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A RESEARCH ARTICLE ON FORMULATION AND EVOLUTION OF HAIR DYE

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ABSTRACT

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. Objective 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. Materials and Methods The herbal dye was prepared in-house according to the proposed composition, using all the natural ingredients. The dye was evaluated for its organoleptic, physico-chemical and stability parameters. Results The parameters were found to be comparable and sufficient for the evaluation of herbal dye. The values of different evaluations justified the usage of the hair dye. Conclusion Herbal based hair dye has been prepared and evaluated using the various parameters. It offers a natural alternate, which can be used, irrespective of any side effects. The results can be incorporated while developing the pharmacopeial standards.

KEYWORDS: *Herbal, Dye, Organoleptic, Hair Dye, Gray Hair, Natural Herbal.*

INTRODUCTIONS

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 population will have 50% gray hair. The chemical based hair dyes, which cause skin and other skin related diseases, natural herbal dyes are being preferred nowadays. Today most of the human beings are very careful about their beauty and hairs play an important role in this. Herbal drugs without any adverse effects are used for healthy hair. Nearly 70% of human beings above 50 years struggle with the problem of balding and graying of hair. People have been using natural dyes since ancient times for the purpose of dyeing carpets, rugs and clothings by the use of roots, stems, barks, leaves, berries and flowers of various dye yielding plants. The need of herbal based natural medicines is increasing fastly due to their natural goodness and lack of side effects. Amla, Bhringraj, curry leaves, Henna, tea, lemon juice, beetroot juice, honey are well know ayurvedic herbal drugs traditionally used as hair colorant and for hair growth compared to the chemical based hair dyes, which cause skin and other skin related diseases, natural herbal dyes are being preferred nowadays. Today most of the human beings are very careful about their beauty and hairs play an important role in this. Herbal drugswithout any adverse effects are used for healthy hair. Nearly 70% of human beings above 50 years struggle with the problem of balding and graying of hair. In few cases, these symptoms of ageing occur earlier. Graying starts on the skin of head at about 40 years, starting initially from the temples, followed by beard, moustache and finally up to the chest. The age at which graying starts is deeply influenced by heredity. But premature depigmentation in adults is mainly due to variety of other factors, as illness, some specific drugs, shock etc. People have been using natural dyes since ancient times for the purpose of dyeing carpets, rugs and clothings by the use of roots, stems, barks, leaves, berries and flowers of various dye. Yielding plant. The need of herbal based on natural medicines is increasing fastly due to their natural goodness and lack of side effects. Henna, bhringraj, amla, curryleaves, and beetroot juice, and lemon juice, coffee, powder. Well – known ayurvedic herbal drugs traditionally used as hair colorant and for hair growth. As initial fabric dye, could bemixed with henna to make different light brown to black shades of hair dye. Use of these chemicals can result inunpleasant side effects, such as skin irritation, allergy, hair breakage, skin discoloration, unexpected hair color etc. Continuous application of such compounds on natural hair causes multiple side effects such as skin irritation, allergy, hair fall, dry scalp, erythrema and also skin cancer. In India, henna has been used traditionally for colouring palms and hairs. Drugs from the plant sources are easily available, are less expensive, safe, and efficient and rarely have side effects. In the present era of eco-conservation, the use of natural dyes. Hair is an essential feature that plays a key role in self-perception. Sometimes, it also expresses people's personality. Hair style can be created and modified through hair cosmetics, including hair conditioning, hair straightening, hair waving and hair coloring cosmetic products. Hair graying is a natural part of aging, which occurs in approximately 50% of the people over 50 years old. Therefore, the product of hair coloring is the one of the most important cosmetics for modern people. For hair coloring cosmetics, there are three major types of hair dyes, namely, the temporary, semi-permanent and permanent hair dyes. In general, temporary hair dyes are water-soluble dyes of high molecular weight, which cannot penetrate the hair shaft. The dyes are only temporarily dropped on hair and can be washed off via normal cleaning procedure. Some of the temporary hair dyes can be obtained from natural resources, such as henna from Lawsonia inermis Linn. Semi-permanent hair dyes are generally synthetic and are typically composed of relatively low molecular weight coal tar materials. These dyes can diffuse freely in and out of the cortex and remain on the hair longer than a temporary dye. Permanent hair dyes are the most frequently used on hair; this is due to

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the persistence and darkness effects it has on the hair intermediates, couplers and oxidants. Thus, during the hair dying process, the hair must firstly be bleached. For permanent hair dyes, the oxidation procedures are dependent on three main components, i.e., primary with a mixture containing ammonium/sodium persulfate and hydrogen peroxide. After the hair s are bleached, the dye formation reactions will occur by primary intermediates (such as p-phenylenediamines) with couplers to attain the final hair color. A dye can generally be described as a colored substances that has affinity to the fiber fur or hair.

