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STUDY OF FORMULATION AND EVALUATION OF HERBALHAIR DYE

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ABSTRACTS

Herbal drug treatments are plant derived substances or product with therapeutic or different human advantages which incorporate both uncooked or processed elements from one or extra plants. Herbs are used in various beauty formulations such as natural shampoo, natural tablets, natural hair dye, natural toothpaste etc. In evaluation to natural hair dyes, artificial hair dyes are suggestedto reason pores and skin and other pores and skin associated diseases. The foremost and goal of current find out about is formulation and contrast of natural hair dye. In this learn about dried alcoholic extracts of henna, indigo, amla, bhringraj, myrobalan and tea decoction in distinctive attention are used for six hair colorant formulations. The brown coloration protecting energy of human hair of every formulation retained for 30 days at room temperature.

KEYWORDS: Materials, Extraction, Preparation, Chemical test and evaluation.

INTRODUCTION

The social magnitude of bodily look and splendor has been documented in many studies, which requires luxuriant hair, vivid eyes, glowing tooth and flawless skin, the place grey hairs act as a hindrance. Graying of hair happens due to a range of motives like genetics, stress, dietary deficiency and disease. The most important cause of untimely graying is hereditary and it is pronounced that by way of the age of fifty, half of the world's population will have fifty percentagegrey hair. Hence there is a massive demand for hair dyes in the market.

The manufacturing technique is hazard to fitness of the human beings concerned in the

method and its functions leads to environmental air pollution and additionally reasons potential side consequences to the customers of the product. The worry of aspect results from the artificial dyes has confined its use by using fitness aware clients in the course of the world and has to overcome various regulatory limitations earlier than it reaches its destination.

A dye can commonly be described as a coloured substance that has an affinity to the fibre,for hair. The dye is normally utilized as aqueous solution, and may additionally require mordant to improve the fastness of the dye on the fibre, fur or hair. Natural dyes additionally referred as mordant dyes. Different mordant will supply unique hue shade with the equal dye. A mordant is for this reason an agent which approves a response to take place between the dye and the fibre.

Hair dyes include Amla, Hibiscus, Henna, Coffee and Custard Apple Pulp Powder.Colorants are classified as being temporary or permanent. In temporary colouring the color can be washed from hair easily.

However substantial improvement is needed in the areas of color saturation, colour development, precise initial color consistency, improvement wash fastness, improved hair conditioning without causing hair damage and skin irritation. Because of the manufacturing hazards, environmental pollution, its side and toxic effects there is a vital need for an alternative to the existing greenish brown colour dye.

Fresh researchers have found that Egyptians, Greek and Roman were using to dye their hair several thousand years ago. Many different extracts form plant were used for the purpose of hair dyeing in Europe and Asia before the invention of modern dyes. There are three type of hair dye ie, temporary, semi-permanent and permanent hair colour. The dyeing of the hair is an ancientart that involves treatment of the hair with various chemicals compound. Hair dye has been used in Ancient Egyptian times when Rameses reinforced red hair color using henna. In ancient Greece,the hair was bleached with a rinse of potassium solution and rubbed with a type of ointment madeof yellow flower petals and pollen. As compared to the chemical based hair dye, which cause skin and other skin related disease, natural herbal dye are being preferred nowadays. Herbal drugs without any adverse effect are used for healthy hair. The need of herbal based natural medicine is increasing fastly due to their natural goodness and lack of side effects.[1]

ADVANTAGE OF HERBAL HAIR DYE

- No mess or hair color stains on your skin.
- Using herbal hair color is one of the best quick fixes without any side effects.
- This hair dye will help you strengthen your hair and keep your hair protected from chemicals throughout the procedure.
- If you want soft and silky-colored hair, this the best option.
- Both men and women can use it.

DISAVDANTAGES OF HERBAL HAIR DYE

- Herbal drugs have slower effects as compare to allopathic dosage forms.
- It requires long term therapy.
- They are difficult to hide taste & odor.
- Manufacturing process are time consuming & complicated.
- No pharmacopoeia defines any specific procedure or ingredients to be used in any of herbal cosmetics.

