

Review of Natural Resources used to Hair Dye and Hair Care Products

Patel Avani Dipakbhai* and Rajvi J. Mahida

Department of Pharmaceutical Quality Assurance at ROFEL Shri G. M. Bilakhia College of Pharmacy, Vapi, Gujarat, India-396191

Abstract:

Hair cosmetics are an important tool that helps to increase patient's adherence to alopecia and scalp treatments. The formulations and the mode of action of hair cosmetics: Shampoos, conditioners, hair straightening products, hair dyes and henna; regarding their prescription and safety. Hair is an important part of the body appeal and its look is a health indicator. Hair care technologies have been reported in literature claiming innovations and strategies for hair treatments and cosmetic products. Hair dyes are classified into the following category based on their color retention property, namely temporary, semi-permanent and permanent. The primary toxicological concerns of hair dyes, primarily oxidation hair dyes, are with contact dermatitis and long-term "potential" systemic effects. Hair is an important part of body, reflects personality of person. There are many cosmetics available for hair care. Indian medicinal plants having hair care properties are summarized in terms of their biological source, active constituents and biological activity.

Keywords: plants, skin disorder, skin problems, parts of plants

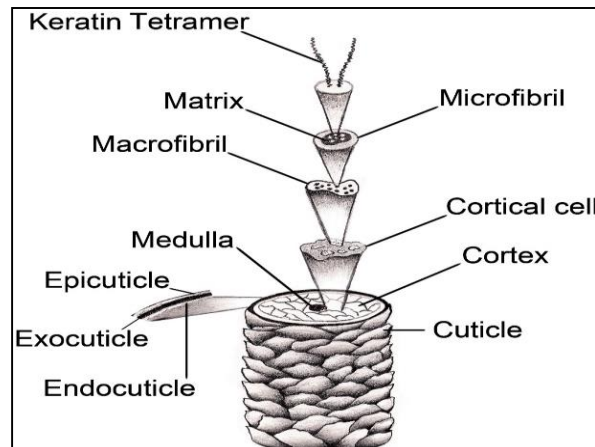
INTRODUCTION

Introduction of Hair:

Hair, protective appendages on the body and structures of integument with sebaceous glands, sweat glands and nails are considered an important part of the body, derived from the skin ectoderm. They are also known as epidermal derivatives, since they originate from the epidermis during embryological development. As described by Naizet, the hair is mainly constituted by three parts: the bulb, the root and the stem, and it is implanted in the pilosebaceous follicle in the dermis. The bulb is the deepest end of the hair and is also the portion that makes it grow. It is connected to the richly innervated and vascularized dermal papillae, which allow the contribution of nutrients necessary for hair growth. The root is firmly fixed in the hair follicle, the part of the hair located between the bulb and the surface of the epidermis where hair takes the form of the stem. The root and stem are made of the same three concentric layers: the medulla, the cortex and the cuticle on the outside. The medulla is the central core. The next stratum, the cortex, represents the largest and thickest part of the hair determining many of their mechanical properties. The cortex is made of packed spindle-shaped cortical cells, filled with keratin filaments parallelly oriented to the longitudinal axis of the hair shaft, and of an amorphous matrix of high sulfur proteins. In particular, cysteine residues in adjacent keratin filaments tend to form covalent disulfide bonds with a strong crosslink between adjacent keratin chains; thus, it contributes to providing the shape, the stability, and the texture of the hair. The cuticle is a very resistant layer of overlapping dead cells that form a protective barrier against the outside environment and external aggressions. It consists of endocuticle and exocuticle. Normal cuticles have a smooth appearance, allowing light reflection and limiting friction between the hair shafts. Indeed, it is responsible for the hair luster and texture.

The cuticle comprises three parts: b-layer, a-layer, and epicuticle. Specifically, described by Hordinsky et al. as well, the epicuticle is a hydrophobic lipid layer, made of 18- methyleicosanoic acid on the surface of the fiber, or

the f-layer, overlapping cuticle cells surrounding the elongated polyhedral cortical cells. The combination of the outer hydrophobic layer with the cortex gives the physical properties of shine and volume (body), essential for the appearance of "healthy hair". Indeed, if hair is damaged by frictional or chemical forces with the subsequent removal of the flayer, the first hydrophobic defense, the hair fiber becomes much more fragile. It is useful to remember that hair fibers contain sulfur-rich proteins, lipids, water, melanin, and trace elements.