What Is Melanin

A dye can generally be described as a colour substance that has an affinity to the fiber, for hair. Melanini is what gives colour to human skin, eye and hair.

It's the ration of two types of melanin eumelaninand pheomelanin that determine your natural hair colour. Melanin comprises a large group of interrelated molecules that are responsible for for the biological functions of many organisms.[1] In the human body, it controls the pigmentation of skin, hair and eyes. There are three types of melanin found in our body. These eumelanin, pheomelanin, and neuromelanin. Eumelanin is responsible for dark pigmentation like black and dark brown, while pheomelanin gives a lighter pigmentation which includes lips (pink/red tone), red hair etc. Neuromelanin has even darker pigmentation. Usually, neuromelanin is not present since birth, and develops through the lifetime.Melanin controls the colour of your hair. The shade of your hair colour depends on the type(s) of melanin you have in your hair and its quantity. If you have black hair, it is evident that your hair consists of a large amount of eumelanin. An average amount of eumelanin will make your hair brown in colour. If you have blond hair, then it means that you have a very less amount of eumelanin. Red hair or pinkish blond happens when your hair has a significant amount of pheomelanin and a little bit of eumelanin. Melanin also plays the role of a protector for your hair. It protects you from harmful UV rays. The darker your hair shade, the more protection you get from sun damage. Hair dye is important cosmetic item for not only men but also for women. Synthetic dyebased hair dye or permanent hair dyes consist of two component-color and developer. The colour component usually contain a range of synthetic dyes and intermediate that such as ammonia, diamino benzene, phenyl diamine, resorcinol and phenol, Ortho Para amino phenol, P-toluenodiamine etc. and their salts (usually HCl, sulphate). Most of them are powerful irritants and have been implicated powerful irritates in several type of allergies and other therapeutic problemds.[1-3] Other irritant ingredients include H2O2 and naphthol. Hair dye solid in Europe union containing any of the ingredient need to carry a warning can cause an allergic reaction containing an ingredient that can penetrate your has been determined to cause cancer. If we use permanent or semi- permanent hair color dye and hair dye shampoo continuously we are increasing the risk of developing breast cancer.[1] Prolonged uses of the hair dye generally cause a local irritation and skin toxicity problems. Natural hair dyes solve the problem of hair cuticle, irritation, scalp hair damaging, which are safe for use and does not have the problems of staining skin, itching and hyper sensitive reaction. The natural brown hair dye possess full penetration to be used as coloring agent and safe hair colorant.[5] Henna based brown hair dyes that impart natural color to the hair and spreads evenly across the scalp of hair and leave behinds fragrant soft and manageable hair. A systematic scientific approach toward the active constituent of natural dyes can prevent the hair damage caused by photo-oxidation reaction. So, need was felt to design and formulate natural dyes with commonly implied natural hulls and herbs to be an alternative source to the synthetic and semi- synthetic dyes. In the present investigation three formulations were developed to get natural shades by using combination of natural ingredients. Dyeing is an ancient art which predates written records. Its practice could be traced back during the Bronze Age in Europe. Primitive dyeing techniques included sticking plants to fabric or rubbing crushed pigments onto cloth. The dyeing method with natural dyes improved with time and techniques. The natural dyes from crushed fruits, and other plant materials were boiled into the fabric when some fastness to light and water tests were achieved. Natural dyes were solely used for coloration of textile products till the midst of nineteenth century.

The first synthetic dye uvine was invented by Perkin in 1856. Since then demand for synthetic dyes became ever-increasing as they were affordable, easily producible and were available in different colours possessing good colour-fastness and most of them are easy to produce. As a result, with a distinct lowering in the cost of synthetic dyestuff, the natural dyes were virtually neglected at the beginning of twentieth century. Natural dyes do not always mean safe. In fact, the toxicological properties of synthetic dyes are very well tested scientifically and safety data sheets are available for each dye. Similar study in case of natural dyes is not available. Many of the natural dyes are quite safe but few are toxic. Logwood, for example, is a natural dye, capable of producing a range of colours such as violets, blue-greys, and the best natural black, depending on the mordant used.