Powder of Herbal Hair Dye

REVIEW OF LITERATURE

1. ***(Rashmi mallya and Padmini ravikumar et al., 2014)*** reported the formulation and evaluation of natural hair colorants- Marketed hair colors containing crude plant powders require processing prior to use which is inconvenient to the consumer and these products also have poor rinsability. Hence, there is a need to formulate hair dyes containing crude drugs which are ready to use with good rinsability.
2. ***(S. Sri Bhuvaneswari, T. Prabha and S. Sameema Begum et al., 2021)*** reported the

Formulation and evaluation, comparison of herbal hair dye with marketed Formulation Herbal products are being preferred due to the advantages in contrast to the synthetic one which has adverse effect on human health because of harsh chemicals like paraphenylene diamine. The word "Herbal" is a symbol of safety.

3. ***(Padmaja Naishadham, Sushma P.R and Rohan Dasika et al., 2013)*** reported the Evaluation of Organic Hair Dye Formulation by an Environment Friendly Process Graying of hair is a natural phenomenon attributable to ageing and frequent use of synthetic shampoos which has encouraged application of synthetic dyes with the increase in the usage of hazardous chemicals in the process of manufacturing.
4. ***(Laxmi N Jamagondi and Aniket S Katte et al., 2019)*** reported the Development and evaluation of herbal hair dye Formulation- Conventional methods of hair dyeing involve use of chemicals that result in unpleasant untoward effects which include irritation, breakage of hair, skin discoloration and cancer. Marketed hair colors containing crude plant powders require processing prior to use, which is inconvenient to the consumer and these products also have poor rinsability. Hence, there was a need to develop a formulation of hair dye with colour extract from plant source which is ready to use with good rinsability.
5. ***(P. Meenaprabha, V. Kamalakkannan and R. Sambathkumar et al., 2021)*** reported formulation and evaluation of herbal hair dye herbal medicines are plant derived materials or product with therapeutic or other human benefits which contain either raw or processed ingredients from one or more plants.
6. ***(Kadambari tomer1, neeraj k. sethiya and vijendra singh et al., 2009)*** reported preparation and characterization of some polyherbal formulation for evaluation of hair colorant effects. The Indian subcontinent is enriched by a variety of flora both aromatic and medicinal plants. Herbal drugs constitute a major part in all the traditional systems of medicine. There are approximately 1250 Indian medicinal plants, which are used in formulating therapeutic preparation according to Ayurveda and other traditional system of medicine.
7. ***(Nilani Packianathan1 & Saravanan Karumbayaram et al., 2010)*** reported Formulation and Evaluation of Herbal Hair Dye: An Ecofriendly Process The increase in environmental and health hazards in the manufacture of dyes and its use throughout world is a major concern.
8. ***(Miss. Mane Ashwini Ganpa et al., 2021)*** reported the Formulation and Evaluation of Herbal Hair Dye" Hair dye cosmetic products are used for colouring hair. Hair dye classified according to color resistance, into classified, according to color, resistant, into

temporary, semi-permanent and permanent. In oxidation system, there is an intense diffusion of the molecule into the cortex, what promotes a longer color resistance. Dye and color precursors present difference related to chromophore groups.

9. ***(Phadatare suvarna P, Pesari tanuja N, Pokharkar Deepak and Pingle R.P., 2015)*** reported preparation, evaluation and hair dyeing activity of herbal hair oil and comparison with marketed dye the usage of herbal cosmetics has been increased to many folds in personal care system and there is a great demand for herbal cosmetics that offer multifunctional effects.
10. ***(N. Santhosham, J. Jahnavi, N. Mounika, N. Vishnu, R. Bhargavi, SK. Manjoorilhali and S. Vamsikrishna et al., 2023)*** reported peparation and evaluation of herbal hair dye herbal based hair dyes are being preferred on large scale, due to the vast number of advantages it exerts to overcome the ill-effects of a chemical based hair dye.

OBJECTIVES OF THE STUDY

- List of reasons people color their hair.
- Explain how the hair's porosity affects hair color.
- Understand the types of melanin found in hair.
- Define and identify levels and their role in formulating hair color.
- Identify primary, secondary and tertiary color.
- Know what role tone and intensity play in hair color.
- List and describe the categories of hair color.
- Explain the action of hair lighteners.
- List and describe the procedure for a virgin single-process colour service.
- Understand the two processes involved in double-process hair colouring.
- Describe the various forms of hair lightener.
- Understand the purpose and use of toners.
- Know how to properly cover gray hair.
- Know the safety precautions to follow during the hair colour process.

