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# FORMULATION AND EVALUATION OF POLY HERBAL HAIR OIL

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**ABSTRACT**

The word cosmetic was derived from the Greek word "kosmtikos" meaning having the power, arrange, skill in decorating. Hair care products are defined as the formulations which are used for the purpose of cleansing, modifying the hair texture, providing nourishment to the hair and maintaining the healthy appearance of hair. Polyherbal hair oil, also called as herbal natural oil, are made from plant-based ingredients and botanical extracts. Hair oil formulation applied to the hair for the treatment of hair disorder such as baldness, greying of hair, hair fall, dry hair and helps in providing nourishment to hair. The preparation of the Polyherbal hair oil is based on Herbal formulation and Evaluation including organoleptic and physicochemical parameters determination. The organoleptic test such as colour, Odor and texture, pH, Acid value, Saponification value was measured and observed. Different herbal ingredients such as olive oil, coconut oil, clove oil, amla, neem, bhringraj, hibiscus, onion seed, ashwagandha were used to make poly herbal oil. Using varying amount of the plant part, the herbal formulation was created and assessed for the evaluation.

**KEYWORDS:** Hair oil, herbs, formulation, preparation, evaluation, results and discussion.

## 1. INTRODUCTION

Hair is one of the vital parts of the body considered to be protective appendages on the body. The problems associated with it includes hair loss, unruly hair, lack of hair volume, conditioning, immature greying, dandruff, thinning of hair, dullness etc.[1] Hair can vary in shape, length, diameter, texture, and colour. The cross section of the hair could also be circular, triangular, irregular, or flattened, influencing the curl of the hair. Different natural hair products are used to overcome this problem. They contain hair growth potential as well as improves the quality of hair.[2]

Herbal formulations have lesser or no side effects than synthetic formulation, that's why they are more in demand in the market.[3] Poly herbal hair oil is one of those. Natural elements are found in these hair oil which has number of beneficial effects. We have formulated poly herbal hair oil by using various plants like Amla, Neem, Bhrinraj, Ashwagandha, and different oils like coconut oil, olive oil, and clove oil. Amla is used for promoting hair growth and reducing dandruff, Neem leaves are used for their anti-microbial activity, strengthening the scalp and adding shine, Ashwagandha is use for improving hair texture, nourish the hair roots.[5] Coconut oil use for their protection against damage, giving smooth hair follicle and easily absorb into the scalp, clove is used for their Anti-microbial activity, rose oil and white grass oil (essential oil) both use for essence.[6]

Global hair oil market is divided based on types of products, distribution, source and application. This market is estimated to reach $6.5 billion by 2025; it will reach USD 43.02 billion in 2032.[4] The market is expanding due to its increasing availability of different product and consumer awareness. India has been an important market for hair oil over the period. Indian hair oil market has eye on the target of USD1.89 billion in 2025.

## 2. AIM AND OBJECTIVE

**2.1. Aim:** To formulate and evaluate the poly herbal hair oil.

### 2.2. Objectives

1. To formulate a polyherbal hair oil using a combination of herbs such as: coconut oil. olive oil, clove oil, vitamin E, Amla, Neem, onion seed, Bhrinraj, Ashwagandha.
2. To evaluate the physicochemical parameters of the prepared polyherbal hair oil, such as pH, viscosity, and specific gravity.


**Figure 1: Ingredient used in the formulation of Poly herbal hair ojil.**

## 3. Material and Method

### 3.1 Plant Profile

#### 3.1.1. Collection of Amla

- **Scientific name: -***Phyllanthus emblica Linn*
- **Common names: -** Amla
- **Description**: Phyllanthus emblica fruit is spherical in shape, light greenish yellow in colour, smooth, and hard on appearance, with six vertical stripes. It is planted throughout the deciduous of tropical India and on the hill slopes up to 2000 m.[7]

**Figure 2: Amla.**

**Uses**

1. Improves Immunity: Amla benefits include antibacterial & astringent properties which help improve the body's immunity system. Indian Gooseberry also increases white blood cells which help flush out the toxins from the body.
2. Hair Care: Amla is used in a lot of shampoos and conditioners owing to its rich antioxidant & iron content. Indian Gooseberry contains high levels of Vitamin C which helps reduce hair fall. It also strengthens the roots & maintains hair colour. Antibacterial properties of Amla help fight dandruff.
3. Reduces Stress: Amla is a great stress reliever which helps induce sleep and relieve headaches.[8]

