



Review Article

A Review On Natural Hair Dye

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ABSTRACT

Dye use is very common among both Men & Women. Hair dye users are increasing day by day. The colouring of hair is performed not only by professionals but also a popular cosmetic product. Hair dye is used mostly to change grey hair, since grey hair is a sign of an advanced age. Most of them are using hair dye in our home. Earlier natural hair dyes were used but now due to advancement in the cosmetic industry, different types have been developed. There has been concern about hair dye since scientist is trying to find out if there is a link between hair colour and cancer.


INTRODUCTION

The art of hair dyeing was known as early as 5000 years BC among the Egyptians

1. Hair dye has been used since ancient Egyptian times when Rameses II reinforced red hair colour using henna
2. Since ancient times plants have been used for dyeing targets and even now, they play a key role in food, textile and cosmetics. Among them, henna leaf and walnut husk were the most efficient natural hair dyes
3. Natural colours are divided into several categories, vegetable origin: From root, stem, bark, wood leaf, flower and seed of plants as annatto, turmeric, henna, etc, animal origin as cochineal, etc and mineral origin
4. Natural dyes are environmentally friendly, low toxic and less allergenic. Natural dyes in the structure consist of catechins, flavonoids, ascorbic acid, etc, which show natural antioxidant property
5. Herbal hair colour is used in various disorders such as dandruff, premature graying and head lice etc
6. Natural hair dyes solve the problem of the destruction of the scalp and hair cuticle, which are safe for use.
7. [Natural colours include many pigments such as carotene (Golden), lutein (yellow),

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anthocyanins (red), etc. In this article, an overview of the types of used natural pigments for colouring hair and oils for hair tonic are discussed . (2)

Role of ingredients used in the formulation

1. Henna

A red-orange-coloured compound present in the dried leaves of the plant. 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 paraphenylenediamine, 2-nitro-4-phenylenediamine, 4-aminophenol and 3-aminophenol. Henna has also antifungal activity against *Malassezia* species (causative organism of dandruff). Henna prevents premature hair fall by balancing the pH of the scalp and graying of hair. Henna leaf paste is used for alleviating Jaundice, Skin diseases, Smallpox, etc. Extract of Henna leaves with ethanol (70%) showed significant hypoglycaemic and hypolipidaemic activities in diabetic mice .



Fig 1-Henna

2. 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 richest and concentrated form of Vitamin C along with tannins found among the plants. Whole fruit is used as an active ingredient in 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 reduces hair loss. Amla has antibacterial and antioxidant properties that can help promote the growth of healthy and lustrous hair .



Fig 2-Amla

3. Reetha



Fig 3-Reetha

Its fruit is rich in vitamin A, D, E, K, saponin, sugars, fatty acids, and mucilage. Reetha extract is useful for the promotion of hair growth and

reduced dandruff. Extract of fruit coat acts as a natural shampoo, therefore is used in herbal shampoos in the form of hair cleanser. Reetha as soap nuts or washing nuts has played an important role as natural hair care products since olden times. This plant is enriched with saponins, which makes the hair healthy, shiny, and lustrous when used on a regular basis.

4. Shikakai



Fig 4-Shikakai

It contains Lupeol, Spinasterol, Lactone, Hexacosanol, Spinasterone, Calyctomine, Racimase-A Oleanolic acid, Lupenone, Betulin, Betulinic acid, Betulonic acid. The extract obtained from its pods is used as a hair cleanser and for the control of dandruff. Shikakai or acacia concinna, has a rich amount of vitamin C, which is beneficial for hair. Shikakai naturally lowers the pH value and retains the natural oils of the hair and keeps them lustrous and healthy. It is also effective in strengthening and conditioning hair. Amla, reetha, and Shikakai compliments each other, therefore, they are mixed to have healthy and lustrous hair. All of these ingredients come in two forms, one as dried fruit and the other in powdered form. Amla, Reetha, and Shikakai suit all hair types and help prevent split ends, hair fall, dandruff, greying of hair, and other hair-related problems, to make hair soft and silky.