MATERIALS AND METHODS

4.1. Collection of Sample Churnam

The sample of herbal hair dye like Amla, Coffee, Custard apple pulp powder, Henna and Hibiscus were purchased from local raw material trade at Kuttiyappa Stores, Krishnagiri and the brand name was IMPCOPS which was manufactured by the Indian Medical Practitioners

Co- operative Pharmacy & Stores Limited, Thiruvanmiyur, Chennai- 600 041.

4.2. Description of Herbal Hair Dye

The prepared herbal hair dye contains all the goodness of natural ingredients. Apart from acting as a hair dye, this formulation, because of the perfects blend of herbal, also acts as a hair growth promoter, hair nourisher, conditioner and anti-dandruff agent as well as Amla, Coffee, Custard apple pulp powder, Henna and Hibiscus.

1. AMLA (*Emblica officinalis*)
2. COFFEE (*Coffee arabica Linn.*)
3. CUSTARD APPLE PULP POWDER (*Annona squamosal)*
4. HENNA (*Lawsonia inermis.*)
5. HIBISCUS (*Hibiscus rosa*.).

AMLA

Synonyms: Emblica, Indian goose berry, Amla.

Biological Source

This consists of dried, as well as fresh fruits of the plant "*Emblica officinalis"*

Family: Euphorbiaceae.

Amla Powder

Geographical source

It is a small or medium-sized tree found in all deciduous forests of India. It is also found inSri lanka and Myanmar.

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

COFFEE

Synonyms: Coffee bean, Coffee seed, Arabica coffee, Abyssinian coffee, Brazilian coffee.

Biological source

It is the dried ripe seeds of "*Coffee arabica Linn."*

Family: Rubiaceae.[3]

Coffee powder

Geographical source

It is indigenous to Ethiopia, Brazil, India, Vietnam, Mexico, Guatemala, Indonesia and Sri Lanka.

Chemical constituents

- Caffeine
- Tannin
- Fixed oil
- Proteins

Uses

- Applying coffee topically to hair and the scalp might stop hair loss and promote regrowth.
- Sprinkle coffee grounds in your backyard to repel snails and fleas.
- Reuse coffee grounds to exfoliate our scalp to unclog hair follicles.
- Create a vintage look on clothes or napkins by using coffee.
- Make coffee oil to lighten and brighten the eye area.
- Mix coffee grounds with body wash for a body and foot scrub.

CUSTARD APPLE PULP POWDER

Synonyms: Sugar apple, Sitaphal, Custard apple.

Biological source

"Annona squamosal" is a small and well-branched tree that gives edible fruits known as sugar apple.

Family: Annonaceae.[5]

Custard apple pulp powder

Geographical source

Squamosa also branded as Sugar apple or Custard apple is considered endemic to tropical America but is widely distributed in tropical and subtropical countries in Asia such as Malaysia, Laos, Thailand and Vietnam.[17,18] In India it is scattered all over Rajasthan where they grow wildin the Aravalli hill region.[19]

Chemical Constituents

- Alkaloids,
- Phenolic compounds,
- Flavonoids,
- Saponins,
- Tannins,
- Phytosterols,
- Carbohydrates,
- Proteins
- Amino acids.

Uses

- Custard apple is very beneficial in managing hair fall if it is applied on hair of scalp.
- Using Custard apple can manage the hair fall as it contains vata balancing property and of it is used continuously.
- It can help in providing nutrition to the hair.

HENNA

Synonyms: Alcanna spinosa, Casearia multiflora, Lawsonia alba, Lawsonia speciosa, Lawsoniaspinosa, Lawsonia and Rotantha combretoides.

Biological source

The plant *"Lawsonia inermis"*, well known for its cosmetic and therapeutic virtues. Henna leaves are natural sources of colour for hand, feet, fingers, nail and hair.

Family: Lythraceae.[6]

Henna Powder

Geographical sources

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)
- Tannins (gallic acids).

Uses

- Henna repairs the damaged hair strands and restores the acid-alkaline balance of the scalp.
- Henna is best to colour 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 the dandruff and scalp infections effectively.
- Henna is used in cosmetics, hair care products and also used as a dye for hands, clothing

and nails.

HIBISCUS

Synonyms: Shoeblack plant, Mahagua, Mahoe, Cotton rose, Roselie, Jamaica sorrel, China rose.

