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FORMULATION AND EVALUATION OF HERBAL HAIR OIL

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ABSTRACT

For the mankind, Beauty and Body care are as old as our civilization. So are the herbal products. In modern day, Herbal products are a coalition of pharmaceutical products and bio active ingredients. The focus of this studyis the formulation and evaluation of Herbal hair oil. This hair oil is formulated by utilizing botanicals like Bhringraj, Hibiscus, Neem, Brahmi, Camphor, Sesame oil, Coconut oil, Jasmine oil and Amla. Aiming to strengthen, nourish and promote Fast hair growth and address Hair fall concerns. In this research Poly-herbal hair oil is prepared using leaves, roots, fruits, steam/ alcoholic extracts, oil and fresh plants. The formulated oil undergoes Physical, Phytochemical and Biological evaluation. Also, general characterization. From this study it was found that hair oil provides essential nutrients for the Hair follicles and Sebaceous glands. As evidenced by the parameters like Irritation test, pH test, Specific gravity, Viscosity test, Sensitivity test, Phytochemical screening, Acid value and Saponification values. And within acceptable standards. This 'Poly herbal hair oil exhibits superior results. Suggesting its efficiency in preventing dandruff, reversing graying, enhancing lustre and promoting hair growth.

KEYWORDS: Hair-Growth, Polyherbal hair oil, Anti-Hair fall, Antidandruff, Phytochemicals.

I) INTRODUCTION

Hair is one of the vital parts of the body considered to be protective appendages on the body and accessory structure of the integument along with sebaceous glands, sweat glands and

nails. The basic part of hair is bulb (a swelling at the base which originates from the dermis), root (which is the hair lying beneath the skin surface), shaft (which is the hair above the skin surface). Hair loss is a dermatologic disorder, and the surge for discovering natural products with hair growth promoting potential is continuous. Each hair grows in three cyclic phases' viz., anagen (growth), catagen (involution) and telogen (rest). Herbal cosmetics are in high demand due to the increasing interest of mankind towards them because they are more effective with nil or less side effects, easily available ingredients etc. Hair care cosmetics are now added with herbs, and they are well recognized compared with synthetic ones. Herbal hair oil is preferred and is used in many ailments of hair. They promote hair growth, improve elegance of hair and prevent hair fall. Hair oil not only promotes hair growth they also provide necessary moisture to the scalp rendering in beautiful hair The present work was aimed to prepare and evaluate a polyherbal hair oil containing herbs like ***Amla, Bhringraj, Hibiscus, Neem, Bramhi, Camphor, Sesame oil, Coconut oil, Jasmine oil*** etc. All these herbs have well known traditional potential in the treatment of hair care.

Method Used: Accurately weigh all the dried and fresh herbs such as **Amla, Bhringraj, Hibiscus, Neem, Bramhi** and **Camphor** were grinded in the mixture and was mixed in 63% of oils. The above content was boiled for 15 min. The whole mixture was allowed to Macerate, soak and Precipitate for 5 days. Then it was filtered through muslin cloth. To the filtrate coconut oil was added to make up the volume (200 ml). Finally, the herbal hair oil is placed in a container.

The quantities of various ingredients used in the formulation of herbal oil are presented in Table.

Ingredients	Quantity for 100ml	Quantity for 200ml
1. Amla	15%	30%
2. Bhringraj	7%	14%
3. Hibiscus	5%	10%
4. Neem	5%	10%
5. Bramhi	7%	14%
6. Camphor	1%	2%
7. Sesame oil	20ml	40ml
8. Coconut oil	q.s.	q.s.
9. Jasmine oil	10ml	20ml
Total	100ml	200ml

A. Ingredients

1. Amla
2. Bhringraj
3. Hibiscus
4. Neem
5. Bramhi
6. Camphor
7. Sesame oil
8. Coconut oil
9. Jasmine oil

B. Study of Drugs

1. *Amla*

Introduction

Indian gooseberry (Emblica officinalis) popularly known as amla, is a deciduous tree of the Phyllanthaceae family.

History

Amla, also known as Indian gooseberry (Emblica officinalis), has a rich history in traditional medicine and pharmacognosy.

Historically, Amla has been used in Ayurveda, the traditional system of medicine in India, for centuries. Its medicinal properties are documented in ancient Ayurvedic texts, where it is considered a powerful Rasayana (rejuvenative) herb. Amla is valued for its diverse pharmacological activities, including antioxidant, immunomodulatory, anti- inflammatory, and hepatoprotective effects.