Moustache and Still Later The Chest. The Age at Which Hair of A Person Turns Gray is Largely Decided by Hormonal Imbalance

According to Ayurveda, the three doshas - Vata, Pitta, and Kapha - regulate your body. Any imbalance in these doshas can cause diseases like thyroid. Changes in thyroid hormone levels can reduce the production of melanin in your body and lead to grey hair.

WHAT IS DYE

A dye is natural or synthetic substance used to add a colour to or change the colour of something. 'blond hair dye'.

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DEFINATION OF DYE

Natural dyes are dyes or colorants derived from plants, invertebrates, or minerals. The majority of natural dyes and from plant sources -roots, leaves etc.

Advantages of Herbal Hair Dye

Colour your hair who no chemical and more natural ingredients.

- Deeply conditions Natural hair colour covers the gray hair with no side effects.
- and nourishes hair strands from the core.
- Cure the existing hair problems.
- Natural appearance because of use of real human hair fibers.
- May be styled as natural hair.
- Less susceptible to heat damage.
- Able to colour and perm.
- Moves like natural hair.

Disadvantages of Herbal Hair Dye

- More expensive.
- Needs more maintenance and care.
- Requires styling.
- More susceptible to sunlight fading and environment damage.
- May be heavier in weight than synthetic wigs, which may lead to itching.

Side Effects of Hair Dye

- Asthma.
- Hair fall.
- Allergic reaction.
- If you are not cautious enough,hair dyeing can have a negative impact on your eye too.
- Skin redness.
- Skin itching.
- Rashes.
- Ears and scalp and face problems

Objectives of the herbal dye:

- To bring more natural dye extraction process together on singl paper
- To show the fastness properties of many types of natural dye.
- To show different method of extraction suitable for different sources.
- The evaluation of its various parameters as organoleptic physico-chemical, phytoconstituents, rheological aspects, patch test and stability testing for its efficacy and shelf life

PLAN OF WORK

Selection of herbs: fresh leaves of henna were collected, and dry thoroughly and oter surface has been collected. and leafs of henna(lawsonia innermis), and curry leaves(murraya koenigii), seeds of Fenugreek (Trigonella foenumgraecum) amla (phyllanthus emblica), and beer root juice lemon juice, were collected and whole herd are dried underbshadevv and powdered, all powder materials passed throught the sieve (No,80) was purchased from local market of Ahmednagar For all the above materials were studied for their Morphological, Physical (Ash values) and Phyto-chemical identifications and reported.

STEP: I

Collection of plant materials from medicinal plant garden (CBCP) and authenticated

STEP: II

Evaluation of purity and quality of raw materials by morphological, physical and chemical techniques, toxicological studies were performed

STEP: III

All the drugs were made into powder weighed according to the formula mentioned

STEP: IV

Prepared herbal hair dye formulas - (H.H.D-I to H.H.D-IV)

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STEP: V

Human white hairs were collected from human voluntaries

STEP: VI

The formulated dye pastes were kept a side for 1h for imbibition and then the white hair samples were kept in the above paste for 30 min, 1 hr ,and 2 hrs then washed with water and observed for its dyeing effect (colourgrade),safety parameters, for all formulations.

Materials & Methods

The herabal dye was prepared in house according to the proposed compostion using all the natural ingredients. The dye was evaluated for this its organoleptic physic chemical and stability parameters. The plant materials used in this study program were collected from the local herbal market (shah alam market) of Lahore. Henna, amla and curry leaves, bhringraj and beet roor juice ans lemon juice, honey. Were collected and dried under shade for ten days. The shade dried plant materials were ground and again dried under shade for five days. The dry powdered materials have been stored in a desiccator for further processing.

METHADOLOGY

Selection of herbs: fresh leaves of henna were collected, and dry thoroughly and oter surface has been collected. and leafs of henna(lawsonia innermis), bhringraj(eclipta prostrata) and curry leaves(murraya koenigii), amla(phyllanthus emblica), and beer root juice lemon juice, were collected and whole herd are dried underbshadevvand powdered, all powder materials passed throught the sieve (No,80).for all the above material were studied for physiological and identification and report in result. Collection of plant materials from medicinal plant garden.