Biological sources

It is obtained from flowers of *"Hibiscus rosa sinensis Linn."*

Family: Malvaceae[6]

Hibiscus powder

Geographical sources

The hibiscus plant is Native to tropical Asia, China and Philippines.

Chemical constituents

- Ascorbic acid
- Thiamine
- Citric acid
- Glucose
- Fructose
- Oxalic acid
- Riboflavin

Uses

- Leaves and flowers can be used as a hair growth promoter and to prevent premature graying and to treat scalp disorders.

- The flowers is reported to be good for the treatment of heart diseases, diabetes, epilepsy, leprosy, etc.
- The flowers of *"Hibiscus rosa sinensis"* can be used to control high blood pressure, stomach pain, liver diseases, etc.
- *"Hibiscus rosa sinensis"* can be used as a diuretic.

4.3.Health benefits of herbal hair dye

i. The principal colouring ingredient is Lawsone which acts as a non-oxidizing hair colour. Henna also contains flavonoids and gallic acid which act as mordents in the process of colouring. Henna helps in adjusting the scalp pH preventing premature graying of hair. It also has antifungal activity and helps in preventing dandruff.

ii. Henna is a natural hair dye that has been used by people to colour their hair. Natural hair dyes have been used by people all over the world for several decades. Henna just doesn't help in dyeing your hair but it also nourishes the hair and hence, it is so popular.

iii. It is might help to stop hair fall. When the scalp is healthy and the hair follicles are clean, your hair is less likely to fall because one of the major reasons for hair fall is an unhealthy scalp.

iv. Amla helps in maintaining the hair colour, strengthens hair follicles, promotes hair growth and reduce hair loss. Possess antibacterial and antioxidant properties which makes the hair healthy and lustrous.

v. It's extract is used as a hair cleanser and controls dandruff. Its lowers scalp pH and hence retains natural oils which make the hair shiny and lustrous and prevents split ends and hair fall.

vi. Coffee is used as natural hair colourants.

vii. It helps in darkening your hair colour and enhancing the texture.

viii. Its acts as a dye that adds to your hair colour besides giving it a good scalp treatment.

ix. Hibiscus is naturally enriched with Calcium, Phosphorus, Iron, Vitamin B_1, Vitamin C, Riboflavin, and Niacin which promote thicker hair growth and reduce premature graying, also acts as a conditioner.

4.4.EXTRACTION

- Extract: Extract can be defined as preparations of crude drug which contain all the constituents which are soluble in the solvent.
- It is a separation process involves the separation of medicinally active portions of plant or

animal tissues from the extraction inactive or inert components by using selective solvents in standard extraction procedures.

- In this method the selected components are dissolved by the use of selective solvents known as menstrum & undissolved part is a marc. After the extraction unwanted matter is removed. Extracts are prepared by using ethanol or other suitable solvent.

4.4.1. Decoction

- In this process the crude drug is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered.
- After boiling, the liquid is strained and water is passed through the content of the strainer to make the required volume.
- This procedure is suitable for extracting water-soluble, heat stable constituents.

Decoction Extract

Procedure

- The herbal powder's collected and sieved resulting in fine powder (30gm).
- The powder was soaked in distilled water (70ml).
- The subsequently mixture was subjected to different temperature (60, 75 & 80^{o}C) and time (30, 45 & 60mins).
- The result solution was filtered and collect pure extract.
- The temperature, concentrate and time combination yielding the maximum absorption-

were taken as optimum condition for extraction of drug.

- The extract was prepared by using decoction methods.

4.5. PRELIMINARY PHYTOCHEMICAL SCREENING

Preliminary analysis of extracts was carried out to identify the presence of various phytoconstituents by employing standard protocols. The results were summarized in Table after conducting the following chemical tests.

Tests for Alkaloids

a. **Dragendorff's test:** By adding 1ml of Dragendorff's reagent to 2ml of extract, an orange red precipitate was formed, indicating the presence of alkaloids.
b. **Mayer's test:** Few drops of Mayer's reagent were added to 1ml of extract. A yellowish or white precipitate was formed, indicating the presence of alkaloids.
c. **Hager's test:** 2ml of extract were treated with few drops of Hager's reagent. A yellow precipitate was formed, indicating the presence of alkaloids.

Tests for Caffeine

a. **Murexide test:** To 3-4ml of extract solution and add 3-4 drops of concentrated nitric acid and evaporate to dryness, cool & add 2 drops of ammonia hydroxide, the resulting purple colour is produced, that indicating the presence of caffeine.