#### 3.1.2 Collection of Neem

- **Scientific name:** *Azadirachta indica.*
- **Common names:** Neem, Indian Lilac, Margosa Tree.
- **Description**: The Neem tree is an evergreen plant characterized by its broad, dense canopy of pinnate leaves, fragrant white flowers, and small, oval-shaped fruits. It can grow up to 20–30 meters in height and is known for its resilience, thriving even in poor soil conditions.[9]

**Figure 3: Neem.**

**Uses**

1. Medicinal: Neem oil, leaves, and bark are used in traditional Ayurvedic medicine to treat ailments like skin infections, fever, and digestive disorders. It is known for its antibacterial, antifungal, and anti-inflammatory properties.
2. Agricultural: Neem oil is a natural pesticide and insect repellent, effective in organic farming practices. Its seeds are used in fertilizers and soil conditioners.
3. Cosmetic: Neem is a common ingredient in skincare and hair care products, valued for its purifying and nourishing effects.[10]

#### 3.1.3 Collection of bhringraj

- **Scientific Name**: *Eclipta alba Linn Hassk*
- **Common Name**: Eclipta alba or False Daisy
- **Description**: A creeping herb with white or yellow flowers, commonly found in moist, tropical regions. It's an annual plant, reaching heights of 30-60 cm, with opposite, oblong-lanceolate leaves and small, daisy-like flower heads.[11]

**Figure 4: Bhringraj.**

**Uses**

1. Bhringraj has antimicrobial properties in which the oil could potentially be used to control dandruff.[12]

#### 3.1.4. Hibiscus flower

- **Scientific Name:** *Hibiscus rosa-sinensis Linn*
- **Common Name**: Chinese hibiscus, China rose, shoeblack plant, or rose mallow.
- **Description**: The Hibiscus rosa-sinensis is a tiny

tree or shrub with glossy leaves that grows to a height of 2.5–5 m (8–16 ft) and a width of 1.5–3 m (5–10 ft). It blooms brilliant red in summer and autumn in solitary flowers. The five petaled flower have a diameter 4 inch and stand out due to their scarlet anthers with orange tips.[13]

**Figure 5: Hibiscus Powder.**

**Uses**

1. **Antioxidant Properties**: Rich in antioxidants, hibiscus can help protect the body against damage from free radicals
2. **Skin Health:** Hibiscus is used in skincare products for its antioxidant and exfoliating properties, potentially improving skin elasticity, reducing wrinkles, and promoting a radiant complexion.
3. **Hair Growth:** Hibiscus is a popular ingredient in hair care products, known for stimulating hair growth, strengthening hair, and preventing hair fall.
4. **Hair Conditioning:** Hibiscus can act as a natural conditioner, adding shine and smoothness to hair.[14]

**3.1.5. Onion Seeds: Scientific name:** *Allium cepa*
**Common Name:** Onion
**Description**: Onion seeds develop into plants with narrow, hollow leaves and a bulb that forms at the base. The bulb, composed of fleshy leaf bases, can be white, yellow, or red and is the edible part of the plant.[15]

**Figure 6: Onion Seed.**

**Uses**

1. **Scarring:** Applying a gel containing onion extract to the skin, alone or with other ingredients, for at least 10 weeks seems to improve the appearance of scars.
2. **Obesity:** Eating onion or taking onion extract by mouth doesn't reduce body weight in people who are overweight or obese.
3. **Hair care:** Help to treat dandruff and decrease hair fall, and repair gizzy and spilt hair.[16]

**3.1.6. Ashwagandha**

- **Scientific name:** *With ania somnifera*
- **Common Name**: ashwagandha, Indian ginseng, poison gooseberry, and winter cherry
- **Description**: Ashwagandha grows as a small shrub between 30cm to 3m tall. The green branches are covered with a layer of white woolly hairs. The leaves are around 10cm long and 4cm wide, dull green, oval shaped and slightly hairy. The flowers are very small, only a few millimetres across, and are greenish yellow.[17]

**Figure 7: Ashwagandha.**

**Uses**

- **Stress:** Take ashwagandha by mouth seems to help reduce stress in some people. It might also help reduce stress-related weight gain.
- **Stimulates Keratin Production**: It is believed to stimulate keratin production, which is essential for healthy hair growth.