Keratin is the main component of the hair. It is a fibrous and resistant protein, whose aminoacidic chains are organized in α helix and contains mainly tyrosine, glycine and cysteine. It is usually present as acidic, neutral and basic keratin.

Introduction of Hair Dye:

Hair dye use is very common among both the genders, today millions use it. Coloring of hair is performed not only by professionals but also a popular cosmetic procedure at home. Hair is made up of root and shaft. Shaft has three layers: Cuticle consisting of tightly packed colorless cells, cortex contains natural color pigments that determine color and medulla a hollow core. Hair dye

cosmetic products are those cosmetic products used for coloring hair. These products were initially designed for women to hide grey hair, but they are increasingly being used by men and, in fact, nowadays various hair dye products exclusively designed for men can be found on the market. The reasons for using this type of product may be different now, not just to hide grey hair, but also to potentiate the natural hair color or to change it completely. In any case, the main reasons behind all of these are fashion and feeling more attractive. Hair dye products are mainly classified into two main categories according to their duration in the hair, i.e., temporary and permanent, which in turn are subdivided into temporary and semi-permanent, and permanent and demi-permanent hair dye products, respectively. This classification is in line with the type of active ingredients involved in the dyeing process and with the dyeing process itself, known commonly as non-oxidative and oxidative hair dye products. The coloring ingredients used in each type of hair dye product and the dyeing process involved.

Types of Hair Dyes:

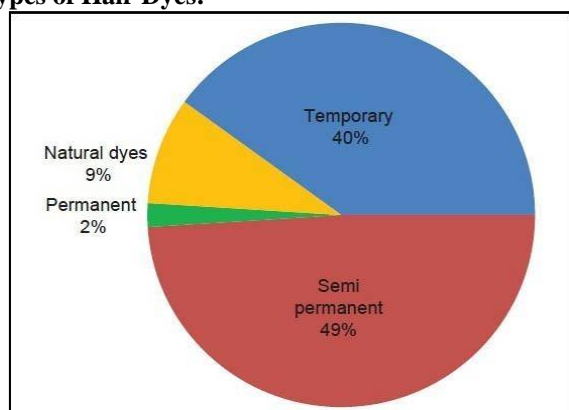


FIGURE: TYPES OF HAIR DYES

1. Temporary Non-Oxidative Hair Dyeing:

The temporary non-oxidative dyeing has a reduced permanence time on the fiber, leaving the hair after the first shampoo washing because dye presents high molecular weight and deposits on the hair surface without the capacity of penetrating the cortex. This type of dye does not have the power of whitening the hair strand and, therefore, it is indicated only to add new nuance and not to change its color. In white, blond or bleached hairs, it is possible to add a new color with a more noticeable effect because the hair strand's background color allows the visualization of the new applied color. The temporary dye can be used for specific purposes such as adding colorful reflections, removing the yellowish effects of the white hair, and covering a small quantity of white hair. It allows the dyeing of hair containing up to 15% white hair, due to their ability to deposit on the hair strands. These dyes, that present acid characteristics usually have high molar mass, according to the structures. They contain anionic characteristics and are selected to allow the maximum solubility in water and the minimum penetration in hair so it is removed in the first washing. They are presented as shampoo, gel, emulsion and solution (liquid) with two

different forms of application: continuous application (progressive) or single application, with one wash at the end of the application process to remove the unabsorbed dye excess on the hair strand.

2. Semi-Permanent Non-Oxidative Hair Dyeing:

These formulations contain basic or cationic dyes with low molar mass, which has a high affinity for hair keratin and resists from three to six washes. The hair dyeing process does not involve oxidation reaction; the application is simple and lasts from 10 to 40 min, followed by rinsing. Several products are available in the market: lotions, shampoos, mousses and emulsions. These cosmetic forms must have the ideal viscosity so that they do not flow during the application. Dyes with low molar mass penetrate slightly in the cortex, especially because of the high pH value of the product that promotes the cuticles opening. Demi-permanent hair products promote major hair color durability (resistance up to 20 washes) because they consist of a mix of semi-permanent molecules with oxidation dye precursors, applied with hydrogen peroxide (H₂O₂).