Tests for Flavonoids

a. **Alkaline reagent test (flavonones):** Two to three drops of sodium hydroxide were added to 2ml of extract. Initially, a deep yellow colour appeared but it gradually became colourless by adding few drops of dilute hydrochloric acid, indicating that flavonoids were present.
b. **Shinoda's test (flavones):** Ten drops of dilute hydrochloric acid and a piece of magnesium were added to 1ml of extract, the resulting deep pink colour indicating the presence of flavonoids.

Test for Carbohydrates

a. **Molisch's test:** Few drops of alcoholic α-naphthol solution were added to 2 ml of extract, later a few drops of concentrated sulphuric acid were added along the walls of test tube at the junction of two liquids, a violet colour ring appeared, indicating that carbohydrates were present.

b. **Benedict's test:** To 5ml of Benedict's reagent, 8-10 drops extract were added, then heated for five minutes; the resulting dark red precipitate indicates the presence of Carbohydrates.
c. **Reducing sugars (Fehling's test):** To 2ml of extract, an equal volume of Fehling's (A & B) solution was added and heated for five minutes, the resulting red/dark red precipitate indicating the presence of Carbohydrates.

Test for protein

a. **Biuret test:** To 3ml of extract, and add the 4% of Sodium hydroxide and add to few drops of 1% of Copper sulphate solution, the results are violet or pink colour appearance that indicating the presence of protein.
b. **Millon's test:** Mix 3ml of extract solution, add the 1ml of concentrated sulphuric acid, the results are white precipitate, white precipitate turns brick red precipitate, indicating the presence of protein.
c. **Xanthoproteic test:** Mixed 5ml of extract solution with 2ml of 40% of sodium hydroxide solution and 2 drops of 10% of lead acetate solution heated to boil, the results are brownish due to lead formation is produced that indicating the presence of protein.

Test for volatile oil

a. **Stain test:** Stain the filter paper with extract solution, the resulting filter paper is not permanently stained is indicating the presence of volatile oil.

Test for Steroid

a. **Salkowski's reaction:** To 2ml of extract, add 2ml of chloroform and add 2ml of concentrated sulphuric acid shake well, the resulting chloroform layers appears red and acid layers shows greenish yellow fluorescence, indicating the presence of steroid.
b. **Libermann-Burchard reaction:** Mix 3ml extract with 3ml acetic anhydride heat and cool add few drops of concentrated sulphuric acid along the side of test tube, the resulting first red, blue and finally green colour are produced that indicating the presence of steroids.

Test for Glycosides

a. **Baljet's test:** In section of drug add sodium picrate, the resulting section shows yellow to orange colour are produced that indicating the presence of glycosides.
b. **Legal's test:** To aqueous or alcoholic extract add 1ml pyridine and 1ml of sodium nitro prusside, the resulting colour is pink, that indicating the presence of glycosides.
c. **Keller-kiliani test:** To 2ml extract with add glacial acetic acid and one drop 5% of ferric

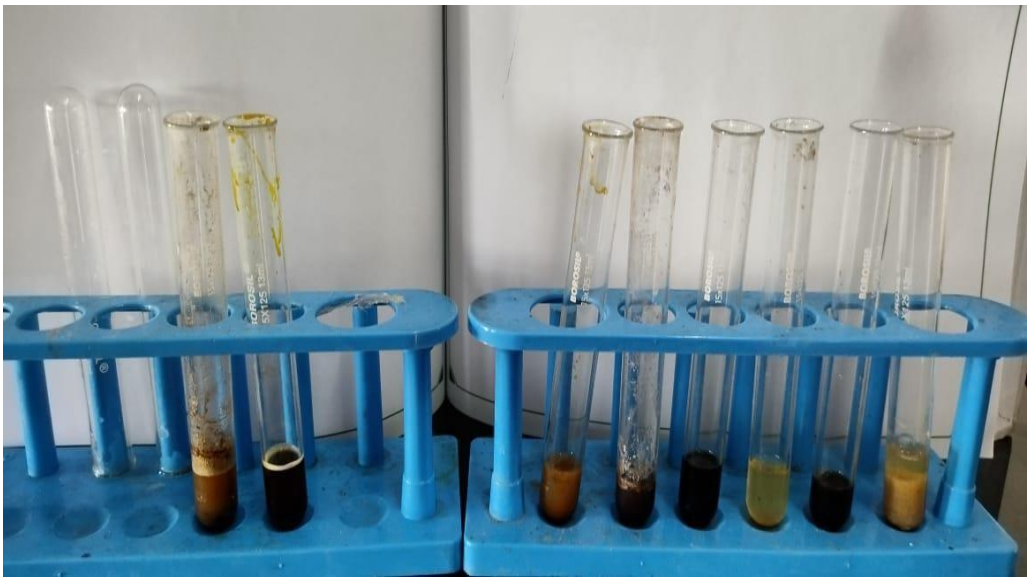
chloride and concentrated sulphuric acid, the resulting is reddish brown colour is produced at junction of the two liquid layers and upper layer appears bluish green indicating the presence of glycosides.

