

Formulation and Evaluation of Polyherbal Hair Dye

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ABSTRACT:

Hair plays an important role in beautification every individual's wants to look good and young. Graying of hair is world's major and serious problem facing by the people especially the young generation, air, dirt, immoderate heat and temperature modifications, life style modification, stress, nutritional deficiency, busy schedule are the main reasons to cause negative effect on the hair, this may cause premature graying of hair every individual wants to mask grey or white hair and to look good and young hair dyes are the commonly used beautifying agents to mask grey or white hairs synthetic hair dyes available in the market are composed of dangerous synthetic agents like PPD and ammonia compounds which cause harmful effects on the hair and cause cancer in present research work we focused on the formulation of poly herbal hair powdered hair dyes. Composed of herbs available in our Environment, herbal hair dyes are of good dyeing effect with zero adverse effects. We formulated three formulations F1, F2 and F3 in which henna and indigo are used in different ratios. In this formulations F3 produces a good dyeing effect in which indigo used in higher quantity than Henna, It produces brownish black which resembles natural hair. The prepared formulations are evaluated for organoleptic properties, powdered characteristics, physio-chemical properties and patch test. Each prepared formulations fulfill all the evaluation parameters. The color produced by the F3 formulations is brownish black, which resembles natural black color of the hair. Hence F3 formulation is found with good dyeing effect.

Keywords: Beautification, graying, Herbal, nourishes.

I. INTRODUCTION:

Hair or Pili is the main characteristics features of all the mammals. It covers most of the body surface except the palms of hands, soles of feet and certain portions of external genitalia. The thickness and pattern of hair distribution depends on genetic and hormonal factors. The hair on the

head provides protection from injury and sun rays, whereas the hair on eyebrows protects the eyes from foreign particles.

Hair coloring or hair dyeing is the exercise of converting the hair color. The primary reasons for this are cosmetic is to cover grey or white hair, to trade to a color regarded as extra elegant or ideal, or to repair the original hair color after it's been discolored with the aid of hairdressing procedures or solar bleaching. Hair dye 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 more healthy. Our tresses are uncovered to exclusive environmental factors each day which includes polluted air, dirt, dirt, immoderate heat and temperature modifications among others. These can have a negative effect on our hair ultimately. While you get your hair colored, you get a shielding layer which protects your natural hair from those environmental dangers. Within the past natural organic materials were blended with metals inclusive of copper and iron, to supply extra lasting or richer sunglasses. Non-stop utility of such compounds on natural hair causes more than one adverse effect which includes skin infection, hypersensitive reaction, hair fall, dry scalp and additionally skin cancers. It's been observed in the neighborhood market survey that the maximum of the marketed natural formulations in India, though claim to be herbal, safe and powerful may sincerely include the dangerous synthetic agent, Paraphenylenediamine (PPD), at 20-25% concentrations that is the main ingredient of business artificial dyes. Natural dyes are the colors derived from plant, animal or insect be counted with none chemical processing. In India, henna has been used traditionally for coloring fingers and hairs. [1]

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.

Advantages of natural hair dye:

- Because it is a Herbal hair dye there is no side effect while compared to synthetic hair dye.

- The herbal ingredients are known for their non-toxic and the packaging contains no chemicals, preservatives, artificial colors or perfumes.
- Herbal hair dye is free from harsh chemicals such as ammonia, peroxide, and polyphenylenediamine.
- It is less damaging to hairs and safer to use.
- It also nourishes hair.
- Using herbal hair color is one of the best quick fixes without any side .

II. MATERIALS AND METHODS:

Formula for powdered poly herbal hair dye:

SL.NO	INGREDIENTS	F1	F2	F3
1	Henna	25gm	15gm	10gm
2	Indigo	-	10gm	15gm
3	Amla	3gm	3gm	3gm
4	Curry leaves	3gm	3gm	3gm
5	Tea leaves	5gm	5gm	5gm
6	Hibiscus	5gm	5gm	5gm
7	Aloe vera	2gm	2gm	2gm
8	Neem	3gm	3gm	3gm
9	Orange peel powder	2gm	2gm	2gm
10	Lemon peel powder	2gm	2gm	2gm

1.HENNA

Synonyms:Caseariamultiflora, Lawsoniaalba, Lawsoniaspeciosa, Lawsoniaspinosa, Lawsonia and Rotanthacombretoides.