5. Coffee



Fig 5- Coffee

In hair colorants, herbs can be used in the form of powder, aqueous extract, or their seed oil to impart shades of different colors varying from reddish brown to blackish brown. The herbal drugs like coffee powder obtained from its seeds are used as hair colorants.

6. Tea

Being rich in polyphenols, selenium, copper, phytoestrogens, melatonin, tea also has been used in traditional Chinese medicine and Ayurvedic medicine has been used since long as a hair colorant.



Fig 6-Tea

7. Hibiscus

It is excellent for an increase in hair growth activity. Hibiscus is naturally enriched with Calcium, Phosphorus, Iron, Vitamin B1, Vitamin C, Riboflavin, and Niacin, which help to promote thicker hair growth and decrease premature graying of hair [46]. This flower is used for controlling dandruff. Hibiscus exhibits antioxidant properties by producing flavonoids such as anthocyanins and other phenolic compounds. It

can be used to rejuvenate the hair by conditioning it .



Fig 7-Hibiscus

8. Bhringraj

Petroleum ether extract of bhringraj initiates a greater number of hair follicles. The oil-based extract of leaves has been used traditionally for improving hair growth and for imparting natural colour to grey hair. Neeli bhringadi Thailam, mentioned in Ayurveda, is suitable for promoting hair growth and for providing natural color to grey hair. Bhringraj is used in the preparation of various oil, shampoo, hair dye , etc.



Fig 8-Bhringraj

9. Jatamansi



Fig 9- Jatamansi

Nardostachysjatamansi is an important drug of Ayurveda and is used in different traditional systems of medicine such as Ayurveda, Unani, Siddha, etc. Its rhizomes and roots are used as a tranquilizer, laxative, cardiac tonic, for curing vertigo, nervous headache, low and high blood pressure, etc. The rhizomes as well as roots of the plant are medicinally rich and therefore, have been the focus of chemical studies (3)

10. ALOE VERA

Anthraquinones, resins, tannins and polysaccharides are the chemical constituents in Aloe vera . The gel also contains vitamins A, B, C, E, B12, enzymes and amino acid . Aloe vera gel is effective for scalp and can be used not only to treat hair loss, but to promote hair growth as well. Aloe vera contains aloe emodin which promotes hair growth by stimulating hair follicle. It is used as a natural mordant . One of the most valuable cosmetic properties of aloe gel is its ability to stimulate the circulation of the skin and remove the dead skin cells so giving a fresher and younger appearance to the skin. It is recommended for sunburn, insect bites and etc. (4)



Fig 10-Aloe Vera

Hair Coloring Mechanisms

For most natural plant hair dyes, there are two mechanisms for hair coloration: direct dyeing and mordant dyeing. Briefly, the hair dyeing process can be divided into two steps:(i) Diffusion of dye molecules from dye bath to the keratinous hair fiber; (ii) Formation of chemical bonds (hydrogen,

ionic, and covalent bonds) between the carboxyl or hydroxyl groups present in the dye molecules and amino/sulfhydryl groups in hair keratin, with or without the aid of auxiliary mordanting agents

Diffusion is a three-stage process

1. The first stage is the transport of dye molecules to the fiber/water interface by a combination of aqueous diffusion and agitation
2. In the second stage, dyestuffs are adsorbed onto the outer layer of hair cuticle
3. Final stage is the diffusion of dye molecules of low molecular weight into inner hair structures (cuticle and cortex) and can be characterized by the change to the cell membrane complex (CMC) present in the hair cuticle.