**Aloe Vera**
**Scientific name:** Aloe barbadensis miller.
**Common Name:** True aloe, Indian aloe, Burn aloe and First aid plant.
**Description:** Aloe vera is a succulent plant known for its thick, fleshy, green leaves and is widely cultivated for its medicinal and cosmetic properties. It's a stemless or short-stemmed plant, belonging to the Liliaceae family, and is characterized by its elongated, lanceolate leaves with serrated edges and white teeth**.**

**Uses: It has been used as a**

- **Antibacterial properties:** Aloe vera is known for Trusted Source its antibacterial, antiviral, and antiseptic properties. This is part of why it may help heal wounds and treat skin problems.
- **It accelerates wound healing:** People most often use aloe vera as a topical medication Trusted Source, rubbing it onto the skin rather than consuming it.
- **Reduces Hair Loss**: It acts as a natural remedy for promoting hair growth and reducing hair loss.[18]

**Figure 8: Aloe vera.**

| S.No | Ingredients | Quantity used (50mL) |
|---|---|---|
| **1** | Amla powder | 5g |
| **2** | Coconut oil | 10ml |
| **3** | Neem powder | 5g |
| **4** | Onion seed powder | 2g |
| **5** | Clove oil | 5ml |
| **6** | Bhringaraj powder | 3g |
| **7** | Rose oil | q.s |
| **8** | Ashwagandha powder | 3g |
| **9** | Vitamin E | 2ml |
| **10** | Aloe vera | 5ml |
| **11** | Olive oil | 10ml |

## 4 Evaluation of prepared Poly herbal hair oil

4.1 The different methods of evaluation were used to evaluate prepared poly herbal hair oil.

1. Specific gravity
2. pH
3. Acid value
4. Saponification value
5. Irritancy test
6. Organoleptic evaluation
7. Viscosity test
8. Ascorbic acid test
9. Saponin test
10. Solubility test
11. Test for lipid

**4.1.1 Specific gravity**: Weighing was done on an initially empty bottle with a specific gravity ($W_1$). The identical specific gravity bottle was then filled with water and weighed again ($W_2$). Later, the specific gravity container was replaced with hair oil, and the weight was again measured($W_3$). Weights are noted, showing that the specific gravity of the hair oil was determined. The weight of an empty bottle of specific gravity is $W_1$gms. A bottle containing water and specific gravity weighs $W_2$ gms. The weight of a hair oil bottle with a given gravity is $W_3$ grams. The specific gravity of the water bottle is 0.9961 g/cm$^3$.[19]

**Figure 9: Determination of specific gravity using density bottle.**

**4.1.2 pH:** 10 ml of herbal hair oil were put in a beaker and bulb of pH. meter dipped in this oil. The measured pH values are documented.[20]


**Figure10: Determination of pH meter.**

**4.1.3 Acid value:** 1ml oil was weighed in a conical flask and added to the 2.5 ml of ether and 5 ml of ethanol in ratio (2:1). Phenolphthalein indicator was added to the solution. This solution was titrated with 0.1M potassium hydroxide (KOH) solution until it changes from pink to blue.

Acid value: V*N*56.1/W

Where, V= Volume of KOH used N= Normality of KOH
W = Weight of the oil sample
56.1 = Molecular wt. of the KOH.[21]