Biological source :The plant “Lawsoniainermis”, well known for its cosmetic and therapeutic virtues. Henna leaves are natural sources of color for hand, feet, fingers, nail and hair.

Family:Lythraceae.

Geographical source :The henna plant is native to Northern Africa and it is also found in Western and Southern Asia.

Chemical constituents :

Lawsone (2-hydroxy 1,4-naphthoquinone)

- Sugars (glycosides) and
- Tannins (gallic acids)

Uses :

- Henna repairs the damaged hair strands and restores the acid-alkaline balance of the scalp.
- Henna is best to color hair and has no chemicals, toxins and ammonia.
- It is also used for protecting hair from sun and dust. Henna can also make hair strong..

- It can be used to treat dandruff and scalp infections effectively.
- Henna is used in cosmetics, hair care products and also used as a dye for hands.[4]



2. INDIGO

Biological source : Indigo obtained from a plant of Indigoferatinctoria .

Family :Fabaceae

Chemical constituents :

- Glycoside indane
- Indigotin
- Flavonoids and

- Tannins

Uses :

- Coloring agent.
- Promote hair growth .



3.AMLA

Synonyms: Emblica, Indian goose berry, Amla .

Biological Source: This consists of dried, as well as fresh fruits of the plant “Emblicaofficinalis”

Family: Euphorbiaceae.

Chemical constituents :

- Vitamin C (Ascorbic acid),
- Alkaloids (Phyllanthin),
- Carbohydrates(Pectin),
- Hydrolysable Tannis (Emblicanin A & B)

Uses :

- Condition your scalp .
- Promote healthy hair growth.
- Improve the tone of henna hair dye .
- Minimize grays .
- Reduce dandruff .[4]



4.CURRY LEAVES

Synonym : Kadipatta

Biological Source : Dried leaves of murrayakoenigii (L).

Family : Rutaceae

Chemical constituent : phenols, flavanols, amino acids and alkaloid.

Uses :

- 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.
- Rich in folic acid Good for skin and hair.[2]



5.HIBISCUS

Synonym : shoeblack plant. mahagua. mahoe. cotton rose. roselle. Jamaica sorrel.

Biological Source: green shrub of hibiscus rosa-sinensisflowers .

Family : Malvaceae

Chemical Constituents:

The phytochemical analysis showed that hibiscus rosa-sinensis contained tannins, anthraquinones, quinines, phenols, flavanoides, alkaloids, terpenoids, saponins, cardiac glycosides, protein, free amino acids, carbohydrates, reducing sugars, mucilage, essential oils and steroids.

Uses :

- It is high-quality for growth in hair growth activity.
- Hibiscus is obviously enriched with Calcium, Phosphorus, Iron, diet B1, vitamin C, Riboflavin and Niacin, which assist to promote thicker hair increase and decrease untimely graying of hair.
- This flower is used for control dandruff.
- Hibiscus is famous for antioxidant properties via generating flavonoids along with anthocyanins and different phenolic compounds.
- It can be used to rejuvenate the hair via conditioning it.[1]

**6.TEA LEAVES**

Synonym : Camellia sinensis.

Biological Source: Dried leaves of camellia sinensis .SSS

Family :Theaceae

Chemical constituents :

- Being rich in polyphenols,
- selenium,
- copper,
- phytoestrogens .

Uses :

- 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.
- It helps 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. [2]

7.ALOE VERA

Synonym :GawarPatha

Biological Source: Dried latex of the leaves of aloe barbadensis miller **Family :**Asphodeleceae

Chemical constituent :Anthroquinone glycoside, tannins .

Uses:

- Aloe Vera is effective for scalp and may be used no longer simplest to deal with hair loss, but to promote hair boom as properly.
- Aloe Vera consists of aloe emodin which promotes hair growth by stimulating hair follicles.
- It's also beneficial in treating the scalp from solar burn.
- It is used as a herbal mordant.
- It is also recognized for its emollient effect.[2]





8. NEEM

Biological source :Neem plant consist of fresh leaves of Azadirachtaindica

Family :Meleaceae

Chemical constituents :

- Azadirachtaindica
- Nimbidin
- Nimbidol
- Sodium Nibinate

Uses :

- Helps to control the premature greying of your hair.
- It covers gray hair naturally .
- Antimicrobial agent.



