unpleasant side effects, including temporary skin irritation and allergy, hair breakage, skin discoloration, unexpected hair color and cancer. Since the conventional methods of hair coloring using natural or synthetic colorants has limitations, an attempt has been made in this study to formulate a hair dye using herbal extracts and other additives from plant

source having good coloring property that is safe and ready to use.

## HERBAL HAIR DYE

Herbal hair dye offers a natural alternative to traditional chemical-based dyes, relying on plant-derived ingredients like henna, indigo, and amla. Unlike their chemical counterparts, herbal dyes are renowned for their gentle formulation, free from harsh chemicals like ammonia and peroxide. This gentleness extends to the scalp and hair, as herbal dyes retain the hair's natural oils, promoting healthier locks. One of the key attractions of herbal hair dye is its versatility in producing a spectrum of shades, from vibrant reds to deep browns and blacks, depending on the specific botanicals used. Beyond color, these dyes often boast conditioning properties, particularly henna, which can leave hair feeling soft, nourished, and fortified against breakage.

While herbal dyes may not deliver the same immediate color intensity or longevity as their chemical counterparts, they offer a gradual fade that lends a more natural transition between colors. Moreover, users can personalize their color by adjusting ingredient proportions or combining herbal extracts, offering a bespoke approach to hair coloring. However, achieving lighter shades or drastic color changes may require multiple applications or additional techniques. In essence, herbal hair dye provides a gentle, customizable, and natural approach to coloring hair, appealing to those seeking to minimize chemical exposure while enjoying the benefits of botanical-based hair care.





Fig 1: Herbal Hair Coloring: Before and After

## TYPES OF HAIR DYE

### A. Temporary

- The colorants which are used would not penetrate the hair or surrounding.
- Herbal hair dye can be easily rinsed off with just 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.

### B. Semi-permanent

- Semi-permanent dye includes particularly either Nitrophenylene diamines or Nitroaminophenes or both Aminoantraquinones.
- 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.

### C. 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.

- Permanent dye systems are capable of dye hair a lighter colour than the original.
- Includes elements like dye intermediate and oxidizing agent.

## BENEFITS OF HERBAL HAIR DYE

- Herbal hair dyes use natural ingredients derived from plants, minimizing exposure to harsh chemicals often found in traditional dyes.
- It can help nourish the hair and scalp with vitamins and minerals, promoting overall hair health.
- They may be gentler on sensitive skin, reducing the risk of irritation or allergic reactions.
- Herbal hair dyes tend to fade gradually, resulting in less noticeable regrowth lines compared to synthetic dyes.
- Some herbal ingredients, like henna, can add strength and thickness to the hair shaft, reducing breakage and split ends.
- Herbal dyes can be a preferred option for individuals seeking a more holistic approach to hair care, aligning with natural living principles.

### ADVANTAGES OF HERBAL HAIR DYE

- Gentler on the scalp, less irritation.
- Contains conditioning agents for soft, shiny hair.
- Eco-friendly and biodegradable.
- Some types strengthen hair and promotes its health.
- Causes less damage compared to chemical dyes.

### DISADVANTAGES OF HERBAL HAIR DYE:

- Longer wait times.
- Results can be unpredictable.

- Color fades faster.
- Can be more expensive.
- Fewer color options.

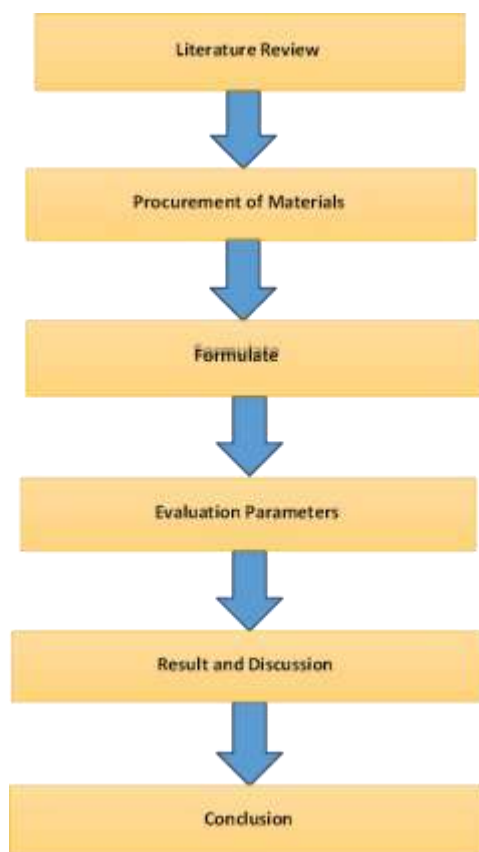
### USES OF HERBAL HAIR DYE:

- Conditioning hair.
- Promoting scalp health.
- Covering grey hair.
- Adding shine to hair.
- Customizing hair shades.
- Reducing scalp irritation compared to chemical dyes.

### REVIEW OF LITERATURE

Paper Title	Author(s)	Year	General Summary
Formulation Of Natural Hair Dye By Using Natural Herbs And Their Evaluation	Sadhana Patil, Dhanashri Mohite, Rohidas Suryawanshi, Shridevi Kale	2025	Focuses on preparing natural hair dyes from herbal ingredients and evaluating their effectiveness, stability, and safety.
Review on Herbal Hair Dye	Smith & Jones; Patel et al.	2018; 2020	Provides an overview of herbal hair dyes, their plant sources, mechanisms of coloring, benefits over synthetic dyes, and limitations.
Herbal Hair Dye: A Comprehensive Review of Botanical Alternatives in Hair Coloring	Sweta Joshi, Hricha Joshi, Ujjwal, Rekha Thirpola	2024	A detailed review of botanical hair colorants, including phytochemical profiles, traditional uses, and emerging research.
Formulation and Evaluation Of Herbal Hair Dye	Patni, Vishwas, Neeraj, Satija	2024	Discusses developing and testing herbal dye formulations, including color intensity, safety assessment, and application properties.

### PLAN OF WORK



## AIM AND OBJECTIVES

### Aim

The main aim of herbal hair dye is to color hair using natural plant-based ingredients while maintaining scalp health and minimizing damage caused by synthetic chemicals.

### Objectives

1. To provide safe hair coloring
2. To reduce hair and scalp damage
3. To promote hair health
4. To provide eco-friendly solutions
5. To offer long-term usability
6. To cater to sensitive users
7. To maintain natural appearance

### MATERIALS :

1. **Henna**



**Fig 2: Henna**

**Biological source:** It is obtained from the leaves of the plant *Lawsonia inermis*. These leaves contain a natural pigment called lawsone, which is responsible for the characteristic reddishbrown color imparted by henna.

**Family:** Lythraceae.

**Active constituents:** Primary active constituent is lawsone and it also contains tannins, flavonoids, polysaccharides.

**Uses:** Natural colorant.

Acts as Hair conditioner. Promotes hair growth.  
Contains antioxidant property.

## 2. Ratanjot



Fig 3: Ratanjot

**Biological source:** Ratanjot, also known as alkanna tinctoria, derives from the roots of the Alkanna tinctoria plant. This plant, commonly referred to as dyer's alkanet.

**Family:** Boraginaceae.

**Active constituents:** Alkannin, shikonin are the primary active constituents and it also contain terpenoids, flavonoids, tannins.

**Uses:** Used as traditional medicine.  
Culinary uses. Used in cosmetics.

## 3. Kapoor kachri



Fig 4: Kapoor kachri

**Biological source:** It is the rhizomes of Hedychium spicatum. This plant is commonly known as spiked ginger lily or perfume ginger.

**Family:** Zingiberaceae.

**Active constituents:** Essential oils (Eucalyptol, Camphor, Linalool), Flavonoids, Phenolic compounds (Gallic acid, ferulic acid) and terpenoids.

**Uses:** Improves scalp health.

Strengthens hair.

Acts as conditioning agent. Gives natural shine.

## 4. Chia seeds



Fig 5: Chia seeds

**Biological source:** Chia seeds are the edible seeds of flowering plant Salvia hispanica and it is an annual herbaceous plant.