The CMC is a continuous phase of intercellular matters that binds the cuticle and cortical cells together. Studies have shown that penetration through CMC is the main transport pathway for dye substances to reach the hair cortex. Less ionized small molecules are more likely to penetrate through and spread over the lipid bilayer of CMC. Besides, the condition of hair fibers also affects the absorption and diffusion of external dye substances. For example, the use of hydrogen peroxide in hair dye formulation can destroy the disulfide bonds of hair keratin, causing CMC breakage and damages to the cuticle and cortex components, resulting in swelling loose hair fibres and lifted cuticles, thus facilitating deeper penetration and stronger bonding of dyestuffs to the hair exterior shaft. Direct dyeing, as a non-oxidative hair colouring process, is a direct formation of a dye-complex or bonding between the dyestuff and hair fibre. The colour strength of directly dyed hairs depends on the affinity of dye molecules to the hair fibre surface. Generally, dye stuffs of low molecular weight (the critical sizes are 1.2–1.3 nm for anionic dyes, 1.4 nm for

cationic dyes, and 0.95 nm for non-ionic dyes) can easily penetrate into the cuticle layer of hair fibre. Dyes of high molecular weight cannot penetrate the cuticles but may be adsorbed onto hair fibre via various types of forces, i.e., van der Waals, electrostatic, and hydrogen bonding. Among the direct dyes, natural dyes extracted from henna leaves and walnut husks are popular representatives. Take henna for example, at pH 4.5–6.0, the reduced form of lawsone (2-hydroxy-1,4-naphthoquinone), its main colourant, reacts with the protonated amino groups present in hair keratin fibers. Additionally, SEM observation finds that henna dyestuffs might be capable of recovering the cuticle damage and providing a smooth moisture-rich appearance on the dyed hair cuticles. Mordant dyeing refers to the formation of charge-transfer complex between the dye and a mordanting agent on the dyed hair. Mordants are substances that can fix dyes on hair fibers through interactions with dye molecules and hair fibers for improved colour fastness. Common mordants are metal salts, such as iron (II) sulphate, copper (II) sulphate, and alum, and act as a link between the dye and the hair fiber. Dative covalent bonding is the probable mechanism in binding metallic mordants to dye molecules with the oxygen containing groups playing a key role. Figure 1b shows dative covalent bonding between an iron (II) ion and a polyphenol dye that bond to the hair fiber by hydrogen bonding [36]. Mordant dyeing can be conducted by pre-, meta- or post-mordanting methods. The choice of mordants and mordanting methods has significant influence on the hue of the dyed colors and fastness properties. For natural dyes, it is difficult to predict an optimal mordanting procedure because the results are highly dependent on the dye plant and mordant type. On the other hand, the treatment of transition metal mordants may result in the accumulation of iron and copper in human hairs, which has been

reported to cause photooxidative damage of dyed hairs through Fenton chemistry. In this regard, the development of bio-mordants, especially tannins and metal-rich plants, as effective alternatives to metallic mordants warrants further investigation. For example, Aloe vera extract was reported as a bio-mordant to improve the hair dyeing properties. Tannin-rich plant extracts from *Punica granatum* (pomegranate) peels, *Eucalyptus maculata* (eucalyptus), *Rhus coriaria* (sumac) and *Emblica officinalis* (amla) are bio-mordants widely used in the textile industry as alternatives to the metallic mordants but are rarely reported for hair dye applications. *Molecules* 2022, 27, 8062 3 of 21

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Technological Innovations for Natural Hair Dyeing

1. Colorant Production by Synthetic Biology Techniques

Traditional methods of obtaining hair dye colorants from plants is limited by the dependence on complex extraction/purification procedures, varying botanical sources, long cultivation cycles and limited harvest seasons. In recent years, synthetic biology techniques have brought new tools for producing plant colorants by microbial fermentation. Metabolic and genetic engineering approaches have shown great potential to edit or introduce colorant-formation genes into