9. ORANGE PEEL

Synonym – Orange or sweet orange

Botanical name: Citrus sinensis

Family – Rutaceae

Biological source – It is obtained from the orange peel which is dried or fresh outer part of the pericarp of ripe or nearly ripe fruits of citrus sinensis.

Chemical constituents;

Limonene, (S)-linalol, pectin, octanal, decanal, essential alcohols, etc.

Uses :

- Control dandruff.
- Anti-oxidant.
- Anti-inflammatory.
- Orange oil as perfuming agent.
- Leading to more lustrous hair & less hair fall.
- Promotes hair growth .[5]



10. LEMON PEEL

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.

Chemical consituents;

Limonene ,sabinene ,citronella l,linalool ,neral ,geranial ,ocimene ,myrcene .

Uses;

- Remove scalp build up.
- Boosts immune system.

- The lemon citric acid in lemon can even address the root of your hair problems.
- Reduce the dandruff of our hair. [2]



METHODOLOGY

For the preparation of herbal hair dye we used different herbs as mentioned in the formula

- All ingredients were collected from the local market in Tumakuru and from online shopping apps.
- Collected herbal drugs are dried.
- All the ingredients were grinded thoroughly and passed through sieve no #80 to get fine powder.
- Ingredients are weighed according to the composition and mixed to get a uniform mixture.

Evaluation of the Herbal Hair Dye

The prepared poly herbal powdered hair dye was evaluated for various parameters, such as organoleptic, physio-chemical, phyto-chemical constituents and the powdered characteristics.

1.Organoleptic Evaluation:

Organoleptic characteristics for various sensory characters like color, taste, odor etc. The raw drugs and powders were separately studied by organoleptic and morphological characters like color, odor, texture and appearance.

SL.NO	PARAMETERS	F1	F2	F3
1	Color	Greenish	Greenish brown	Brownish black
2	Odor	Characteristic	Characteristic	Characteristic
3	Texture	Fine	Fine	Fine
4	Appearance	Powder	Powder	Powder

2.Physico-Chemical Evaluation:

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

1. pH:

pH of aqueous solution of the formulation was measured by using a calibrated digital pH meter.

2. Loss on drying

Weigh about 1.5 gm of the powdered drug in a porcelain dish. Dru in the oven at 100 ° C or 105 ° C .

Until two consecutive weighing do not differ by more than 0.5gm cool the desiccators and weigh .the loss in weight in usually recorded as moisture .

3. Ash content :

Place about 2-4gm of the ground air dried material, accurately weighed in previously ignited and tared crucible (usually of platinum or silica) spread the material in an even layer and ignite it by gradually increasing the heat to 500 -600 C until it turns white . indicating the absece of carbon cool in a desiccator and weigh if the carbon free ash can't be obtained in thiss manner cool the crucible and moisten the residue with about 2 ml of water or a saturated solution of ammonium nitrate , dry on a water bath , then on a hot plate and ignite to constant weight allow the residue to cool in a suitable desiccator for 30 min and the weigh without delay , calculate the content of total ash in mg/gm air dried material .[3]

SL.NO	PARAMETERS	F1	F2	F3
1	pH	6.7	6.9	6.5
2	LOD	1.7% w/w	1.9% w/w	1.5% w/w
3	Ash value	0.18% w/w	0.16% w/w	0.17w/w

3. Phyto- Chemical Evaluation:

Polyherbal hair dye is evaluated for the phyto-chemical constituents present in the formulaion.

Phyto- chemical constituents	Presence/absence of Phyto -chemical constituents in polyherbal hair dye
Alkaloids	+
Napthoquinoeones	+
Tannins	+
Flavonoids	+
Terpenoids	+
Resins	+
Phenol	+

TESTS FOR POWDERED CHARACTERISTICS :

1. Angle of repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow. Required amount of dried powder is placed in a cylinder tube open at both ends is placed on a horizontal surface . Then the funnel should be raised to form a heap .The height and radius of heap is noted and recorded . For the above method , the angle of repose can be calculated by using formula .