Another option of formulation involves mixing nitro aniline dyes with basic or acid dyes which aim for a better color result and a bigger resistance to washes, considering the high affinity of the two families of dyes. The hair space not filled with the basic dyes will be occupied by nitro anilines, thus promoting a much more uniform color in the first application.

3. Permanent Hair Dyes:

The permanent hair dyes are commonly used because this category provides greater efficacy of permanent dyeing, resistance to shampoo washes and other external factors, such as drying, friction, light, and others. This category represents about 80% of the sold hair dyes and gets any shade, covering up to 100% of white hair strands. Also, it is possible to have dark and light natural hair color due to the combination of the oxidizing agents with the ammonia hydroxide. The principal difference between the demi-permanent hair dye in comparison with a permanent one is the alkalizing agent used because, in the first, monoethanolamine with low color lightening power is used. Color formation happens upon mixture and involves complex reactions between precursors in the presence of an oxidizing agent. The precursors can be classified into two categories: oxidation basis or primary intermediaries, and the couplers or reaction modifiers.

Introduction of Hair Care:

Hair care is an overall term for hygiene and cosmetology involving the hair which grows from the human scalp, and to a lesser extent facial, pubic and other body hair. Hair care routines differ according to an individual's culture and the physical characteristics of one's hair. Hair may be colored, trimmed, shaved, plucked or otherwise removed with treatments such as waxing, sugaring and threading. Hair care services are offered in salons, barbershops and day spas, and products are available commercially for home use. Laser hair removal and electrolysis are also available, though these are provided by licensed professionals in medical offices or specialty spas.

DIFFERENT HERBS USED IN HAIR CARE:**1. Amla:**

Amla (*Emblica officinalis*, Family- Euphorbiaceae) is a deciduous tree widely found in India at the height of 350 m. It is often cultivated at a commercial level in Uttar Pradesh, Gujarat, Rajasthan and Maharashtra. Amla contains 5-6% of tannins such as gallic acid, ellagic acid and phyllembelin. It is commercialized in the form of shampoos and hair oil. Mainly its oil and aqueous extract is used in the hair care formulations.

2. Bhringraj:

Bhringraj (*Eclipta Alba* Linn, Family- Asteraceae) is an annual or perennial plant found in moist places throughout India, ascending up to 600 ft. Bhringraj mainly contains coumestans, alkaloid, glycosides, triterpenic acid and steroids.

3. Henna:

Henna (*Lawsonia inermis*, Family- Lythraceae) grows wild and cultivated as a garden plant throughout India. Henna leaves are the part of the plant that is used in hair formulations. Leaves mainly contain lawsone (quinone) which dissolves in basic pH to give a dark intense orange color. Henna leaves have been used from ancient times as a hair color due to the chemical interaction of lawsone (thiol group) with the keratin.

4. Reetha:

Its fruit is rich in vitamin A, D, E, and K, saponin, sugars, fatty acids and mucilage. Reetha extract is useful for the promotion of hair growth and reduced dandruff. Extract of the fruit coat acts as a natural shampoo, therefore, is used in herbal shampoos in the form of hair cleanser. Reetha, as soapnuts or washing nuts, play an important role as natural hair care products since older times. This plant is enriched with saponins, which makes the hair healthy, shiny, and lustrous when used on a regular basis.

5. Shikakai:

It contains Lupeol, Spinasterol, Lactone, Hexacosanol, Spinasterone, Calyctomine, Racimase-A, Oleanolic acid, Lupe none, Betulin, Betulinic 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 compliment each other, therefore, they are mixed together to have healthy and lustrous hair. All of these ingredients come in two forms, one as a dried fruit and 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.

6. 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. Herbal drugs like coffee powder obtained from its seeds are used as hair colorants.