The Indian Pharmacopoeia, which sets standards for drugs in India, likely includes specifications for Amla concerning its quality, purity, and strength. These standards ensure that Amla preparations used in medicinal products meet specific criteria for efficacy and safety.

Synonym

Indian gooseberry, Embelic. Indian name. Dhatri, Amlaka, Adiphala (Sanskrit) Amla, Amlika, Aonla (Hindi) Nelli, Malanelli (Tamil).

Biological Source

This consists of dried, as well as fresh fruits of the plant Emblica officinalis Gaerth (Phyllanthus emblica Linn.), belonging to the family Euphorbiaceae.

Geographical location

It is a small- or medium-sized tree found in all deciduous forests of India. It is also foundin Sri Lanka and Myanmar. The leaves are feathery with small oblong pinnately arranged leaflets. The tree is characteristic greenish-grey and with smooth bark.

2. *Bhringraj*

Introduction

Bhringraj is one of the main constituents for herbal preparations used in the management of hair loss due to its antibacterial, anti-inflammatory and anti-allergic properties. It also helps fight hair fall and greying of hair.

A. History

Bhringraj oil is an herbal oil that has its roots in Ayurvedic medicine, which is a traditional system of medicine that has been practiced in India for thousands of years.

B. Synonym

Kesharanjana, keshraja, markava, bhungrah, bhunga, ravipriya, suryavarta, pittapriya.

C. Biological Sources, family

Also known as Eclipta prostrata Roxb.) belongs to the Asteraceae family and is commonly known as false daisy in English and bhringoraj or bhringraj in Bangladesh and India.

D. Geographical Location

This species grows commonly in moist places in warm temperate to tropical areas worldwide. It is widely distributed throughout India, Nepal, China, Thailand, Bangladeshand Brazil.

3. *Hibiscus*

A. Introduction

Hibiscus is a flowering plant that belongs to the family Malvaceae, also known as mallow family. The Hibiscus flowers are large and showy, and the genus grows into herbs, shrubs or small trees. There are more than hundred species found that are used throughout the world as food and medicine.

B. History

The exact origin of Hibiscus rosa-sinensis is unknown, although it has been cultivated in China, Japan and the Pacific islands for a long time. Two white-flowered species, Hibiscus arnottianus and Hibiscus waimeae, are believed to be native to Hawai.

C. Synonym

Hibiscus also is known as karkade, red tea, red sorrel, Jamaica sorrel, rosella, soborodo (Zobo drink), Karkadi, roselle, and sour.

D. Biological Sources, family

Hibiscus rosa sinensis is known as China rose belonging to the Malvaceae family.

E. geographical location

Originally native to tropical Asia it is now grows throughout warm- temperate, subtropical and tropical regions throughout the world.

4. *Neem*

INTRODUCTION

Neem is a member of the mahogany family, Meliaceae. It is today known by the botanicname *Azadirachta indica* A. Juss. In the past, however, it has been known by several names, and some botanists formerly lumped it together with at least one of its relatives. The result is that the older literature is so confusing that it is sometimes impossible to determine just which species is being discussed.

History

Neem is thought to have originated in Assam and Burma (where it is common throughout the central dry zone and the Siwalik hills). However, the exact origin is uncertain: somesay neem is native to the whole Indian subcontinent; others attribute it to dry forest areas throughout all of South and Southeast Asia, including Pakistan, Sri Lanka, Thailand, Malaysia, and Indonesia.

Synonym*:* Common Names

English: neem, Indian lilac. French: azadira d'Inde, margousier, azidarac, azadira. Portuguese: margosa (Goa). Spanish: margosa, nim. Sanskrit: nimba, nimbou, arishtha (reliever of sickness). Sri Lanka: kohomba.

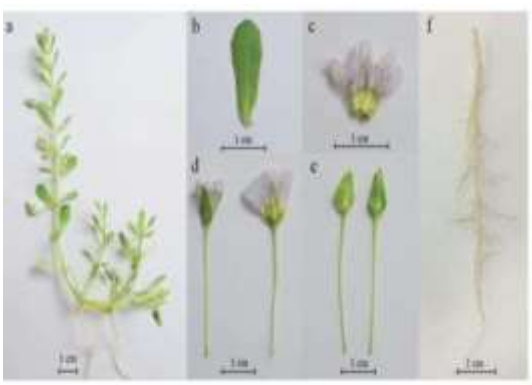
Geographical location

This species grows commonly in moist places in warm temperate to tropical areas worldwide. It is widely distributed throughout India, Nepal, China, Thailand, Bangladeshand Brazi.

