

Research Article

Evaluation and extraction of natural hair colors from different herbal and dry fruit items for formulation

Lubna Liaquat^a, Phool Shahzadi^{a,*}, Azra Yaqoob^a, Zeeshan Ali^a, Zahida Parveen^a, Alim-un-Nisa^a,
Usman Saeed Kiani^b, Razia Kalsoom^c

^aPCSIR Laboratories Complex, Lahore 54600, Pakistan

^bInstitute of metallurgy and materials engineering, Univeristy of the Punjab, Lahore 54000, Pakistan

^cPCSIR Laboratories Complex, Islamabad, Pakistan.

Abstract

In the present investigation, attempts were made to make a powder herbal hair dye resembling natural hair color with better dyeing effect, superior quality, long-lasting, and hundred percent pure. Synthetic hair dye includes dye modifiers, antioxidant alkalizers, soap ammonia, wetting agents, fragrances, and a variety of other softening agents that are harmful to health and cause cancer. To overcome these problems in the present investigation, we developed a method to get a natural brown color using a combination of different plant materials, i.e., amla (*Embllica officinalis gaertn*), olive (*Olea europaea*), almond peel, and peanut peels. The current study examined several combinations of hair-care plants, including henna, peanut, almond, walnut, indigo, and aloe vera. Additionally, basic and inexpensive ingredients were used, saving money and foreign exchange. We get brown hair naturally from these raw materials, which are themselves medicines for hair growth and have an endless list of therapeutic benefits that antimicrobial antiseptic, and anti-inflammatory herbs impart. Brown color and a scalp free from dandruff ensure quality with no side effects. It is pharmacologic invention for ageing hair, which is a vital alteration for synthetic hair dye. It is a 100% natural source. A natural herbal hair dye is an excellent colorant for all types of hair because synthetic dyes have the chief disadvantage of causing preventive reactions and hair loss. All natural hair dyes are made from plants using the latest scientific achievements in green chemistry. The result obtained from the brown hair dye process investigation confirmed that hair dye prepared from hulls was excellent and economical, with a number of benefits for hair.

Keywords:

Henna, Peanut Hull, Natural herbs, Almond Hull, Black Tea, Aloe vera.

1. Introduction

Continuously using permanent or semi-permanent hair color dye along with hair dye shampoo can heighten the likelihood of long-term exposure to synthetic hair dye chemicals, thus potentially elevating the risk of breast cancer development [1]. Hair dye A need was felt to formulate the product containing only plant products and develop a hair dye alternative to synthetic dyes / having metals salt base. The natural brown hair dye from natural sources and natural ingredients which is safe for use of hyper sensitive reaction [2]. Brown hair dyes derived from henna provide a natural hue to the hair, distributing evenly across the scalp, and resulting in fragrant, soft, and easily manageable hair. Hair dyes derived from natural sources

address issues [3] like hair cuticle damage, irritation, and scalp sensitivity. They are safe to use and don't pose problems such as skin staining, itching, or hypersensitive reactions. Products using plant-based colorants, sourced from various renewable sources, are generally considered environmentally friendly and bio-compatible [4]. The natural brown hair dye possesses full penetration to be used as coloring agent and safe hair colorant [5]. Hair dye is important cosmetic item for not only men but also for women. Now a days, oxidation dyes account for around 80% of the hair colorant industry, with the remaining non-oxidative segment which is based on synthetic organic dyes representing the remaining market, with the exception of a very small portion that is made up of lead acetate and natural colors [6]. Synthetic dye-based or permanent hair dyes typically consist of two components: color and developer. The color component typically includes various synthetic dyes and intermediates such as ammonia, diaminobenzene, phenyldiamine, resorcinol,

*Corresponding Author:

psk717@gmail.com (Phool Shahzadi)

Table 1. Ingredients Formulation for Medium Brown

Name of Hair Dye	Shade	Ingredients	Composition
H1 (Hair dye)	Medium Brown	Henna	30-35 %
		Indigo	3-7 %
		Aloe vera	5-7 %
		Peanut Hull	8-10 %
		Walnut Hull	8-12 %
		Gram Hull	8-10 %
		Pine nut Hull	8-10 %
		Almond Hull	8-12 %
		Black gram	2-3 %
		Laung	3-5 %
		Alum	2-3 %
		Lemon	3-5 %
		Black Tea	2-5 %

Table 2. Ingredients Formulation for Pale Yellow

Name of Hair Dye	Shade	Ingredients	Composition
H2 (Hair dye)	Pale Yellow	Henna	35-40 %
		Indigo	5-7 %
		Aloe vera	5-7 %
		Peanut Hull	7-10 %
		Walnut Hull	7-10 %
		Gram Hull	3-4 %
		Pine nut Hull	6-9 %
		Almond Hull	7-9 %
		Black gram	2-3 %
		Laung	3-5 %
Alum	2-3 %		
Lemon	3-5 %		

ortho-para-aminophenol, p-toluenodiamine, green ingredients, and their variants. These ingredients, often in forms like HCl or sulfate (e.g., PPP), are potent irritants and have been linked to allergic reactions [7]. Other irritant ingredients include H₂O₂ naphthol. The release of reactive oxygen species (ROS) following dye exposure is another factor that may lead to skin allergies [8, 9]. Hair dye sold in the European Union containing any of the listed ingredients must carry a warning due to their potential to cause allergic reactions and penetrate the skin, leading to a risk of cancer. Prolonged use of such hair dye typically results in local irritation and skin toxicity. It can also manifest as blisters, itching, rashes, pigmentation issues, and in some cases, serious dermatological disorders, indicating a wide range of potential biological effects [2, 10]. In spite of above disadvantage natural dye possess some limitation and technical drawback like color yield, higher cost, limited shades, low fastness properties and blending problems. The increase in synthetic dyes over the past three centuries has led to the neglect of natural dyes, resulting in a decrease in research efforts dedicated to them [5, 11]. To address the limitations of natural dyes, a systematic scientific approach can be employed. The active constituents also offer protection against hair damage caused by photo reactions and pollution. This formulation has been demonstrated to be a viable alternative to synthetic and semi-synthetic dyes in vitro. In the current study, a formulation has been developed to achieve a natural brown color using a combination of natural ingredients. The primary objective of this investigation is to formulate a hair color that is both natural and safe.