**Family:** Lamiaceae.

**Active constituents:** Omega-3 fatty acids, Dietary fiber, Proteins and antioxidants.

**Uses:** Helps in moisture retention.

Acts as natural texture enhancer. Strengthens hair.  
Nourishes the scalp.

## 5. Fenugreek powder



Fig 6: Fenugreek powder

**Biological source:** It is an annual herbaceous plant with trifoliate leaves, comes from the seeds of *Trigonella foenumgraecum* plant.

**Family:** Fabaceae.

**Active constituents:** Saponin (diosgenin, yamogenin, gitogenin), Galactomannan gum, Flavonoids, Alkaloids.

**Uses:** Controls dandruff.

Natural shine enhancer. Color enhancer.

Acts as hair conditioner.

## 6. Bhringraj



Fig 7: Bhringraj

**Biological source** for Bhringraj is *Eclipta prostrata* or *Eclipta alba* belonging to the Asteraceae family. The plant is known by several other names, including false daisy.

**Family:** Asteraceae

**Active constituents:** alkaloids, flavonoids, and Triterpenoids and Saponins

**Uses:** Reduces Hair Fall

Treats Dandruff And Scalp Itchiness Treats Scalp Infections

Stops Premature Greying Of Hair

## 7. Arapu powder



Fig 7: Arapu powder

**Biological source:** It is obtained from the leaves of *Albizia amara*, it is a small to medium sized deciduous tree with spreading crown.

**Family:** Fabaceae.

**Active constituents:** Saponins, Flavonoids, Tannins, Phenolic compounds and Alkaloids.

**Uses:** Acts as natural cleanser.

Acts as conditioner. Balances oil production

## 8. Flax seed powder



Fig 8: Flax seed powder

**Biological source:** Flax seeds consists of the strands of pericyclic fibers of the stem *Linum usitatissimum* Linn.

**Family:** Linaceae.

**Active constituents:** Alpha-linolenic acid which is an omega-3 fatty acid, lignans which have antioxidant properties and Vitamin E.

**Uses:** Acts as conditioner.

Acts as thickening agent. Improves scalp health.

## METHOD OF PREPARTAION

### 1. Selection Of Herbs :

Choose herbal powders based on their colouring properties and hair benefits. Common ingredients include:

- Henna (*Lawsonia inermis*) – natural red–brown colour
- Bhringraj (*Eclipta alba*)– enhances colour and promotes growth , prevents hair fall
- Fenugreek (*Trigonella foenum-graecum*) – conditions hair

## 2. Drying and Powdering

- Herbs are cleaned to remove dirt and impurities.
- The ingredients are shade-dried to preserve active constituents.
- Dried materials are pulverized into fine powder using a grinder/mill.
- Powders are sieved to obtain uniform particle size.

## 3. Mixing of Powders

- Accurately weighed powders are mixed in specific proportions (e.g., Henna 60%, Indigo 20%, Amla 10%, Bhringraj 5%, Fenugreek 5%).
- A mechanical blender or manual mixing can be used to achieve a uniform blend.

## 4. Preparation of Paste (Reconstitution Before Use)

- The herbal dye powder is mixed with warm water/tea decoction/coffee decoction to make a smooth paste.
- The paste is allowed to stand for 2–6 hours for dye release, especially for henna-based formulations.

## Storage

- The prepared herbal hair dye powder should be stored in an airtight container, protected from moisture and sunlight to maintain colour stability.

## FORMULATION TABLE

S.NO	INGREDIENTS (gm)	F1	F2	F3	F4	F5
1.	Henna (gm)	10	15	5	20	-
2.	Ratanjot (gm)	10	5	15	-	20
3.	Kapoor kachri (gm)	5	5	5	5	5
4.	Chia seeds powder (gm)	5	5	5	5	5
5.	Fenugreek powder (gm)	5	5	5	5	5
6.	Bhringraj(gm)	5	5	5	5	5
7.	“Arapu powder (gm)	5	3	7	5	5
8.	Flax seeds powder (gm)	5	7	3	5	5