7. Tea:

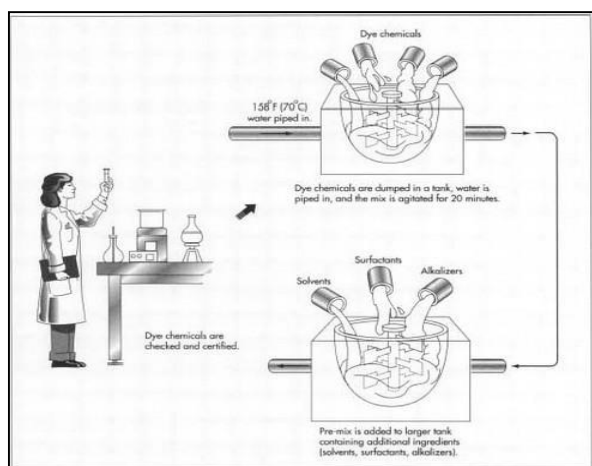
Being rich in polyphenols, selenium, copper, phytoestrogens, melatonin, tea also has been used in traditional Chinese medicine and in Ayurvedic medicine has been used since long as a hair colorant.

8. Hibiscus:

It is excellent for increasing 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. 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.

HOW TO MAKE HAIR DYE?

Preparations such as these were the only hair dyes available until the late nineteenth century. Hydrogen peroxide was discovered in 1818, but it was not until 1867 that it was exhibited at the Paris Exposition as an effective hair lightener. A London chemist and a Parisian hairdresser began marketing a 3% hydrogen peroxide formula at the Exposition as the Golden Fountain of Youth Water, and this was the first modern chemical hair colorant. Advances in chemistry led to the production of more hair dyes in the late nineteenth century. The first synthetic organic hair dye developed was pyrogallol, a substance that occurs naturally in walnut shells. Beginning in 1845, pyrogallol was used to dye hair brown, and it was often used in combination with henna. So-called amino dyes were developed and marketed in Europe in the 1880s. The earliest was p-phenylenediamine, patented in Germany by E. Erdmann in 1888 as a dye for fur, hair, and feathers. To dye hair with p-phenylenediamine and related dyes, a weak solution of the chemical, mixed with caustic soda, sodium carbonate, or ammonia, was applied to the hair. Then hydrogen peroxide was applied, which brought out the color. The amino dyes produced a more natural-looking black than previous dyes, and could make shades of red and brown as well.



RAW MATERIALS:

Most commercial hair dye formulas are complex, with dozens of ingredients, and the formulas differ considerably from manufacturer to manufacturer. In general, hair dyes include dyes, modifiers, antioxidants, alkalizers, soaps, ammonia, wetting agents, fragrance, and a variety of other chemicals used in small amounts that impart special qualities to hair (such as softening the texture) or give a desired action to the dye (such as making it more or less permanent). The dye chemicals are usually amino compounds and show up on hair dye ingredient lists with such names as 4-amino-2-hydroxytoluene and m-Aminophenol. Metal oxides, such as titanium dioxide and iron oxide, are often used as pigments as well. Other chemicals used in hair dyes act as modifiers, which stabilize the dye pigments or otherwise act to modify the shade. The modifiers may bring out color tones, such as green or purple, which complement the dye pigment. One commonly used modifier is resorcinol, though there are many others. Antioxidants protect the dye from oxidizing with air. Most commonly used is sodium sulfite. Alkalizers are added to change the pH of the dye formula, because the dyes work best in a highly alkaline composition. Ammonium hydroxide is a common alkalizer. Beyond these basic chemicals, many different chemicals are used to impart special qualities to a manufacturer's formula. They may be shampoos, fragrances, chemicals that make the formula creamy, foamy, or thick, or contribute to the overall action of the formula. Hair dyes are usually packaged with a developer, which is in a separate bottle. The developer is most often based on hydrogen peroxide, with the addition of small amounts of other chemicals depending on the manufacturer.

MANUFACTURING PROCESS:

Checking ingredients:

Before a batch of hair dye is made, the ingredients must be certified. That is, the chemicals must be tested to make sure they are what they are labeled, and that they are the proper potency. Certification may be done by the manufacturer in-house. In many cases, the ingredients arrive from a reputable distributor who has provided a Certificate of Analysis, and this satisfies the

manufacturer's requirements.