Evaluation of purity and quality of raw materials by physical and chemical techniques. All of the materials were make into powder and weighed according to the formulation. Prepared herbal hair dye. And human white hair were collected from human. The formulated dye pastes were kept a side for 1hour for imbibition the hair was kept in the above paste for 30 min, 1h, and 2h.Then washed with water and observed for its dyeing effect (colour is black) safe parameters, for all formulations.



ROLE OF INGREDIENTS USED IN THE FORMULATION

Henna

ITS principle coloring ingredient of is lawsone, a red orange colored compound present in dried leaves of the plant in a concentration of 1 1.5% w/w. Lawsone acts as a non oxidizing hair coloring agent at a maximum concentration of 1.5% in the hair dyeing product. Other constituents in henna such as flavonoids and gallic acid act as organic mordants to the process of colouring. Carbohydrates give the henna paste a suitable consistency for adherence to the hair. Natural henna is usually hypoallergenic but allergic reactions occurred in mixed types including black henna. This occurs due to chemical compounds consisting of para- phenylenediamine¸ 2-nitro-4- phenylenediamine¸ 4-aminophenol and 3-aminophenol. Henna has also antifungal activity against Malassezia species

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(causative -organism of dandruff). Henna prevents premature

hair fall by balancing the pH of the scalp and graying of hair. Henna leaf paste used for alleviating Jaundice, Skin diseases¸ Smallpox¸ etc.

USES OF HENNA

- Henna improves hair growth.
- It reduces the hair fall.
- Henna is a natural hair dye, henna controls scalp itchiness.
- Dandruff, when applied to the scalp

SIDE EFFECTS

- Henna seems to be safe for most adult when used on the skin or hair.
- It can cause some side effects such as inflammation of skin including redness itching burning sweeling broken skin ect.
- Henna is unsafe of children especially infants.





AMLA

Berries obtained from amla enhances the absorption of calcium, helping to make healthier bones, teeth, nails, and hair. It maintains the hair color and prevents premature graying, strengthens the hair follicles. Amla is the most rich and concentrated form of Vitamin C along with tannins found among the plants.Whole fruit is used as an active ingredient of the hair care preparations. The Vitamin C found in the fruit binds with tannins that protect it from being lost by heat or light. This fruit is also rich in tannins, minerals such as Calcium, Phosphorus, Fe and amino acid. The fruit extract is useful for hair growth and.

Reduce hair loss. Amla has antibacterial and antioxidant properties that can help promote the growth of healthy and lustrous hair.

USES OF AMLA

- Strengthen the scalp and hair.
- Reduce premature pigment loss from hair, or greying,
- Stimulate hair growth.
- Prevent or treat dandruff and dry scalp.

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SIDE EFFECTS

- If you have a dry scalp or skin, eating too much amla can aggravate the problem.





TEA

Being rich in polyphenols, selenium, copper, phytoestrogens, melatonin tea also has been used in traditional chinese medicine and in ayurvedic medicine has been used since long as hair colourant. herbal teas can also be used in other recipies and concoctions to create homemade hair products that can provide a lot of health benefits for your hair. For example you could use a tea such as reishi tea as a base in a mask designed to promote hair growth.

Uses of tea

- Nutrients that can help make damaged hair soft and shiny again. It prevents split ends.
- Tea can stop hair loss. It is the use of tea it keeps soft and shiny. Tea is packed good for you.
- It help in hair growth.
- Applying black tea to your hair and scalp is considered safe.
- The caffeine in black tea may dry your hair shaft, potentially resulting in a dry, damaged appearance.

Side Effects

- It may leads to the dryness if used too frequently. Irregular sleep.
- Reduced iron absorption.
- Increased anxiety, stress, and restlessness. Tea leaves naturally contain caffeine.
- Tea is a source of a class of compounds called tannins.

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Lemon Juice

Lemon is a citric fruit that is know for being rich in antioxidants, vitamins c, and minerals. It has some valuable benefits to the body and skin. It is no surprise that lemon is good for hair too. centuries, and it's known for achieving natural, sun-kissed highlights. The lemon's acidity permanently strips hair of its pigment, and when combined with UV light, the lightening effect that always comes with sun exposure is magnified. The citric acid speeds up the bleaching process, and this reaction destroys hair's pigment to expose the lighter colors underneath it. The best way to try the lemon-juice method is to spray it liberally onto your hair, spread it evenly throughout using a comb, and sit in the sun for at least an hour. It will likely take a few sessions to one of the oldest tricks in the book, lemon juice has been used to lighten hair for see the desired results, but keep in mind that the more you expose your hair to citric acid, the more you're deteriorating it and breaking down the cuticle, causing hair to feel dry and brittle.