5. *Brahmi*

Introduction

Bacopa monnieri (L.) Wettst. (commonly known as Brahmi) is a perennial herb belonging to the family Planta-ginaceae. It has been used in Ayurvedic medicine as a brain tonic and memory enhancer for hundreds of years.



History

The herb was allegedly used by ancient Vedic scholars to memorize lengthy sacred hymns and scriptures. BM is colloquially called Brahmi, after the Hindu creator-god Brahma, especially when combined with other alleged intellect-sharpening herbs like Centella asiatica (Gotu Kola).

Synonym

Brahmi, kapotvadka, somvalli and saraswatiare various synonyms of brahmi. Madukparni, manduki, twashtri, divya and mahaaushdhi are various names of mandukparni.

Biological Source

Brahmi consists of the fresh and dried leaves and stem of Centralla asiatica Urban. Family: Umbelliferae.

Geographical location

The plant grows in India, Pakistan, Sri Lanka and Madagascar.

6. *Camphor*

A. Introduction

Camphor is a waxy, colorless solid with a strong aroma.


B. History

The word camphor derived in the 14th century from, romanized: kafur, perhaps through Sanskrit: कर्पूर. In Old Malay, camphor was called *kapur barus*, meaning "the chalk of Barus".

C. Keywords

camfora, कर्पूर

Biological Sources

It is found in the wood of the camphor laurel (*Cinnamomum camphora*), a large evergreen tree found in East Asia; and in the kapur tree (*Dryobalanops* sp.), a tall timbertree from South East Asia., family: Lauraceae.

D. Geographical Location

Taiwan, southern Japan, Korea, India and Vietnam, and has been introduced to many other countries.

E. Uses

Alternative medicine and scent, Topical medication, Respiratory aerosol, Perfume.

7. *Sesame oil*

- **Introduction**

Sesame (*Sesamum indicum*) is a plant in the genus *Sesamum*, also called **benne**.

The word "sesame" is from Latin *sesamum* and: *sēsamon*; which in turn are derived from ancient Semitic languages, from these roots, words with the generalized meaning "oil, liquid fat" were derived.

- **History**

Sesame seed is considered to be the oldest oilseed crop known to humanity. The genus has many species, and most are wild. Most wild species of the genus *Sesamum* are native to sub-Saharan Africa. *S. indicum*, the cultivated type, originated in India.

- **KEYWORDS**
- *Dysosmon amoenum* Raf.
- *Sesamum africanum* Tod.
- *Sesamum occidentalis* Heer & Regel
- *Sesamum oleiferum* Sm.

- **Geographical Location**

Numerous wild relatives occur in Africa and a smaller number in India. It is widely naturalized in tropical regions around the world and is cultivated for its edible seeds, which grow in pods.

- **Uses**

In Asia, sesame seeds are sprinkled onto some sushi-style foods. In Japan, whole seeds are found in many salads and baked snacks, and tan and black sesame seed varieties are roasted

and used to make the flavouring *gomashio*.

8. *Coconut oil*

Introduction

Coconut oil (or coconut fat) is an edible oil derived from the kernels, meat, and milk of the coconut palm fruit. Coconut oil is a white solid fat below around 25 °C (77 °F), and a clear thin liquid oil in warmer climates. Unrefined varieties have a distinct coconut aroma. Coconut oil is used as a food oil, and in industrial applications for cosmetics and detergent production.

History

It has been traced back in paintings and carvings to at least 5000 years ago in New Guinea, but it is most likely that people have used coconut since prehistoric times.

Synonym

Cocos nucifera, coco, coco palm, cocoa palm, coconut palm, coconut tree oil.

Biological Source

Oil expressed from the dried solid part of endosperm of coconut, Cocos nucifera L., belonging to family Palmae.

Geographical Location

It is largely cultivated in African and southeast Asian countries. Coconut also known as copra is a dietary as well as industrial product throughout the world. Large quantity of oil is produced in India, Sri Lanka Malaysia, South Africa, China, Indonesia, and other countries.