microorganisms for enhanced production of anthocyanins, curcumin and carotenoids. The first microbial synthesis of anthocyanins was reported by Yan et al. wherein a four-step metabolic pathway containing heterologous plant genes was constructed in engineered *E. coli* and the cytosol was able to take up naringenin and mustard alcohol to produce anthocyanin 3-O-glucoside. Likewise, heterologous synthesis of curcumin was produced in engineered *E. coli* by using 4-coumarate-CoA ligase (4CL1) from *Arabidopsis thaliana*, diketide-CoA synthase (DCS) and curcumin synthase 1 (CURS1) from turmeric. Additionally, a more efficient biosynthetic pathway of β -carotene was assembled in microorganisms by metabolic engineering techniques by increasing the copy numbers of the *carB* and *carRP* genes and overexpressing genes related to the mevalonate pathway. However, despite the substantial advances in the fields of synthetic biology and metabolic engineering, the development of heterogenous microbial cell factories is cumbersome and time-consuming. Additionally, the potential biosafety risks in synthetic biology are a matter of great concern recently. Thus, it is still challenging for industrialization of such technologies to produce various types of natural colorants and apply them in hair dye cosmetics.

2. Encapsulation of Colorants for Stabilization and Detoxification

Stability issues (thermal-, light and acidity/alkalinity stability) must be considered when using natural colorants in hair dye cosmetics. Many encapsulation systems have been successfully developed over the past years to protect sensitive phytochemicals or plant extracts from environmental stresses (heat, UV and extreme pHs). Encapsulation provides a promising strategy to protect sensitive dye molecules (core material) by enclosing them in an outer shell (wall material) to ensure the stability and dyeability of

natural colorants in commercial hair dye products. Microcapsules of natural colorants can be obtained by various encapsulation techniques, including both chemical (emulsion polymerization, suspension polymerization, and interfacial polymerization) and physical (spray-drying, spray-cooling, and co-extrusion) approaches. Tang et al. used maltodextrin and gum Arabic as wall materials to prepare microcapsules of extracted colorants from Chinese gallnut and henna by spray drying techniques. The encapsulation of gallnut extract significantly improved the photo- and thermal-stabilities as well as formulation stability in alkaline formulation while the encapsulation of henna extract remarkably reduced its contact toxicity without affecting the hair dyeing properties. Therefore, encapsulation technology has provided a route to solve the stability and compatibility issues addressed in natural dyeing with plant colorants.

3. Development of Inorganic Nanocarriers for Efficient Hair Dyeing

Benefiting from small particle size, large surface area and nanostructure, and tailorable physicochemical properties, nanomaterials are ideal carriers of bioactive ingredients for cosmetic applications. In recent years, various inorganic nano-carriers (e.g. nanoparticles, nanofibers and nanotubes) have shown usefulness in stabilizing hair dye plant dyes and enhancing the dyeing effect. For example, carbon nanotubes with small size and increased surface to volume ratio can easily be absorbed onto the hair cuticles and interact with the hair fiber, leading to enhanced affinity and long-lasting coloring effects. Similarly, gallic acid reduced/functionalized silver nanoparticles and colored silica nanoparticles have been developed as novel dyes for bleached human hairs owing to their local surface plasma resonance properties. Besides, oxidation of dopamine to eumelanin-like polydopamine and deposition on

the surface of hair in the form of nanoparticles were shown as a novel biomimetic strategy to develop melanin-mimicking pigments for hair dyeing. Furthermore, Panchal et al. reported that halloysite nanotubes, when loaded with lawsone, were effective for the coloration of both pigmented and grey hairs with good shampooing fastness and can modify the hair surface through physical adsorption and self-assembly. There are also reports on hair dye applications of other abundant and easy-to-obtain natural clay minerals such as sepiolite, palygorskite and kaolin. Collectively, inorganic nanomaterials incorporated/functionalized with hydrophilic or hydrophobic dye molecules from natural sources have provided possibilities for the development of novel natural colorants-based hair dye products.(5)

Extraction Methods of hair dye

Leaves of tea, Henna, Amla, Reetha, Shikakai, Alove vera, Coffee, Hibiscus, Bhringraj, Jatamansi were procured powdered and passed through the sieve number 80.