Uses of Lemon

- Remove scalp build up.
- Reduce the your body weight.
- Eliminate bad cholesterol.
- Boosts immune system.
- Suppresses appetite.
- The lemon citric acid in lemon can even address the root of your hair problems.
- Reduce the dandruff of our hair

Side Effects

- Lemon contain citric acid, which might make your hair more sun sensitive.
- Overuse of lemon on hair can cause irritation and itchiness on scalp due to its acidic nature.
- Many individuals use lemon right into their scalp to get rid of dandruff.
- Lemon might dry up your hair terribly.
- Hair will loss its original colour
- The protein layer from the hair base breaks and weakens the strands.
- The reaction disrupts the hair development process directly.
- The hair might lose its shine.




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BEET ROOT JUICE

The beet root juice many nutrients for hair and skin. Including nourishment for scalp. Beet root juice contain many vitamins A,C,E, and electrolytes. That keep the hair hydrated all the time by eliminating dryness. If you've ever sliced, cooked, or juiced beets, you know just how easily their rich, red hue stains, so it should come as no surprise that beet juice is a great option for dyeing hair red. With natural pigments aplenty, it can temporarily color hair especially light hair deep red easily and safely. If you'd like to try this method, just mix beet juice with a carrier oil, like coconut or olive oil, then apply it all over your hair, and wrap it juice with a carrier oil, like coconut or olive oil, then apply it all over your hair, and wrap it in plastic to sit for at least half an hour before washing out.

Uses of beet root juice

- Beet root juice is a powerful source of nitrates.
- Nitrates dilate the blood vessels, lowering blood pressure.
- This is beneficial to the heart
- Promotes hair growth.
- Prevents hair loss.

Side Effects

- Many cause kidney stone risk.
- May cause a stomach upset.
- May cause anaphylaxis.
- Might harm the liver





HONEY

Honey has both emollient humectant properties, making it a great hair moisturizer. Emollients smooth the hair follicles adding shine to dull hair. Humectant bond with water molecules adding moisture to dry standards. By moisturizing and locking in shine honey can help restore the natural luster of your hair. When applied to the hair and scalp, honey is able

to provide the same skin regenerative properties to the skin of the scalp. Overall, it provides a great deal of moisture to the hair and scalp. It works as an emollient and conditions the hair and scalp. Once the hair and scalp are moisturized by the honey, it also locks in the moisture as it has humectant benefits as well.

USES OF HONEY

- Honey has both emollient and humectant properties, making it a great hair moisturizer.
- Emollients smooth the hair follicles, adding shine to dull hair.
- Honey can help restore the natural luster of your hair.
- Moisturizes dry hair and scalp.
- Reduces hair breakage
- Restores shine.
- Softens of hair.

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SIDE EFFECTS OF HONEY

- It can be lighten your hair colour but cannot turn it grey.
- Irregular heart rhythms.
- Excessive perspiration.
- Fainting





CURRY LEAVES

The curry leaves murraya koenigii or bergera koenigii is a topical to the sub topical tree. Family rutaceae. The hypothesis is that the rich nutrients in curry leaves can help prevent thinning hair or hair loss. The leaves may also help remove dead hair follicles, which can interfere with hair growth. Curry leaves are commonly known as kadi patta. It is one of the most common household ingredients which are easily found in most india kitchens. It is just another spice that adds flavour to dals, chutneys, soups, and stews. But you know what they have so much more to offer than just added flavour in your food. Curry leaves are loaded with properties that can work wonders for your hair and lead to hair growth. follow these ways do a patch test for your safety,

USES OF CURRY LEAVES

- Curry leaves are rich in antioxidants, vitamins C, and iron.
- It can strengthen the hair roots and prevent hair leaves.
- Control the hair loss.
- Repair the frizzy damaged hair.
- Curry leaves can be used for treating upset stomach.
- Rich in folic acid
- Good for skin and hair.

SIDE EFFECTS

- They are natural and leaves no side effects.
- They use them to get a characteristic aroma in the cuisines.



FENUGREEK

Fenugreek seed have high protein and nicotinic acid content, which are known to be beneficial against hair fall and antidandruff, in treating a variety of scalp issues like dryness of hair, baldness and hair thinning. The seed also help in moisturizing the hair and bringing back the luster and bounce.