9. *Jasmine oil*

Introduction

Jasmine (taxonomic name: Jasminum) is a genus of shrubs and vines in the olive family of Oleaceae. It contains around 200 species native to tropical and warm temperate regions of Eurasia, Africa, and Oceania. Jasmines are widely cultivated for the characteristic fragrance of their flowers.

History

Jasminum sambac is considered as a native of the East Indies. The name Jasmine is of Arabic origin and is believed to have been derived from Yasmin. It is reported that the height of its po pularity reached its peck two to five hundred years ago at canton and metropolis of southern China.

Synonym

common jasmine, jasmine, jessamine, poet's jasmine, summer jasmine, white jasmine.

Biological Source

common jasmine or simply jasmine, is a species of flowering plant in the olive family Oleaceae.

Geographical location

Jasmines are native to tropical and subtropical regions of Eurasia, Africa, Australasia and Oceania, although only one of the 200 species is native to Europe.

II) MATERIALS AND METHODS

A. Identification and Phytochemical Screening

1. *Amla*

Microscopy

Prep: TS of fruit + HCl + Fluoroglucinol.

Powder microscopy of fruit powder of Amalaki

Prep: Powdered drug + HCl + Fluoroglucinol.

Chemical Constituents

It is highly nutritious and is an important dietary source of vitamin C, minerals, and amino acids. The edible fruit tissue contains protein concentration 3-fold and ascorbic acid concentration 160-fold compared to that of the apple. The pulpy portion of fruit, dried and freed from the nuts contains: gallic acid 1.32%, tannin, sugar 36.10%; gum 13.75%; albumin 13.08%; crude cellulose 17.08%; mineral matter 4.12%; and moisture3.83%. Tannins are the mixture of gallic acid, ellagic acid, and phyllembin.

Identification tests

a) Physical Tests

b) Chemical Tests

Identification of chemical constituents

- **Ferric chloride test**

The aqueous or alcoholic extract of amla is treated with ferric chloride solution.

- Adding gelatin and sodium chloride solution in the aqueous extract.

Identification of amla

- Foreign organic matter not more than 3%.
- Water soluble extractive not less than 40%.
- Ethanol soluble extractive not less 30% Total ash- not more than 5%.
- Acid insoluble ash- not more than 2% Loss on drying- not more than 12%.
- Determined on 5 gm by drying in an oven at 105°C.

Extraction

Extraction process was carried out by following steps,

Step 1. The drug powder was first made soluble into the alcohol and water of quantities 25ml each for 24 hours.

Step 2. After 24 hours the solution was filtered out the filtrate was collected.

Step 3. Filtrate was then heat until all the alcohol and water gets evaporated completely in order to get the extract.

Step 4. After getting the extract the extractive values of Amla were studied.

2. *Bhringraj*

A. **Microscopy**

Prep: TS of stem + HCl + Fluoroglucinol.

Powder microscopy

Prep: Powdered drug + HCl + Fluoroglucinol.

F. Identification Tests(physical, chemical)

1. Bhringraj powder was taken with dragondroffs reagent.
2. Bhringraj powder was added with dil. Fecl.
3. Neutral Fecl 3 when treated with drug powder.
4. Similarly when powder treated with Biuret reagent
5. Benedicts reagent with powder.

G. Chemical Constituents

The principal constituents of Eclipta alba are Coumestan derivatives like Wedololactone, Demethylwedelolactone, Desmethyl-wedelolactone-7glucoside and other constituents are Ecliptal, β-amyrin, Luteolin-7-O-glucoside, Hentriacontanol, Heptacosanol, Stigmasterol.

Identification of chemical constituents in extract

i. Sample + Dragondroff's Reagent
ii. Sample + dil. FeCl3
iii. Neutral FeCl3.

H. Extraction

Extraction process was carried out by following steps,

Step 1. The drug powder was first made soluble into the alcohol and water of quantities 25ml each for 24 hours.

Step 2. After 24 hours the solution was filtered out the filtrate was collected.

Step 3. Filtrate was then heat until all the alcohol and water gets evaporated completely in order to get the extract.

Step 4. After getting the extract the extractive values of Bhringraj were studied.

3. *Hibiscus*

A. Microscopy

TS of Flower bud. Observed under Microscope.