Method-1

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

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 (colour grade), safety parameters, for all formulations.(6)

Method-2

1. Weighing :

Next a worker weighs out of the ingredient for the batch. For some ingredients, only a small amount of in necessary in the batch. But if a very large batch is being made, and several ingredients are needed in large amounts.

2. Mixing :

In a formula in which no pre mixing is required, after checking and weighing, the ingredients are simply mixture. The ingredients are completely mixed with each other.

3. Filling :

The finished batch of hair dye products formed place in the filling area. Then the measured amount of hair dye on the weighing balance.

4. Packaging :

From the filling area, the plastic bag is taken to the packaging line. The packaging complete and the labelling of the product write the with full information. Then the product are them taken to the warehouse to await distribution.(7)

Types of hair dye

Temporary :

1. These type of hair colours used to colour the hair for temporarity.
2. The colorants which are used doesn't penetrate into the hair or surrounding.
3. Can be easily rinsed off water one shampooing.
4. Temporary hair coloring some time used to apply finely ground metals by means of a Puffer Spray.
5. Such metals, which include orasse, bronze and aluminum, both untreated and anodized in various colors, it provides metallic effect

when applied to hair, mainly used for high lighting.

6. Powders, setting lotions, crayons are used for temporary color.
7. Temporary hair coloring may also be achieved by using the leuco derivative of a basic dye like crystal violet.
8. The various type of products used for temporary coloring of hair include rinse, lotion, aerosols, crayons etc.
9. In rinse aqueous or hydro alcoholic solution of simple dye stuffs are used.
10. In lotions dye in solution with a transparent polymer, such as 3% polyvinyl pyrrolidone in water or aqueous alcohol.
11. Crayons are used either directly rubbed on to the wet hair or applied with the help of hair brush.

Semipermanent :

1. Most of them are basic dye stuffs, whose cationic character gives them a natural affinity for the hair.
2. Metalized dye stuffs in combination with nitro derivatives of aromatic diamines or aminophenols.
3. Performance of colorants can be enhanced by the inclusion of solvent.
4. Shampoo is the most commonly used base.
5. Semi-Permanent dye contains mainly either Nitro Phenylene diamines, Nitro Aminophenol or Aminoanthraquinones.

Permanent :

1. Most popular hair dye products.
2. The dyes are formed during the dyeing process and are not present, as such in the solution before application.
3. **Consists of two parts**
 - a. Dye intermediate
 - b. Oxidizing agent

4. Dye intermediates are blends of primary intermediates and coupling agent or modifier, in a suitable base.

5. During dyeing of hair, the intermediate solutions are mixed and applied to the hair.
6. The primary intermediates are gradually oxidized and then undergo coupling reaction with modifiers.
7. Permanent dye systems are able to dye hair a lighter shade than the original.
8. These dyes are capable of confusing the difference in color between individual hair.
9. Very effective on mixed colored white hair and black hair. (7)

EVALUATION TEST FOR NATURAL HAIR DYE

Test for Carbohydrates (Reducing Sugars) (Fehling's test)

The extracts were treated with 5.0 ml of Fehling's solution and kept in a boiling water bath. The formation of yellow or red colour precipitate indicates the presence of reducing sugars.

Test for Saponins

About 2 g of the powdered sample was boiled in 20 ml of distilled water bath and filtered. The 10 ml of the filtrate was mixed with 5 ml of distilled water and shaken vigorously for a suitable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously and then the formation of emulsion was observed. This indicates the presence of Saponins.

Test for Terpenoids

A volume of 5 ml of the plant extract was mixed in 2 ml of chloroform and concentrated H₂SO₄ was added to form a layer. A reddish-brown colour of the interface shows the presence of terpenoids.