## FORMULATION



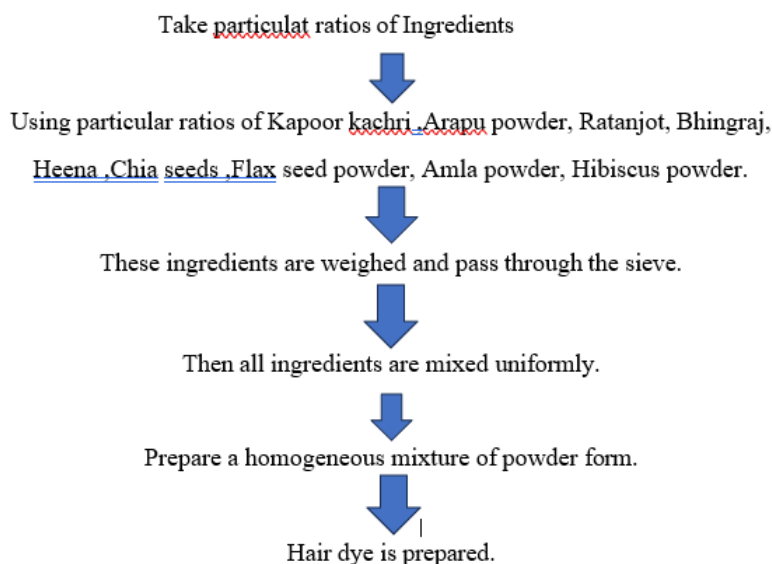


Fig : Formulation of Herbal Hair Dye

## EVALUATION TESTS

### 1. Organoleptic evaluation

The prepared herbal hair dye was evaluated for various parameters.

Sr. No.	Parameters
1	Odour
2	Appearance
3	Texture

### 2. Physicochemical assessment

- **PH:** The herbal hair dye was dissolved in water and the pH of the resulting solution was recorded by dipping the electrode in the solution using a digital pH meter.

- **Loss on drying:** This method is commonly used for moisture content determination is the loss on drying method or LOD. The crude drugs heated at 105°C to constant weight and calculated the total loss of weight.
- **Total ash value:** The 2 gm of sample was taken in a silica crucible then ignited by gradually increasing the heat to 400°C until it appeared white indicating absence of carbon. It is then cooled in a desiccator and total ash of air-dried material is calculated.
- **Patch test:** This test usually involves application of small amount of aqueous solution of herbal dye at the back of ear or on internal elbow in an area of 1sq.cm and

leaving it until it dries. It was applied for a fixed interval of time and any sign of redness; itching or any feeling of uneasiness was observed at regular intervals up to 24 hours.

- **Stability studies** : Formulation and development of a pharmaceutical product is not complete without proper stability analysis carried out on it to determine physical and chemical stability and thus safety of the product. The prepared formulations were stored at different storage conditions of temperatures such as cold temperature, cool temperature, and at room temperature.

- **In Vitro and In Situ Studies for Finalized Hair Dye Formulation** : In vitro and in situ testing was done for the herbal hair dye formulations. In vitro, testing was done on the cotton while in situ testing was done on human white hair. The stains obtained on the cotton and hair samples were almost the same.

## RESULTS

### 1. organoleptic evaluation

Formulation Code	Color	Odour	Apperance	Texture
F1	Reddish Brown	Characreristics	Coarse powder	Fine
F2	Greenish Brown	Characreristics	Coarse powder	Fine
F3	Greenish Brown	Characreristics	Coarse powder	Fine
F4	Greenish Brown	Characreristics	Coarse powder	Fine
F5	Reddish Brown	Characreristics	Coarse powder	Fine

### 2. physicochemical properties

#### A)PH

Formulation Code	PH
F1	6.5
F2	6.2
F3	6.3
F4	6.5
F5	6.4



Fig: pH test

**B) Loss of Drying**

Formulation Code	Loss of Drying
F1	1.9%
F2	1.7%
F3	1.4%
F4	1.9%
F5	1.6%

**C) Total Ash Value**

Formulation Code	Total Ash Value
F1	7.4%
F2	7.31%
F3	7%
F4	6.9%
F5	7.25%

**D) Patch Test**

Formulation Code	Swelling	Redness	Irritation
F1	Negative	Negative	Negative
F2	Negative	Negative	Negative
F3	Negative	Negative	Negative
F4	Negative	Negative	Negative
F5	Negative	Negative	Negative