Test for vitamins

a. Dissolve a quantity equivalent to 10-15 units in 1ml of chloroform and add 5ml of antimony trichloride solution, transient blue colour is produced immediately, that indicating the presence of vitamins.
b. Dilute 1ml of 2% w/v solution with 5ml of water and add 1 drop freshly prepared 5% w/v solution of sodium nitro prusside and 2ml of dilute sodium hydroxide solution and add 0.6ml of hydrochloric acid drop wise and stir, the resulting colour is yellow that turns to blue indicating the presence of vitamins.

Test for Tannins

a. To 2-3ml of aqueous or alcoholic extract add few drops of lead acetate solution, the resulting is white precipitate, indicating the absence of tannins.[7]



4.6. PHYSICO-CHEMICAL ANALYSIS OF HERBAL HAIR DYE

Physico-chemical analysis involves ash value such as total ash (%), acid-insoluble ash (%), sulphated ash and loss on drying.

DETERMINATION OF ASH VALUE

Total Ash value

2 gm of powder was weighed accurately in a previously ignited and tarred silica crucible. The

material was then ignited by gradually increasing the heat to 500-600^{o}C until it appear white indicating absence of carbon. It is then cooled in a dessicator and total ash in mg per gram of air dried material is calculated.

Acid Insoluble Ash Value

To the crucible containing total ash, 25 ml of hydrochloric acid was added and boiled gentlyfor 5 minutes, and then about 5 ml of hot water was added and transferred into crucible. The insoluble matter was collected on an ashless filter paper. This was then washed with hot water until filtrate is neutral and the filter paper along with the insoluble matter was transferred into crucible and ignited to constant weight. The residue was then allowed to cool and then weighed.

Sulphated ash

Take 1-2gm of powder in an accurately weighed crucible; ignite gently at first until the substance thoroughly charred. Cooled, moistened the residue with 1ml of sulphuric acid, heat gently until white fumes are no longer evolved & ignite at 800^{o}C ± 25^{o}C until black particles havedisappeared. Allow the crucible to cool and weigh. Repeat the operation two successive weighingin shouldn't differ by more than 0.5mg.

DETERMINATION OF LOSS ON DRYING

Loss on drying was determined by weighing about 2gm of the powder material inpreviously weighed dried petridish (tarred evaporating dish) and dried in an oven at 105-110^{o}C, take two consecutive weights, which do not differ by more than 5mg. The weight after drying wasnoted and loss on drying was calculated. The percentage was expressed as %w/w with reference to air dried sample.

4.7. RHEOLOGICAL EVALUATION OF HERBAL HAIR DYE

Physical parameters like untapped or bulk density, tapped density, the angle of repose were observed and calculated for the dye formulation.

DETERMINATION OF BULK DENSITY

The given powder is carefully introduced into 100ml graduated cylinder to the mark of 50ml. The tapped or dropped on a horizontal hard wooden surface a height of one inch at 2seconds intervals and change in volume in obtained. The tapping in continuous until the constant value ofthe volume in obtained. Then the powder is weighed and bulk density is calculated

using the formula.

DETERMATION OF ANGLE OF RESPOSE

Angle of response of the given sample is determined by funnel method. The herbal hair dye powder is added in increasing concentration of 1%, 2% and 3% to the sample and the angle of repose is determined for the sample.[9]

4.8. PATCH TEST FOR HERBAL HAIR DYE

- 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 to the two components.
- If after 48 hours there is no itching or redness, process with the application of the product.