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Fenugreek seed have high levels of potassium that helps to prevent the premature graying of hair. You can include fenugreek seed in your diet or simply apply a methi seed mask by blending overnight soaked seeds with coconut milk to retain natural colour of your hair.



Ingredient

Sr.No.	Ingredient	Quantity
1	Henna	50gm
2	Amla	30gm
3	Fenugreek	20gm
4	Beet Root Juice	20gm
5	Lemon Juice	20gm
6	Honey	20gm
7	Curry Leaves	20gm
8	Tea	20gm

Table 1: Ingredients of the prepared herbal hair dye.

Table 2: Formulation

Sr.No	Henna	Amla	Tea	Lemon Juice	Beet Root Juice	Honey	Curry Leaves	Fenugreek	Total
1	50g	25g	10g	2.5g	10g	2.5g	25g	25.g	150g
2	50g	27.5g	10g	1g	10g	1.5g	30g	20g	150g
3	50g	20g	15g	3g	10g	2g	35g	15g	150g
4	50g	15g	10g	5g	7.5g	2.5g	35g	25g	150g
5	50g	20g	10g	2.5g	10g	2.5g	35g	20g	150g
6	50g	10g	7.5g	2.5g	7.5g	2.5g	40g	30g	150g

Application of Hair Dye

The pack, which is in the form of powder, should be used weekly on wet hair, forming a paste of in water with optimum consistency. It should be applied evenly on the hair with the help of a brush, covering the roots to the hair tip. The scalp should be covered. It should be left for 2-3 hours on the scalp for complete drying. Then it should be removed by washing with plain water.

Evaluation of the Herbal Hair Dye

The prepared herbal hair dye was evaluated for its various parameters, such as organoleptic, physico- chemical, phytoconstituents and the rheological aspects.

Organoleptic Evaluation

Organoleptic characteristics for various sensory characters like color, taste, odour *etc*. was carefully noted dow. As illustrated in Table 2 The raw drugs and powders were separately studied by organoleptic and morphological characters like colour, odour, texture and appearance.

Sr.No	Parameter
1	Color of Formulation
2	Odour of Formulation
3	Texture
4	Appearence

Table 3: Organoleptic evaluation of herbal dye

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Physico-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. Table **3** reflects the above findings.

Sr.No	Parameter
1	pH
2	L.O.D
3	Moisture content

Table 4: Physico-chemical evaluation of herbal dye.

Phytochemical Evaluation

Prepared herbal hair dye was subjected to Phytochemical screening to reveal the presence or absence of various phytoconstituents as Carbohydrates, Lipids, Alkaloids, Sugars *etc*. The results of phytochemical screening are highlighted in Table 4.

Sr.No.	Parameter
1	Molisch Test
2	Volatile oil Test
3	Foam Test
4	Felhing Test

Table 5: Phytochemical evaluation of herbal dye

a) Molisch's 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

b) Volatile Oil Test

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

c) Felhing Test

- Take 1ml of sample in dry test tube
- Add 1ml of distilled water in another tube as control
- Add 1ml of felhing reagent (A+B) to all the tube
- Keep in boing Water bath
- look For the development of Red

d) Foam Test

- 1gm of Sample + 4ml water (vigorously Shaken)

e) Hager Test

- sample + Hager reagent (Saturated solution of picric acid)

Rheological Parameter

Sr.No.	Parameter
1	Bulk Density
2	Tapped Density
3	Angle of Repose
4	Carr's Index
5	Hausners Ratio

A. Bulk Density

Weigh 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

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EPRA International Journal of Research and Development (IJRD)
Volume: 10 | Issue: 6 | June 2025 - Peer Reviewed Journal

B. Tapped Density

Weigh accurately 5gm of powder dye and transfer in 100ml measuring cylinder.
Then precisely tap the chamber containing the example 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

C. % Carr's Index

(Tapped density- Bulk density)/ tapped density*100

D. **Housner's Ratio**

Tapped density/Bulk density

Patch Test

This usually involves dabbing a small amount of the aqueous solution of hair dye behind the ear or on inner elbow in an area of 1sq.cm and leaving it to dry. Signs of irritation or feeing of non wellness is noted, if any.Measured and small quantities of prepared hair pack were applied to the specified area for a fixed time. Irritancy, redness, and swelling were checked and noticed for regular intervals up to 24 hours if any. The results of tests for the signs of irritation are displayed in Table.