Test for Alkaloids

The plant extract was mixed with a few drops of acetic acid followed by Dragendorff's reagent and mixed well. An orange red precipitate formed indicates the presence of alkaloid.

Test for Flavonoids

5 ml of dilute ammonia solution was added to the aqueous filtrate of the plant extract followed by the addition of concentrated H₂SO₄. A yellow color observed in the extract indicates the presence of flavonoids.

Test for Tannins and Phenolic compound

About 0.5 g of the dried powdered sample was boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride are added and observed for brownish green or a blue-black colour. A few drops of alcohol and ferric chloride solution were mixed with the plant extract. A blue green colour indicates the presence of phenol.

Test for Amino Acids and Proteins

To 1ml extract, 2 drops of freshly prepared 0.2% ninhydrin reagent was added and heated. Blue colour indicates the presence of proteins and amino acids.

Test for Quinones

A few drops of sodium hydroxide were mixed with the plant extract and shaken vigorously. A blue green or red color indicates the presence of quinones.

ORGANOLEPTIC EVALUATION

Organoleptic Characteristics for varicolored sensuous characters like color, taste, odour etc [53-55]. The raw remedies and grease paints were single handedly studied by organoleptic and morphological characters like colour, odour, texture and appearance.

Physico-Chemical Evaluation

The physical and chemical features of the herbal hair colour were rated to determine the pH, its moisture content and its ash value for the purpose of stability, peace and the volume of inorganic matter present in it.

Phytochemical Evaluation

Prepared herbal hair colour was dominated by Phytochemical webbing to reveal the presence or

absence of various phytoconstituents as Carbohydrates, Lipids, Alkaloids, Sugars etc. The expression when dissolved separately in 5 ml of water and filtered; the filtrates were used to test the presence of carbohydrates. The wet passage of the formulated herbal face pack was checked for the presence or absence of different phytoconstituents as per the standard procedures and ethics.

Patch Test

It usually involves placing small volume of the aqueous solution of hair coloring behind the ear or on inner elbowing an area of 1sq.cm and leaving it to dry. Symptoms of aggro or feeling of non-robustness is noted, if any. Measure and small measures of ready herbal hair pack were applied to the specified area for a fixed time. Irritancy, color, and swelling were checked and noticed for regular intervals up to 24 hours.

Stability Test

Stability testing of the ready expression was performed by storing it at different temperature conditions for the time period of one month. The packed glass vials of expression were stored at different temperature conditions viz. room temperature and 35°C and were estimatef for the physical parameters like colour, odour, pH, texture, and smoothness.

Skin Sensitivity Test

Primary irritation testing: The test was conducted on two albino rabbits to detect the potential primary irritants in developed formulation. It was observed that the rabbits don't have any skin sensitization or irritation history. Predictive sensitive testing: Under this the constituents of expression as a whole were tested for any sensitization or irritation. This test is conducted on volunteers. The ingredients are applied on inner surface of forearm. The patch was kept for 24 hrs. If any irritation the volunteer can fluently remove the patch. After junking of patch, the test point was observed for 40min, because time interval is

necessary to check pressure of certain patch substances.

Advantages

Damage to say NO

Since the constituents used in herbal hair are naturally obtained from plants and their parts it does not cause any damage to hair which is an important benefit. Natural hair color not only color hair but also make hair healthy and aid hair growth. Presence of essential nutrients in coloring condition and nourishes the hair.

Retain your Hair health

Due to the presence of conventional hair colouring can result in and loss which affects and eventually leads to unhealthy hair. And due to presence of herbal hair coloring it is sure that damage to hair is not possible

Condition your hair

The ingredients present in color is natural and it has beneficial nutrients for hair which conditions your hair duly. And due to this candescent, strong ,healthy and thick hair is guaranteed .The natural constituents and essential nutrients in Natural Hair Dyes condition your hair. Shiny, strong, thick and healthy hair is guaranteed.