Patch test

4.9. Herbal hair dye procedure

- The ingredients used are Amla, Hibiscus, Henna, Coffee and Custard Apple Pulp Powder.
- The ingredients are sieve at the number 85 to get the fine powder.
- Weight the sample accurately.

S. No.	Ingredients	Quantity (30gm)
1	Hibiscus	3gm
2	Custard apple pulp powder	5gm
3	Coffee	6gm
4	Amla	8gm
5	Henna	8gm

- The sample are mixed uniformly by using the Mortar and Pestle.
- After the mixing the herbal dye is packet with the air tight button cover.
- The dye can be used with a mixing sufficient quantity of water.

Before Hair Dye Application

After Hair Dye Application

RESULT AND DISCUSSION

The various evaluation parameter of herbal hair dye are organoleptic evaluation, physicochemical evaluation, phytochemical evaluation, rheological evaluation and patch test.

5.1. PHYSICO-CHEMICAL EVALUATION OF HERBAL HAIR DYE

After the successful physicochemical analysis the demonstrated value are as follows.

Table 1: Physico-chemical evaluation of herbal hair dye.

S. No.	Parameter	Results
1	pH	6.7
2	Ash Value	0.18% w/w
3	Loss on Drying	1.7% w/w
4	Sulphated Ash Value	15.5% w/w
5	Acid insoluble Ash Value	1% w/w

5.2.PHYTOCHEMICAL EVALUATION OF HERBAL HAIR DYE

After the successful phytochemical evaluation studies, it shows the presence of alkaloids, flavonoids, carbohydrates, protein, volatile oil, steroid, glycosides, vitamin, tannins and caffeine.

Table 2: Phytochemical evaluation of herbal hair dye.

Test	Presence/ Absence in Aqueous Extract of HerbalHair Dye
Alkaloids	+
Flavonoids	+
Carbohydrates	+
Caffeine	+
Protein	+
Volatile oil	+
Steroid	+
Glycosides	+
Vitamin	+
Tannins	-

Presence (+)Absence (-)

5.3. RHEOLOGICAL EVALUATION OF HERBAL HAIR DYE

After the successful rheological evaluation study was done and it shows the bulk density, tapped density and angle of response.

Table 3: Rheological evaluation of herbal hair dye.

S. No.	Parameters	Results
1	Bulk density	0.32
2	Tapped density	0.51
3	Angle of response	27.55

5.4. PATCH TEST FOR HERBAL HAIR DYE

After the successful patch test study was done and it indicates the absence of swelling,redness or irritation.

Table 4: Patch test of herbal hair dye.

S. No.	Parameters	Results
1	Swelling	Negative
2	Redness	Negative
3	Irritation	Negative

5.5 EVALUATION PARAMETERS OF HERBAL HAIR DYE

After the successful stability test was done and it shows the colour, odour, pHdetermination, Texture, smoothness.

Table 5: Evaluation parameters of herbal hair dye.

S. No	Parameters	Temperature
1	Colour	No Change
2	Odour	Characteristic in odour
3	pH determination.	6.7
4	Texture	Fine
5	Smoothness	Smooth

CONCULSION

A herbal hair pack colours the hair in an atmost gentle manner. The advantages of herbal based cosmetics are non-toxic in nature. It nitrifies the skin of the scalp and hair. This hair formulation provides vital nourishment to the skin. It helps to treat dandruff by removal of excessoil from scalp. Frequent use of this pack leads to manageable, frizz free coloured hair. Pollution, ageing, stress and harsh climates badly affect the quality of hair. In this research, we found effective properties of the herbal hair pack and further studies are needed to be performed to explore more useful benefits of this herbal hair pack. Natural remedies are widely accepted with open hands nowadays as they are safer with minimal side effects as compared to the chemical based products. Herbal formulation are in great demand to fulfill the needs of the growing world market. It is noticeable attempt to formulate the herbal hair pack containing the goodness of powder of different plant, which are excellent for hair care.

The prepared herbal hair dye contains all the goodness of natural ingredients. Coffee for hair strengthens hair by improving the overall quantity and texture of it. Hibiscus is excellent for hair growth activity. Custard apple pulp powder is help in premature graying of hair. Custard apple pulp powder is a great natural source of copper and gives hair the dark melanin color. Organoleptic evaluation finding revealed that the pack is smooth and pleasant smelling powder. Phytoconstituents, which access as true nourisher for the scalp as well as hair.

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