Weighing:

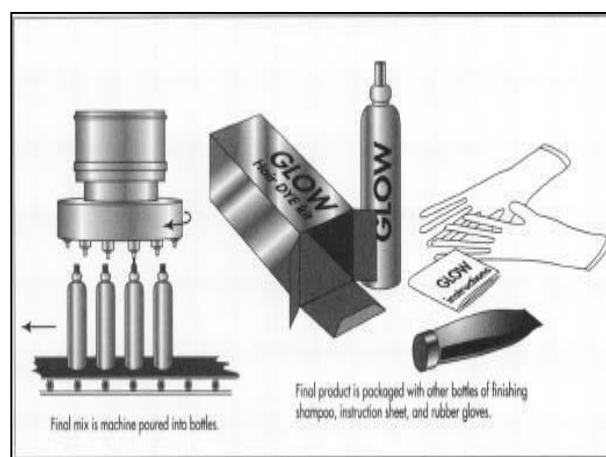
Next a worker weighs out the ingredients for the batch. For some ingredients, only a small amount is necessary in the batch. But if a very large batch is being made, and several ingredients are needed in large amounts, these may be piped in from storage tanks.

Pre-mixing:

In some hair dye formulas, the dye chemicals are pre-mixed in hot water. The dye chemicals are dumped in a tank, and water which has been already heated to 158°F (70°C) is pumped in. Other ingredients or solvents may also be added to the pre-mix. The pre-mix is agitated for approximately 20 minutes.

Mixing:

The pre-mix is then added to a larger tank, containing the other ingredients of the hair dye. In a small batch, the tanks used may hold about 1,600 lbs (725 kg), and they are portable. A worker wheels the pre-mix tank to the second mix tank and pours the ingredients in. For a very large batch, the tanks may hold 10 times as much as the portable tanks, and in this case they are connected by pipes. In a formula in which no pre-mixing is required, after checking and weighing, the ingredients go directly to the mixing step. The ingredients are simply mixed in the tank until the proper consistency is reached. If a heated pre-mix is used, the second mix solution must be allowed to cool. The ingredients that follow the pre-mix may be additional solvents, surfactants, and alkalizers. If the formula includes alcohol, it is not added until the mix reaches 104°F (40°C), so that it does not evaporate. Fragrances too are often added at the end of the mix.



Filling:

The finished batch of hair dye is then piped or delivered to a tank in the filling area. A nozzle from this tank lets a measured amount of hair dye into bottles, moving beneath it on a belt. The filled bottles continue the belt to machines, which affix labels and cap them.

Packaging:

From the filling area, the bottles are taken to the packaging line. At the packaging line, the hair dye bottle is put in a box, together with any other elements such as a bottle of

developer or special finishing shampoo, instruction sheet, and gloves and cap, or any other tools provided for the consumer. After the package is complete, it is put in a shipping carton. The full cartons are then taken to the warehouse to await distribution.

EXTRACTION AND FORMULATION OF HAIR DYE:

The extraction and formulation method of dyes from the above plants are stated in flow chart. The method of obtaining dye from plant material is environmentally friendly since water is used as solvent.

Step 1: Collection of raw materials from medicinal plant garden and authenticated by the Botanist.

Step 2: Evaluation of purity and quality of raw materials by physical, chemical, analytical and microscopical techniques.

Step 3: 100 g of the dried *Tagetes erecta* powder was treated with 100 ml of distilled water and was heated for one hour at 100°C. The extract was filtered to obtain a yellowish brown dye solution. The optical density was recorded. The extracted dye solution was evaporated to 1/10th volume under controlled temperature. The concentrated extract was subjected to freeze drying and the final yield was found to be 33 g.

Step 4: Fully ripped *Cymbomandra betacea* fruits were cleaned thoroughly. The fruits were cut in to small pieces and 100g of the sliced fruit was cooked with 500ml of distilled water for 2hrs by maintaining the temperature at 60°C. After 2hrs the whole mass was filtered to obtain a ruby-red colored aqueous extract. 500ml of the obtained aqueous extract was concentrated for 1hr at 60°C to obtain 100ml of aqueous extract. The concentrated extract was subjected to freeze drying and the final yield was found to be 36 g.

Step 5: Fresh leaves of *Aloe vera* were collected washed thoroughly and the outer green surface (pericyclic fibers) was peeled off and the inner "fillers", white mass was collected by cooping. 10^o g of the collected material was crushed to a semi-solid consistency which was subjected to filtration. The filtrate was subjected to evaporation to 1/10TH of its volume under controlled temperature (60°C) and the final yield was found to be 45 g.