2. Materials and Methods

2.1. Production Profile

The present investigation provides a process for the preparation of herbal hair dye. The plants used in the study are Henna (*Lawsonia viernis Lim*), Indigo, Aloe vera, *Sapindu mucrorosia*, *Embica officinalis*, olive, Walnut Hull, Peanut Hull, Almond Hull were collected, dried in shade till they contain moisture less than 2-3% by mass.

The shade dried weighed plant were crushed to powder form by using electrical speeder. The powdered form material has

tannin or coloring agent [12]. The fine powder raw material was soaked in water

1. Weighed quantity of Henna (*Lawsonia viernis Lim*) mix with sugar.
2. Grinding the Indigo, Aloe vera, and olive homogenously.
3. Grinding the Peanut Hull, Almond Hull and Black Walnut Hull.
4. Soaking above ingredients into the bowl.
5. Boil at simmering point 85-90°C for time period of 30-50 min.
6. Filter it after boiling.
7. The filtrate added in mixture of Henna, Sugar, Vinegar Laung and small quantity of alum under constant vigorous stirring at moderate temperature maintained ph 7-8.
8. Dry it at room temperature
9. The powder from colored hair dye was formulated with suitable ratio of low or high quantity under safe limits to obtain the required composition. It is like a part adding a fragrance agent applied to the hair for light or dark brown shade.

Table 3. Ingredients Formulation for Dark Brown

Name of Hair Dye	Shade	Ingredients	Composition
H3 (Hair dye)	Dark Brown	Henna	25-30 %
		Indigo	2-5 %
		Aloe vera	3-5 %
		Peanut Hull	5-8 %
		Walnut Hull	10-12 %
		Gram Hull	10-12 %
		Pine nut Hull	10-12 %
		Almond Hull	10-12 %
		Black gram	2-3 %
		Laung	5-5 %
		Alum	2-3 %
		Lemon	3-5 %
		Black Tea	3-7 %

2.2. Brown Herbal Hair Dye Preparation

The henna Black tea, sugar lemon, Almond peel, Peanut Pel Walnut Hull etc were collected from different places and dried

Table 4. Herbal Hair Dye

S. No.	Name of Hair Dye	Herbal Hair Dye	Coloring effect or fastness properties	Duration of retaining/permeance	Physical Appearance
1	H1 (Hair dye)	Medium Brown (H1)	4/5 to 5	2-3 months	Very good to excellent
2	H2 (Hair dye)	Pale Brown (H2)	4/5 to 5	2-3 months	Very good to excellent
3	H3 (Hair dye)	Dark Brown (H3)	4/5 to 5	2-3 months	Very good to excellent

in shade for maintain it color an ph. After processing they were crushed into powder and used for the preparation of brown hair colorant [13].

2.3. Collection of unpigmented hair

The human white hair was collected from the barber shops and also from our aged colleague. Suitable combination of different ingredients with henna, 10g aloe vera, 5g indigo, 5g olive, 2g walnut hull, 2g peanut hull, 1g almond skin hull, after crushing into powder for mixed well and (2g black tea and 10 ml water) was added to water in order to make smooth paste. The paste was kept aside or 1-2 hours. The white human hair was kept or put in above. Paste for 1-2 hours. Mixed well with spatula. 2-5 gm sugar and lemon juice as color preservation also added. After that it was washed with tape water and observed for its coloring. Suitable permanent color fast combination of henna and ingredients: Different ratios of henna and ingredients are mixed together to get color fast paste for human white hair and effect of pH was studied. To the paste of above ratio dilute solution of sugar and lemon juice were added in order to obtain the pH of 6,7,8, and 9.

3. Results and Discussion

Progressive natural brown hair dyes offer superior dyeing effects with increased retention capacity, resulting in long-lasting color. The brown shade is unique with its natural characteristics, and immediate results can often be achieved with just one application. One of the key advantages of this brown hair color is its ability to avoid irritation, itching, dandruff, and scalp weakness, while simultaneously providing hair with strength and luster [14].

Natural hair dyes like black walnut powder, almond, peanut hull, indigo, aloe vera, olive, sugar, black tea, lemon, etc., are potent and effective options for dyeing hair naturally. These ingredients are also beneficial for eliminating dandruff and promoting hair growth. In the preparation of brown herbal hair dye, ingredients such as henna, black tea, sugar, lemon, almond peel, and walnut peel are utilized, offering a safe option without side effects [15]. Conversely, chemical-oriented products may provide quick results but can also lead to serious side effects. To address these concerns, opting for herbal hair dyes with attractive shades is recommended.

4. Conclusion

Hair color dyeing is only one of the technologies involved in getting the right color on to the right herbal dye materiel in order to use it effectively. The hair dyeing will need at least one day addition and probably several to achieve the correct or fast hair dye.

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