Sr .No	Parameter
1	Irritation
2	Swelling
3	Redness

Table 7: Patch Test

Stability Test

Stability testing of the prepared formulation was performed by storing it at different temperature conditions for the time period of one month. The packed glass *via*ls of formulation were stored at different temperature conditions *viz*., room temperature and 35°C and were evaluated for the physical parameters like colour, odour, pH, texture, and smoothness as highlighted in Table.

Sr.No	Parameter
1	colour
2	Odour
3	pH
4	Texture
5	Smoothness

Table 8: Stability Test.

RESULT AND DISCUSSIONS

The prepared herbal hair dye contains all the goodness of natural ingredients. Apart from acting as a hair dye, this formulation, because of the perfect blend of herbals, also acts as a hair growth promoter, hair nourisher, conditioner andanti-dandruff agent as well. Henna acting as the base powder, acts as the universal hair dye as it used for its colouring properties throughout the globe. It is also beneficial in the removal of excess oil from the scalp and conditions the hairwell. Bhringraj aids in improving the circulation of blood flowat the root of the hair by providing more nutrients to support hair growth.. This is an age-old remedy for all those people who have been struggling for healthy hair that is free fromgrey hair. It also contains essential fatty acids, which strengthen hair follicles and provides shine and new life. The sufficient amount of vitamin C in amla helps to halt pre-mature greying. It is a great hair conditioner and also remover of dandruff. Tea imparts perfect colour to the hair in combination with other herbs. It is good for the growth of hair and fights against dandruff. Tea for hair strengthens hair by improving the overall quality and texture of it

Table 1: Organoleptic Evaluation.

Formulation code	Colour Result	Odour	Texture	Appearance
F1	Greenish Brown	Characteristic	Fine	Powder
F2	Light Brown	Characteristic	Fine	Powder
F3	Dark Brown	Characteristic	Fine	Powder
F4	Greenish Red	Characteristic	Fine	Powder
F5	Greenish Black	Characteristic	Fine	Powder

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Table 2: Physico-chemical evaluation of herbal dye.

Formulation Code			
	PH	L.O.D	ASH VALUE
F1	6.5	1.4%	0.16
F2	6.1	1.6%	0.15
F3	6.2	1.3%	0.17
F4	6.0	1.5%	0.14
F5	6.4	1.2%	0.13
F6	6.8	1.9%	0.19

Table 3: Phytochemical evaluation of herbal dye.

Formulation code	Foam test	Molisch test	Fehling test	Hager test	Volatile oil
F1	Present	Present	Absent	Present	Absent
F2	Present	Present	Absent	Present	Absent
F3	Present	Present	Absent	Present	Absent
F4	Present	Present	Absent	Present	Absent
F5	Present	Present	Absent	Present	Absent
F6	Present	Present	Absent	Present	Absent

Table 3: Rheological evaluation of herbal dye.

Formulation Code	Bulk Density	Tapped Density	Angle of Response	Carrs Index	Hausners Ratio
F1	0.32	0.466	1.03	34.3	1.36
F2	0.31	0.461	1.06	34.6	1.34
F3	0.33	0.478	1.07	33.9	1.33
F4	0.30	0.476	1.10	33.8	1.32
F5	0.36	0.472	1.02	34.3	1.35
F6	0.34	0.471	1.04	34.1	1.34

Table 4: Patch Test

Formulation code	Swelliing	Redness	Irritation
F1	Negative	Negative	Negative
F2	Negative	Negative	Negative
F3	Negative	Negative	Negative
F4	Negative	Negative	Negative
F5	Negative	Negative	Negative
F6	Negative	Negative	Negative

Table 5: Stability Test

Formulation Code	Colour	Odour	Ph	Texture	Smoothness
F1	No Change	No Change	6.5	Fine	Smooth
F2	No Change	No Change	6.1	Fine	Smooth
F3	No Change	No Change	6.2	Fine	Smooth
F4	No Change	No Change	6.0	Fine	Smooth
F5	No change	No change	6.4	Fine	Smooth
F6	No change	No change	6.8s	Fine	Smooth

CONCLUSION

Results shown that the dye formulation are good with colour, odour, texture. The formulation f6 had shown the required ph & Lod values also, the f6 herbal dye showed for good result after its application for a long period of time. All the formulations, are conducted for phytochemical evaluation. The formulations gave optimum rheological evaluation results. This is no scalp irritations has the patch tests given with no swelling, redness &irritation. Hence in stability test there is no change