Step 6: Quantitative determination of the active constituents namely flavanoids, tannins, carotenoid and polysaccharides by using HPTLC/HPLC technique.

Step 7: Formulation of natural dye with mordant: 30g aqueous extract of *Cymbomandra betacea* containing 35 % flavanoid and 10% tannins, 30g Aqueous extract of *Tagetes erecta* containing 20% carotenoid and 40g *Aloe vera* gel, as natural mordant, containing 0.3% polysaccharide and 98.5% water were mixed together.

Standard hair dyes used for the study:

Standard I

Synthetic hair dye containing paraphenylenediamine marketed as Permanent hair dye (Natural black).

Standard II

Semi-synthetic hair dye containing Amla, Bhrinraj, Methi, Henna, Hibiscus and Para-phenylenediamine, a marketed as Indica herbal hair color

Sample hair dyes used for the study:

Sample –I

- 10% Aqueous extract of *Cymbomandra betacea* (Fruits) containing 35% flavanoid and 10% tannins.
- 20% Aqueous extract of *Tagetes erecta* (Flower) containing 20% carotenoid.
- 70% *Aloe vera* gel (Leaf) containing 0.3% polysaccharide and 98.5% water.

Sample –II

- 30% Aqueous extract of *Cymbomandra betacea* (Fruits) containing 35% flavanoid and 10% tannins.
- 30% Aqueous extract of *Tagetes erecta* (Flower) containing 20% carotenoid.
- 40% *Aloe vera* gel (Leaf) containing 0.3% polysaccharide and 98.5% water.

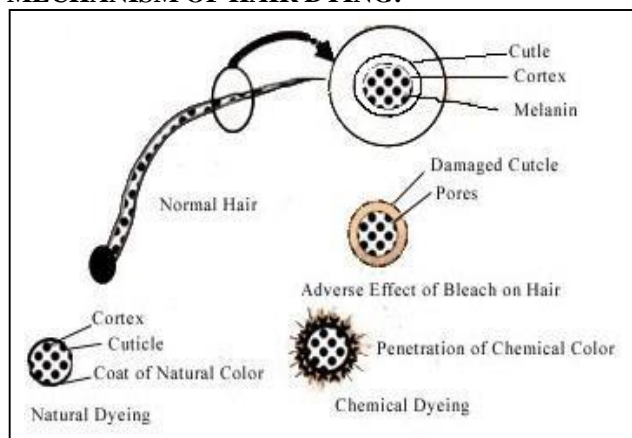
Sample –III

- 40% Aqueous extract of *Cymbomandra betacea* (Fruits) containing 35% flavanoid and 10% tannins
- 40% Aqueous extract of *Tagetes erecta* (Flower) containing 20% carotenoid
- 20% Gel of *Aloe vera* (Leaf) containing 0.3% polysaccharide and 98.5% water.

Study on the hair dying effect:

The formulated dye was applied over grey hair sample and the fastness property and dying effect was observed using system microscope. The effect was recorded, and the results are shown in Table.

Name of Hair dye with constituent	Coloring effect & fastness property	uration of exposure	Physical appearance
1. Natural hair dyed marigold flower dye + <i>Aloe vera</i> juice	4/5 to 5	30 minutes	No damage
2. Semi synthetic hair dye Indigo herbal hair color. (Henna, Amla, Bringraj, Methi, Hibiscus, resorcinol, Paraphenylene diamine and H ₂ O ₂)	4/5 to 5	15 minutes	Cortex damaged
3. Synthetic hair dye Godrej permanent hair dye (Paraphenylene diamine)	4/5 to 5	15 minutes	Cortex damaged

MECHANISM OF HAIR DYING:

Human Hair is a protein fiber made of two layers. The inner layer called cortex contains melanin. Melanin is a pigment which gives your hair shades of blonde, black, auburn or brown. Cortex is covered by another layer called cuticle. Cuticle provides protection to cortex and luster to your hair. Cuticle is inert in nature so it cannot biologically or chemically absorb any color.