**DISCUSSION**

The herbal hair dye was prepared using natural herbal ingredients which are safe and effective for hair coloring. The formulation showed good color imparting ability with smooth consistency and pleasant odor. The prepared dye was easy to apply and spread uniformly on hair. The pH of the formulation was found suitable for scalp application and no irritation or allergic reaction was observed during evaluation.

The herbal ingredients provided natural coloring along with nourishment to the hair. The formulation helped in improving hair texture, softness, and shine. The dye showed satisfactory stability and maintained its color without phase separation during storage. Compared to synthetic

hair dyes, the herbal hair dye was found to be safer due to the absence of harmful chemicals like ammonia and peroxide.

The evaluation studies indicated good washability, acceptable drying time, and satisfactory conditioning effect on hair. Overall, the prepared herbal hair dye was found to be safe, stable, economical, and effective for natural hair coloring and hair care applications.

**CONCLUSION**

Herbal hair dye is a natural and eco-friendly alternative to chemical-based hair colors. It is prepared from plant-based ingredients such as henna, chia seeds powder, amla, hibiscus, and other herbs that provide color while also



nourishing the hair. Unlike synthetic dyes, herbal hair dyes are generally safer, cause fewer side effects, and help maintain the natural strength, shine, and texture of hair.

The use of herbal hair dye offers several advantages, including reduced hair damage, scalp protection, and conditioning benefits. It is especially suitable for people who are sensitive to harsh chemicals like ammonia and peroxide. In addition, herbal formulations are biodegradable and environmentally friendly.

However, herbal hair dyes may provide limited shade options and may require repeated application for long-lasting color results. Despite these limitations, they remain a preferred choice for individuals seeking a healthier and more natural approach to hair coloring.

## REFERENCES

1. Mr. Amar, A. Gophane, Ms. S. B. Goykar, Dr. Santosh Jain “Formulation and Evaluation of Herbal Hair Dye”. *International Journal of Novel Research and Development*, Vol 8(6), a388a391, 2023.
2. Pratik Gupta, Mr. Yogesh Tiwari, Dr. Sayantan Mukopadaya “Formulation and Evaluation of Herbal Hair Dye: A review article. *International Journal of Health Sciences*, Vol 6, 3591– 3609, 2022.
3. S. Sri Bhuvaneswari , T. Prabha, S. Sameema Begum, T. Sivakumr, P. Saranraj
1. “Formulation Evaluation and Comparison of Herbal Hair Dye with Marketed Product”. *Annals of Phytomedicine: An International Journal*, Vol 10(2), 175-181, 2021.
4. Laxmi N Jamagondi, Aniket S Katte, Manmat B Rumane, Naushad N Mirza, Sagar S Sontakke, Akshay R Kale and Mahewash A Pathan “Development and Evaluation of Herbal Hair Dye Formulation”. *Journal of Pharmacognosy and Phytochemistry*, Vol 8(2), 1363-1365, 2019.
5. 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*, Vol 12, 90-98, 2018.
6. K. Sudheer Kumar\*, Afreen Begum, B. Shashidhar, M. Meenu, C. Mahender, K. Sai Vamsi “Formulation and Evaluation of 100% Herbal Hair Dye. *International Journal of Advanced Research in Medical & Pharmaceutical Sciences*, Vol 1(2), 1-5, 2016.
7. Ujwal Havelikar, Arindam Kolay, Sunita Kularia, Rashmi Dorai, Renulata “Formulation and Evaluation of Herbal Plants Based Herbal Hair Dye”. *Journal For Basic Sciences*, Vol 23(5), 600-615, 2023.
8. Shoaeb Mohammad Syed, Ajinkya Holkar, Priyanka Thore and Sakshi Vaidya “Formulation and Evaluation of Herbal Hair Dye: A Laboratory Scale Project”. *Current Cosmetic Science*, Vol 2, 25-30, 2023.
9. Madhuri Khandgaonkar, Pallavi Patharkar, Bhagyashri Gayke, Anjali Shinde, Goraksh Bargaje “Formulation and Evaluation of Natural Hair Dye. *World Journal of Pharmacy and Pharmaceutical Sciences*, Vol 12(9), 1842-1857, 2023.
10. Ganesh Sarkate, Akansha Sarode, Omkar Selmokar, Prof. Poonam Harpale, Dr. Rajesh Oswal “Formulation and Evaluation of Herbal Hair Dye”. *International Journal of Innovative Science and Research Technology*, Vol 7(8), 631-637, 2022.
11. Anshu R. Dudhe, Prachal Virutkar, Renuka Mahajan, Gayatri Katole, Rupesh Dudhe “Formulation and Evaluation of Natural Hair Dye. *International Journal of Creative Research Thoughts*, Vol 11(8), a93-a99, 2023.
12. Neha Goel, M. Harshit Rao, Ekta Shukla and Dr. Prabhakar Budholiya “Formulation and Evaluation of Herbal Hair Dye by using Herbal Extracts”. *World Journal of Pharmacy*