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REFERENCES

1. *Natural colorants and dye In: Pharmacognosy and phytochemistry. 1STEd. India: Career publication, 2004; 1: 98-117.*
2. *Kumar S, Akhila A, Naqvi AA, Farooqi AH, Singh AK, Uniyal GC, et al. Medicinal plants in skin care. Lucknow, India: CIMAP, 1994; 425-30.*
3. *Orfanos CE, Happle R. Hair and hair diseases. Germany: Spring-veriang berlin Heidelberg, 1990; 19-44. [http://dx.doi.org/10.1007/978-3-642-74612-3]*
4. *Gulrajani ML. Natural dyes and their applications to textiles. India: IIT New Delhi, 1992; 1-2.*
5. *Ashok D, Vaidya B, Devasagayam T. Current status of herbal drugs in India: An overview. J Clin Biochem Nutr., 2007; 41(1): 1-11.*
6. *Khare CP. Indian herbal remedies: Rational western therapy, ayurvedic, and other traditional usage. Botany Springer 200.*
7. *Brown K. Hair colourants. J Soc Cosmet Chem., 1982; 33: 375-83.*
8. *Madhusudan RY, Sujatha P. Formulation and evaluation of commonly used natural hair colorants. Nat Prod Rad., 2008; 7(1): 45-8.*
9. *Mielke H. Lead-based hair products: Too hazardous for household use. J Am Pharm Assoc, 1997. [http://dx.doi.org/10.1016/S1086-5802(16)30183-8]*
10. *Balsam MS. Edward sagarin, cosmetics science and technology. John Wiley & Sons, 1972.*
11. *Koutros S, Silverman DT, Baris D, et al. Hair dye use and risk of bladder cancer in the New England bladder cancer study. Int J Cancer, 2011; 129(12): 2894-904. [http://dx.doi.org/10.1002/ijc.26245] [PMID: 21678399]*
12. *Kalia AN. Text book of industrial pharmacognosy. New Delhi: CBS Publishers, 2005; 264.*
13. *Kumar S, Akhila A, Naqvi AA, FoA, Naqvi AA, Forooqi AHA, Singh AK, Singh D. Medicinal plants in skin care. Lucknow: CIMAP, 1994; 51-62.*
14. *Baran R, Maibah HI. Cosmetic dermatology in children Text book of cosmetic dermatology. 2nd ed. London: CRC Press, 1998; 507-8.*
15. *Nadkarni KM. Indian materia medica. Popular Prakashan, 1976; 630-680: 1202.*
16. *Al-Suwaidi A, Ahmed H. Determination of para-phenylenediamine (PPD) in henna in the United Arab Emirates.Int] Environ Res PublicHealth, 2010; 7(4): 1681-93. [http://dx.doi.org/10.3390/ijerph7041681] [PMID: 20617053.*
17. *Polat M, Dikilitaş M, Oztaş P, Alli N. Allergic contact dermatitis to pure henna. Dermatol Online J., 2009; 15(1): 15. [PMID: 19281720]*
18. *Kumar KS, Begum A, Shashidhar B, et al. Formulation and evaluation of 100% herbal hair dye. International Journal of Advanced ResearchIn Medical & Pharmaceutical Sciences, 2016; (2):*
19. *Mac Dougall Color in food woodhead publishing Ltd 1st Ed., 2002.*
20. *Ali NF, El-Mohamedy RSR. Eco-friendly and protective natural dye from red prickly pear (Opuntia lasiacantha Pfeiffer)plant. JSaudiChemSoc,2010; 15:257-61.[http://dx.doi.org/10.1016/j.jscs.2010.10.001]*
21. *Patel MM, Solanki BR, Gurav NC, Patel PH, Verma SS. Method development for Lawsone estimation in Trichup herbal hair powder by high-performance thin layer chromatography. J. Adv Pharm Technol Res., 2013; 4(3): 160-5. [http://dx.doi.org/10.4103/2231-4040.116780] [PMID:24083204]*
22. *S.G. DESIGN AND EVALUTION OF HERBAL HAIR OIL FORMULATIONS BY USING*
23. *ETHANOLIC EXTRACT OF Ziziphus jujubaMill. LEAVES Int J Pharma Bio Sci., 2017; 8(3): 322-7.*
24. *Saif FA. Henna beyond skin arts: Literatures review. J Pak Assoc Dermatol, 2016; 26(1): 58- 65.*