Mechanism of Hair Dyeing:**By Chemical Dye:**

Most of the chemical dyes contain bleaching agents such as ammonia and/or peroxide which damage the outer most layer and create capillaries in hair shaft. Then PPD, OPD, MPD like chemical color fills these capillaries, enter in the inner layer and remain stuck inside, as permanent color. The next application again does the same on hair shaft. This results in loss of strength, roughness and permanent damage to hair.

By Natural Dye:

Natural Dye colors hair by coating the hair shaft. It provides thickness to hair and stick as a semi-permanent color. The next application again does the same and results in increase in strength and shine in hair.

SIDE EFFECTS OF USING HAIR DYES**Overexposure**

Permanent hair dyes contain ammonia and peroxide. Peroxide strips away the natural color of hair and thus exposing your hair to these chemicals regularly can cause your hair to lose luster, break easily and even lead to eventual hair fall.

Allergic reactions

Dyes contain paraphenyldiamine which is an allergen. By this, people who have dermatitis can have a severe reaction. People with eczema and psoriasis should avoid hair dyes. Not only this, but can also cause itching, skin irritation, redness, and swelling.

Effect on Pregnancy

Coloring hair can prove to be fatal for the unborn infant of pregnant women as it may cause malignancy.

Asthma

Hair dyes contain persulfates which can aggravate asthma. Continuous inhalation of the chemicals can cause coughing, lung inflammation and even asthma attacks.

SAFETY FOR HAIR DYES

Epidemiologically and human monitoring studies have not detected any risk of carcinogenicity of the ingredients used nowadays. Contact dermatitis is the main reaction. Turati. Meta-analysis definitively excluded any appreciable excess risk of bladder cancer among personal hair dye users. Although paraphenylenediamine is a common allergen, resorcinol and m-aminophenol were found more frequently in the work of Hamann although many studies have tried to find some linkage between hair dyes ingredients and cancer hazard, there is no conclusive study confirming this hypothesis.

Hair Dye Safety Checklist:

- Follow all directions on the label and in the package.
- Do a patch test on your skin every time before dyeing your hair.
- Keep hair dyes away from your eyes, and do not dye your eyebrows or eyelashes. This can hurt your eyes and may even cause blindness.
- Wear gloves when applying hair dye.
- Do not leave the product on longer than the directions say you should. Keep track of time using a clock or a timer.
- Rinse your scalp well with water after using hair dye.
- Keep hair dyes out of the reach of children.
- Do not scratch or brush your scalp three days before using hair dyes.
- Do not dye or relax your hair if your scalp is irritated, sunburned, or damaged.
- Wait at least 14 days after bleaching, relaxing, or perming your hair before using dye.
- Read the ingredient statement to make certain that ingredients that may have caused a problem for you in the past, such as p-phenylenediamine (PPD) are not present.
- If you have a problem, tell your healthcare provider.

Follow these safety tips when dyeing your hair:

- Don't leave the dye on your head any longer than needed.
- Rinse your scalp thoroughly with water after using a hair dye.
- Wear gloves when applying hair color.
- Carefully follow the directions in the hair dye package.
- Never mix different hair dye products.
- Be sure to do a patch test for allergic reactions before applying the dye to your hair. Almost all hair dye products include instructions for doing a patch test. It's important to do this test each time you dye your hair. Make sure your hairdresser also does the patch test before dyeing your hair. To test, put a dab of dye behind your ear and don't wash it off for two days. If you don't have any signs of allergic reaction, such as itching, burning, or redness at the test spot, you can be somewhat sure that you won't have a reaction to the dye when it's applied to your hair. If

you do react to the patch test, do the same test with different brands or colors until you find one to which you're not allergic.

- Never dye your eyebrows or eyelashes. The FDA bans the use of hair dyes for eyelash and eyebrow tinting or dyeing even in beauty salons. An allergic reaction to dye could cause swelling or increase risk of infection around or in your eyes. This can harm your eyes and even cause blindness. Spilling dye into the eye by accident could also cause permanent damage.

CONCLUSION:

Hair dyeing was started at an early age. Irrespective of their economic and education status volunteers dyed their hair which emphasizes the importance given to appearance. Majority used semi-permanent dyes even though they perceived natural dyes were safe. They continued dyeing despite adverse reactions which indicates cosmetic importance.

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 pharmacopoeial standards.