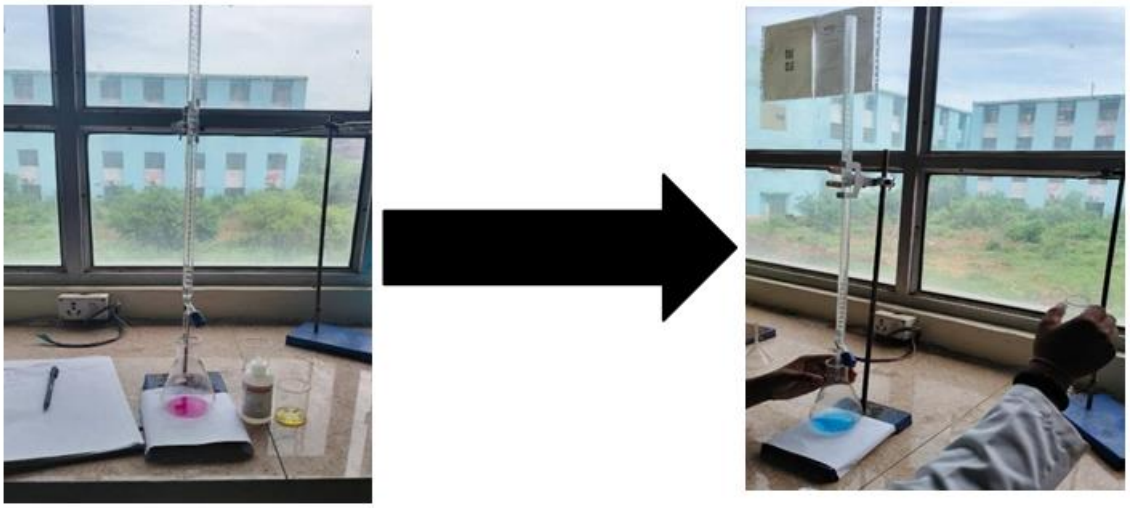


**Figure 11: Determination of Acid value as a result the pink colour converted to blue colour when titrate with 0.1M KOH.**

**4.1.4 Saponification value**: 1ml of herbal hair oil was accurately weighed and transferred it into the conical flask. Add 5ml of ethanol to the oil. And add 25ml of alcoholic KOH. Heat for 30 min in water bath. Phenolphthalein was added as an indicator. Titrate this solution with 0.5N HCL until the colour changes pink to yellow.
Saponification value: V*N*56.1 Where, V= Volume of KOH used N= Normality of KOH 56.1 = Molecular wt. of the KOH.[22]

**Figure 12: Determination of Saponification value as a result the pink colour converted to pale yellow colour when titrate with 0.5M Hcl.**

**4.1.5 Irritancy test:** Oil was applied on hand and expose to the sunlight for 5 minutes to see any irritant effect shown by the poly herbal hair oil or not.

**4.1.6 Organoleptic property:** Colour, odour and texture were determined by senses.
Colour: Greenish yellow Odor: characteristics Texture: Smooth

**Figure13: Determination of Organoleptic property.**

**4.1.7 Viscosity**: Use a viscometer to measure the viscosity. It is the process of calculating a liquid's flow resistance, the higher the viscosity, the larger the flow resistance. The viscosity was measured Using an Ostwald viscometer.[23]

**Figure No 14: Determination of viscosity by using an Ostwald viscometer.**

**4.1.8 Ascorbic Acid Test:** Added 1 drop of freshly prepared 5 per cent w/v sodium nitroprusside solution and 2 ml of dilute sodium hydroxide solution to 1 ml of 2 per cent w/v solution and 5 ml of water. Drop in 0.6ml of hydrochloric acid, mix, and records found.[24]

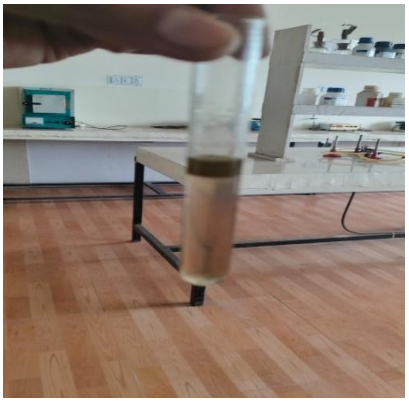
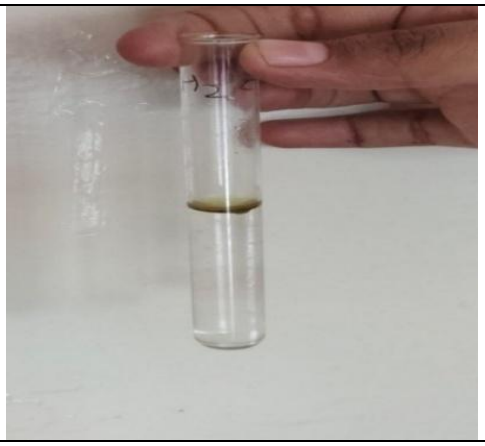