- and Pharmaceutical Sciences, Vol 11(8), 1494-1503, 2022.
13. Rani Temkar, Dipali Pagire “PrepARTion of Herbal Hair Dye”. *International Journal for Research in Applied Science & Engineering Technology*, Vol 11(5), 2317-2326, 2023.
  14. M. Rajan, Malavika. M, Jomi Joy, T. Subbaraju “Formulation and Evaluation of Herbal Hair Dye. *International Journal of Research in Pharmacology and Pharmacotherapeutics*, Vol 11(4), 198-202, 2022.
  15. Mr. Ranjeet Namdeorao Narhire, Dr. L. D. Hingane, Miss. Khade P. B. “Formulation and Evaluation of Herbal Hair Dye. *International Journal of Creative Research Thoughts*, Vol 8(6), 67-72, 2023.
  16. Chandane Vishal, Ms.P.L. Ghodake, and Dr. Prachi Udapurkar “Formulation and Evaluation of Herbal Hair Dye”. *International Journal of Novel Research and Development*, Vol 8(6), 723726, 2023.
  17. Sarkate G, Sarode A, Selmokar O, Harpale P, Oswal R. Formulation and Evaluation of Herbal Hair Dye. 2022;11(3):1-4.
  18. Kumar D, Rajora G, Parkash O, Antil M, Kumar V. Herbal cosmetics: An overview. *International Journal of Advanced Scientific Research*. 2016 Aug;1(4):36-41.
  19. Amreen Fatima AF, Shashi Alok SA, Parul Agarwal PA, Singh PP, Amita Verma AV. Benefits of herbal extracts in cosmetics: a review. 2013.
  20. Meenaprabha P, Kamalakkannan V, Sambathkumar R, Janani R, Nithyanandham S. Formulation and evaluation of herbal hair dye. *World Journal of Pharmaceutical Research*. 2021 Mar 2;10(5):1533-44.
  21. Joshi MV, Nilkanth JV, Rasane SR. Knowledge, practice, and adverse reactions amongst hair dye users-a cross sectional study. *Int J Ayurvedic Med*. 2021;12(3):645-8.
  22. Jamagondi LN, Katte AS, Rumane MB, Mirza NN, Sontakke SS, Kale AR, Pathan MA. Development and evaluation of herbal hair dye formulation. *Journal of Pharmacognosy and Phytochemistry*. 2019;8(2):1363-5.
  23. Lachman L, Lieberman HA, Kanig JL. *The theory and practice of industrial pharmacy*. Philadelphia: Lea & Febiger; 1976.
  24. Sankar J, Sawarkar S, Malakar J, Rawat BS, Ali MA. Mechanism of hair dying and their safety aspects: a review. *Asian Journal of Applied Sciences*. 2017;10:190-6.
  25. Shahi Z, Mehrizi MK, Hadizadeh M. A review of the natural resources used to hair color and hair care products. *Journal of Pharmaceutical Sciences and Research*. 2017 Jul 1;9(7):1026.
  26. Palaniappan V, Karthikeyan K, Anusuya S. Dermatological adverse effects of hair dye use: A narrative review. *Indian Journal of Dermatology, Venereology and Leprology*. 2023 Jul 27:1-7.
  27. Wahyuningsih S, Ramelan AH, Wardani DK, Aini FN, Sari PL, Tamtama BP, Kristiawan YR. Indigo dye derived from *Indigofera tinctoria* as natural food colorant. *InIOP Conference Series: Materials Science and Engineering* 2017 Apr 1 (Vol. 193, No. 1, p. 012048). IOP Publishing.
  28. Ghosh B, Chandra I, Chatterjee S. Fenugreek (*Trigonella foenum-graecum* L.) and its necessity. *Fire Journal of Engineering & Technology*. 2015;1(1):60-7.
  29. Adeel S, Abrar S, Kiran S, Farooq T, Gulzar T, Jamal M. Sustainable application of natural dyes in cosmetic industry. *Handbook of renewable materials for coloration and finishing*. 2018 Jul 16:189-211.