The limitations of currently marketed natural hair colorants used as a paste includes a lengthy soaking time, messy application and difficulty to rinse it off. This study exhibits a gel based formulation of plant powders which is stable and ready to use. Also, this developed formulation has excellent dyeing properties and good rinsability. It also imparts additional benefits such as promotion of hair growth and prevention of hair greying while being safe and ecofriendly.

The world is changing towards the use of safer, nontoxic and natural products with traditional usage. Plants play a key role in food, textile and cosmetic fields and are safe to use. A few of these natural herbs are henna, amla, neem, reetha etc. Also, the herbal hair coloring are used in various disorders such as dandruff, premature greying and head lice and etc. Used vegetable oils for hair may provide multifunctional effects such as softening, reduce dandruff and promotion of growth of hair.

Hair dyes can cause allergic reactions in a few sensitive individuals. The vast majority of hair dye allergies are delayed hypersensitivity or type IV reactions. Allergic reactions to hair dyes are rare when compared to their widespread use and occur at a rate of approximately 1 per 1

million products sold. To further minimize the risk of hair dye allergies, the cosmetic industry has voluntarily implemented risk management measures. Use of hair dye is very common among females. The public should be informed about the risks associated with excessive hair dye use.

Women should understand that natural dyes such as henna are not completely free from side effects. It is important to include information on the ingredients on hair coloring packs and mention possible side effects of both chemical and natural hair dyes.

REFERENCES:

1. Shahi Z., Mehri Khajeh. M., Hadizadeh M., A Review of the Natural Resources Used to Hair Color and Hair Care Products, July 2017, Journal of Pharmaceutical Sciences and Research 9(7):1026-1030.
2. Patel D., Narayana S., and Krishnaswamy B., Trends in Use of Hair Dye: A Cross-Sectional Study, International Journal of Trichology. 2013 Jul-Sep; 5(3): 140-143.
3. Gavazzoni Dias MF. Hair Cosmetics: An Overview, Int J Trichology. 2015 Jan-Mar; 7(1): 2-15.
4. Mallyasvkm's R., Ravikumarsvkm's P. Formulation and Evaluation of Natural Hair Colorants, International Journal of Pharmacy and Pharmaceutical Sciences Vol 7, Issue 3, 2015.
5. Gubitosa J., Rizzi V., Fini P. and Cosma P., Hair Care Cosmetics: From Traditional Shampoo to Solid Clay and Herbal Shampoo, 2019, 6(13).
6. Balsam, M.S. and Edward Sagarin. Cosmetics Science and Technology. John Wiley & Sons, 1972. Hair Dye Study May-June 1996, pp. 54-57.
7. Shahid M., Shahid-ul-Islam, Mohammad F., Recent advancements in natural dye applications, Journal of Cleaner Production 53 (2013) 310-331.
8. Mallya R., Padmini R., Formulation And Evaluation Of Natural Hair Colorants, International Journal of Pharmacy and Pharmaceutical Sciences, Vol.7-(3), 2015.
9. Dario MF., Baby AR., Velasco, Types of Hair Dye and Their Mechanisms of Action, Cosmetics 2015, 2, 110-126.
10. Chisvert A., Miralles P., Salvador A., Hair Dyes in Cosmetics: Regulatory Aspects and Analytical Methods, Analysis of Cosmetic Products, (2018), 159-167.
11. Gupta A., Malviya R., Singh T., Sharma P., Indian Medicinal Plants Used in Hair Care Cosmetics, Pharmacognosy Journal Vol 2, Issue 10, June, 2010 Page 361-364.
12. Gubitosa J., Rizzi V., Fini P., Cosma P., Hair Care Cosmetics: From Traditional Shampoo to Solid Clay and Herbal Shampoo, Cosmetics, 2019(6), 13-28.
13. Sankar J., Sawarkar S., Malakar J., Rawat BS., Ali MA., Mechanism of Hair Dyeing and Their Safety Aspects, Asian Journal of Applied Sciences, 10: 190-196.
14. Packianathan N., Karumbayaram. S., Formulation and Evaluation of Herbal Hair Dye: An Ecofriendly Process, Journal of Pharmaceutical Sciences and Research, 2010, Vol.2 (10), 648-656.