**Figure No 15: Determination of Ascorbic Acid Test.**

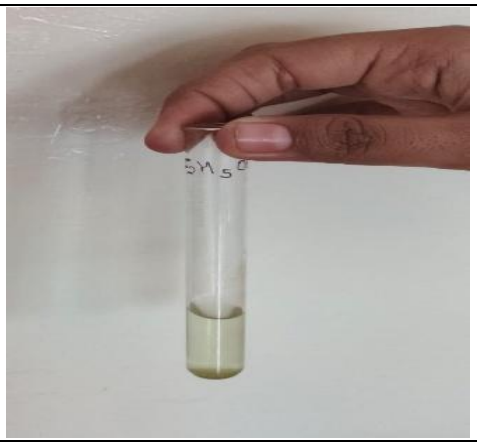
**4.1.9 Saponin Test:** The formation of stable froth was observed by shaking oil and water in a test tube.

**Figure 16: Determination of Saponin test.**

**4.1.10** Solubility test**:** Take 1 ml oil and add in test tube containing water and another one is organic solvent.[25]



**Herbal hair oil insoluble in water**



**Herbal hair oil soluble in organic solvent**

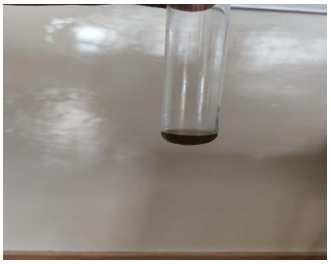
**Figure17: Determination of Solubility test.**

**4.1.11 Stability Test**: It is observed that the prepared five formulations are stable throughout the shelf life for 3 months.

**4.1.12 Test for lipid:** In this test we were to perform Ninhydrin test and Xanthoproteic test for determination of protein and amino acid.

Ninhydrin test: Take 5-10 drops of ninhydrin and add 1 ml herbal oil. Put it in water bath for 5 min. Appearance of blue colour indicate presence of protein.[26]

Xanthoproteic test: Add 1 ml conc $HNO_3$ add 1 ml oil there was appearance of white colour heat for 1 min yellow colour appear cool the mixture add NaOH orange colour appear which indicate the presence of aromatic amino acid is presen.[27]



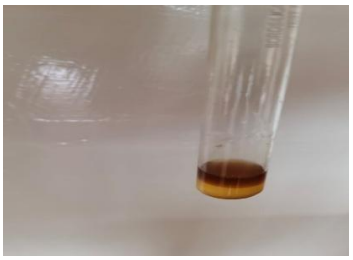


**Figure 18: Determination of lipid in poly herbal hair oil (Ninhydrin test and Xanthoproteic test)**

## 5. RESULT AND DISCUSSION

| S.No | Parameter | Standard value | Observation value |
|---|---|---|---|
| 1 | Specific gravity | 0.85-0.95 | 0.88 |
| 2 | Ph | 5-7 | 7 |
| 3 | Acid value | Less than 4 | 1.22 |
| 4 | Saponification | 180 - 200 mg | 190mg |
| 5 | Irritancy | No irritation | No irritation |
| 6 | Organoleptic test | --- | Greenish yellow, characteristics, smooth |
| 7 | Viscosity | 0.94 | 0.92 |
| 8 | Ascorbic acid test | -- | Yellow to blue |
| 9 | Saponin test | - | Foam forming |
| 10 | Solubility test | Soluble | Soluble in organic solvent Insoluble in water |
| 11 | Test of lipid | Presence of protein | Presence of protein |

## 6. CONCLUSION

The utilization of Poly herbal hair oil in the cosmetics enhanced many folds in personal hygiene and health care system. Herbal oil is one of the most well- recognized hair treatments. The use of different herbal materials which is having different benefits with good combination will give the great effect for hair. The herbal extracts and constituents chosen for the formulation of hair oil were reported to have hair growth, relaxation, anti-dandruff, hair thickening. The formulation was proven to be safe and effective for human use. The formulated hair oil will help in maintaining good growth of hair, not only that it also provides turning grey hair to black, protects from dandruff, reduces stress etc. Formulation was done and evaluated by means of various parameters like pH, organoleptic properties (colour, Odor, texture) acid value, viscosity, specific gravity, acid vale, and stability test. At last, it can be concluded that the Poly herbal hair oil formulations have significant quality.[28]

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