Play with colours

Since the colour is not permanent the colour is washed out and one who wants to play with different hair colours they get occasion to try the different colours, it is most great advantage of natural over chemical.

Minimum Environmental Impact

Since the products obtained are Formulated using natural constituents,the colourings are not dangerous to environment and does not cause any beget on terrain and also it doesn't cause pollution too.

Say YES to Natural Hair Dyes

As per studies synthetic and semi synthetic hair colouring cause the threat of many health issues

like respiratory problem, skin burns, hair loss, itchy skin, and damage to hair Fibre. (8)

Disadvantages

1. More expensive.
2. Need more maintenance and care.
3. Requires styling.
4. May be heavier in weight than synthetic wigs, which may be lead to itching.
5. More susceptible to sunlight fading and environmental damage.(7)

Adverse Effects of Hair Colouring

Hair coloring involves the use of chemicals capable of removing, replacing and/or covering up pigments naturally found inside the hair shaft. Use of these chemicals can result in a range of adverse effects, including temporary skin irritation and allergy, hair breakage, skin discoloration and unexpected hair color results.Side effects of various products result in loss of hair and in extreme cases balding. If consumed by the body by means of inhalation or digestion certain hair dye brands have shown evidence of causing constipation and other dangerous disruptions within human organs.Additionally, there is ongoing discussion regarding more serious health consequences of hair color usage, including lead poisoning. (9)

Uses of Hair Dye

The herbal hair dye contains all the goodness of natural ingredients. Apart from acting as a hair dye, because of the perfect blend of herbals, also acts as a hair growth promoter, hair nourisher, conditioner, and anti-dandruff agent as well. Henna acting as the base powder, acts as the universal hair dye as it is used for its coloring properties throughout the globe. It is also beneficial in the removal of excess oil from the scalp and conditions the hair well. Reetha restores the health of dull, dry, and damaged hair. Bhringraj aids in improving the circulation of blood flow at the root of the hair by providing

more nutrients to support hair growth. The extract of jatamansi is helpful in the growth of hair. It is beneficial for smooth, silky, and healthy hair too. Shikakai is packed with vitamins A, C, D, and K, which together form a powerful antioxidant. This antioxidant is probably the only thing your hair needs to cleanse the scalp of the sebum buildup, unclog pores, kill infection-causing bacteria and stimulate hair growth. Regular use of hibiscus flower juice can easily restrict hair fall control, dandruff, and graying of hair even when you are touching 50 years of age. This is an age-old remedy for all those people who have been struggling for healthy hair that is free from grey 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. Coffee for hair strengthens hair by improving the overall quality and texture of it.(10)

RESULT

The prepared herbal hair dye contains all the goodness of natural ingredients. Shikakai is packed with vitamin A, C, D and K, which together form a powerful antioxidant. This antioxidant is probably the only thing your hair needs to cleans the scalp of the sebum buildup unclog pores, and hair growth. Coffee for hair strengthens hair by improving the overall quality and texture of it. Hibiscus is excellent for hair growth activity. Custard apple pulp powder is help with premature greying of hair. Custard apple is a great natural source of copper and gives hair the dark melanin colour. Organoleptic evaluation finding revealed that the pack is smooth and pleasant-smelling powder. Phyto constituents, which acts as true nourisher for the scalp as well

as hair. The protein of hair stability tests performed at different temperature. The formulation was found to be stable.

CONCLUSION

Herbal based hair dye has been prepared. It offers a natural alternate, which can be used. An herbal hair pack colour the hair in a almost gentale manner. The advantage of herbal based cosmetics is their non-toxic nature. It helps to treat dandruff by removal of excess oil from scalp. The herbal formulation hair pack containing the goodness of powder of different plants, which excellent for hair care. Natural remedies are widely accepted with open hands nowadays as they are safer with minimal side effects as compared to the chemical-based products. In this research we found effective properties of the herbal hair pack and further studies are needed to the preformed to explore more useful benefits of this herbal hair pack.

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