$$\tan \theta = \frac{h}{r}$$

Where

- θ - angle of repose
- h - height of the heap
- r – radius of the base

2. Tapped density

Tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After

SLNO	PARAMETERS	F1	F2	F3
1	Angle of repose	1.03 °	1.06 °	1.09 °
2	Bulk density	0.32 g/ml	0.31g/ml	0.33g/ml
3	Tapped density	0.466g/ml	0.461g/ml	0.478g/ml

observing the initial powder volume or mass , the measuring cylinder or vessel is mechanically tapped for 1min and volume or mass readings are taken until little further volume or mass changes was observed .It was expressed in grams per millimeters .

$$\text{Tapped Density} = \frac{\text{Mass}}{\text{Tapped volume}}$$

3. Bulk density

Bulk density is ratio between the given mass of a powder and its bulk volume .Required amount of the powder is dried and filled in a 50ml measuring cylinder up to 50ml mark. Then the cylinder is dropped onto a hard wood surface from height of 1 inch at 2sec intervals . The volume of the powder is measured .Then the powder is weighed. This is repeated to get average values .[10]

$$\text{Bulk density} = \frac{\text{Mass}}{\text{Bulk volume}}$$

PATCH TEST

• Cleanse a small area of skin on the inner forearm or behind the ear with alcohol.

- Apply a small amount of the contents of the tube of colour cream and let dry without rinsing.
- Up to 48 hours and check for a reaction produced by the components.

- Observe for 48 hours for itching or redness, swelling.

SLNO	PARAMETERS	F1	F2	F3
1	Swelling	Negative	Negative	Negative
2	Redness	Negative	Negative	Negative
3	Irritation	Negative	Negative	Negative



III. RESULTS AND DISCUSSION:

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 herbs, it also acts as a hair growth promoter, hair nourisher. Henna is a good coloring agent. Indigo gives natural black color to the hair. Amla promotes hair growth. Curry leaves helps to retain natural color. Tea leaves keep hair soft and shining. Hibiscus helps to stop hair loss. Neem helps to control premature graying of hair. Aloe-vera reduces frizziness and makes the hair smoother. Orange peel delays premature greying. Lemon peel accelerates the synthesis of collagen & speed up the growth of hair. Organoleptic evaluation findings revealed that the dye is smooth and pleasant smelling powder. Physicochemical parameters reflected that the moisture content was nominal, pH was found neutral to suit the requirements of different scalp types. Ash value was found to be nominal, signifying the presence of inorganic radicals in appropriate amounts. Test for phytoconstituents also done which shows formulated dyes are full pack of constituents which are true nourisher for the hair. Patch test revealed negative results for irritancy, redness and swelling as the herbs in their natural form without use of

artificial additives. From the above observations, it has been signified that since the formulation is constituted with naturally occurring dried herbal ingredients, there are almost minimal possibilities of the deterioration of the formulation, as there is no moisture containing substance in either raw or processed form. The formulation was kept for one month at room temperature to observe the changes in its color, odour, texture and appearance. The formulation was found to be stable. Since it is a natural herbal based formulation, it is free from the ill-effects of ammonia based chemical dyes. However, the regular use of it provides voluminous, smooth and well colored hair. Its continuous use shows superb effects later on. Since natural ingredients are known for their non-toxic, non-habit forming properties and no chemicals, preservatives, artificial colors or perfumes has been incorporated in the pack, the chances of its degradation are almost close to the minimal. This leads to an increased shelf life with stable ingredients.

IV. CONCLUSION:

Poly herbal powdered hair dye, colors the hair in an utmost gentle manner. The advantages of herbal based cosmetics are their nontoxic nature.

This natural herbal hair colorant is excellent for people of all age group. Poly herbal hair dye composed of herbs available in our environment, herbal hair dyes are of good dyeing effect with zero adverse effects and are cost effective. Prepared three formulations F1, F2 and F3 in which henna and indigo are used in different ratios. In F1 only henna is used as colorant. In F2 henna and indigo are used as colorants but henna is taken in lesser concentration than indigo. In F3 henna and indigo are used as colorants but indigo is taken in lesser concentration than henna. In this formulations F3 produces a good dyeing effect in which indigo used in higher quantity than henna. It produces brownish black which resembles natural hair. The prepared formulations are evaluated for organoleptic properties, powdered characteristics, physio-chemical properties and patch test. Each prepared formulations fulfills all the evaluation parameters. From the investigational work it can be concluded that by changing the composition of colorants in the formula the required natural black color could be obtained for white hair.

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