30. Kusstianti N, Wilujeng BY, Megasari DS. The Effects of Cinnamon and Clove Powder Compositions on Hair Coloring. In 1st International Conference on Social, Applied Science and Technology in Home Economics (ICONHOMECS 2017) 2017 Sep (pp. 171-174). Atlantis Press.
31. Desam NR, Al-Rajab AJ. The importance of natural products in cosmetics. Bioactive natural products for pharmaceutical applications. 2021:643-85.
32. Guerra-Tapia A, Gonzalez-Guerra E. Hair cosmetics: dyes. *Actas Dermo-Sifiligráficas (English Edition)*. 2014 1;105(9):833-9.
33. Bouillon C, Wilkinson J. The science of hair care. (No Title). 2005 Feb 28.
34. Amle RM. Review on: Formulation and Evaluation of Herbomineral Hair Dye. *Journal of Research in Pharmaceutical Science*. 2021;7(12);01-11.
35. Cui H, Xie W, Hua Z, Cao L, Xiong Z, Tang Y, Yuan Z. Recent advancements in natural plant colorants used for hair dye applications: A review. *Molecules*. 2022 Nov 20;27(22):8062.
36. Dipakbhai PA, Mahida RJ. Review of Natural Resources used to Hair Dye and Hair Care Products. *Journal of Pharmaceutical Sciences and Research*. 2021 Sep 1;13(9):546-52.
37. Ravichandran S, Jayaprakash A, Karthikraj G, Poovarasu A, Predeep S, Thilakar SK. Study of Formulation and Evaluation of Herbal Hair Dye. 2023;11(8):1494-1503.
38. Pal RS, Pal Y, Rai AK, Wal P, Wal A. Synthesis and evaluation of herbal based hair dye. *The Open Dermatology Journal*. 2018 Oct 18;12(1).
39. Anshu R, Dudhe PV, Renuka M, Gayatri K, Rupesh D. Formulation and Evaluation Of Natural Hair Dye. *IJCRT*. 2023;11(8).
40. Mallya RA, Ravikumar PA. Formulation and evaluation of natural hair colorants. *International Journal of Pharmacy and Pharmaceutical Sciences*. 2015;7(3):347-9.
41. Gousia Begum S, Sekar Keerthana. Design and evaluation of herbal hair oil formulations by using ethanolic extract of *Ziziphus jujuba* leaves. *Int J Pharma Bio Sci*. 2017;8(3):322-7.
42. Chisvert A, Miralles P, Salvador A. Hair dyes in cosmetics: regulatory aspects and analytical methods. *Analysis of Cosmetic Products*. 2017 Nov 20:159.

**HOW TO CITE:** Nikita Tangde, Arti Khamat, Formulation and Evaluation Of Herbal Hair Dye, *Int. J. of Pharm. Sci.*, 2026, Vol 4, Issue 6, 5380-5393, <https://doi.org/10.5281/zenodo.20773191>