B. Identification Tests(physical, chemical)Identification of chemical constituents.

1) 2ml portion of plant extract + 2 drops of alc. FeCl3 (2%)

C. Chemical Constituents

Hibiscus species have been investigated and found to contain many classes of secondary metabolites, including flavonoids, anthocyanins, terpenoids, steroids, polysaccharides, alkaloids, amino acids, lipids, sesquiterpene, quinones, and naphthalene groups.

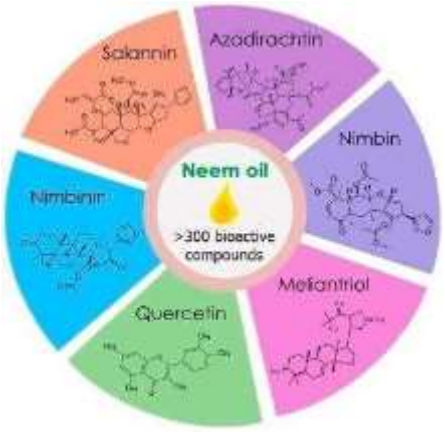
D. Extraction

Take Calyx Hibisci Sabdariffae dry flower calyx powder 2.5000 g, by liquid-solid ratio 20:1(v/w, mL/g) add 50.00 mL water, with hydrochloric acid tune pH to 1.5, in the water- bath of 75℃, extract 1h, extract twice, twice filtrate and be evaporated to respectively dry, add suitable quantity of water and dissolve.

4. *Neem*

Chemical Constituents

azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin.



Identification of chemical constituents

i. 0.2 g crude drug + 2ml Chloroform CHCl3 + 3 ml. Of. Concentrated H2SO4.

ii. 0.5 gram plant extract + diluted with 10 ml of aqueous HCL percent weight by volume. Boil and filter => 2 ML of dilute NH3 add it to 5 ml of filtrate => add 5ml of chloroform.

Extraction

To obtain neem oil, the seeds are first broken open and the kernels separated. The kernels are

then pressed in industrial expellers or in hand- or bullock-operated wooden presses (ghanis).

5. *Brahmi*

Microscopy

1. Powder Microscopy

The powdered form of the drug was taken and was then stained with 1:1 ration of Floroglucinol + HCL.

The after some drops of Sudan Red were added to make the constituents visible. Under the Powder microscopy of Brahmi Ghrita ingredients Kushtha.

Chemical Constituents

Although many chemical compounds have been isolated from Brahmi, the active fractions of this medicinal plant contain bacoside-A and bacoside-B. A number of other phytochemicals such as alkaloids, glycosides, flavonoids, saponins etc.

Identification

Forth Test

Sample of dried Bramhi powder (100gm) was mixed with 5ml sample of water. This mixture was inserted in the test tube and shaken for 30seconds.

Extraction

Extraction process was carried out by following steps,

Step 1. The drug powder was first made soluble into the alcohol and water of quantities25ml each for 24 hours.

Step 2. After 24 hours the solution was filtered out and the filtrate was collected.

Step3. Filtrate was then heated until all the alcohol and water evaporated completely inorder to get the extract.

Step 4. After getting the extract the extractive values of Bramhi were studied.

6. Camphor

A. Info

Melting range, “C: 174to 179; Optical rotation [10 percent (rr/v)] solution in 95 percent alcohol: a) Natural +410 to +43°; Non-volatile matter, percent by mass, Max:0.05; Camphor, percent by mass, A, Min: 96.

B. Identification Tests(physical, chemical)

1. Wagners test

Sample + Iodine soln.

2. Haggers for alkaloids

Sample + Picric Acid.

C. chemical constituents

An astringent *essential oil, **containing *tannin, Alkaloids.**

D. Extraction

Melted liquified solution was prepared of country Camphor.

REFERENCE

(NIH National Library of Medicine NCBI.
https://pubchem.ncbi.nlm.nih.gov/compound/Camphor#section=Synonyms)

7. Sesame oil

- **Identification Tests (physical, chemical)Tests for Chemical Constituents.**

a. Mayers test for alkaloids

- **chemical constituents**

after phytochemical testing, was found to contain alkaloids, phenols, steroids, flavonoids, diterpenes, glycosides and tannins.

- **Reference**: "The Plant List: A Working List of All Plant Species".

8. Coconut oil

Chemical Constituents

Coconut oil is composed of the fatty acids, caprylic acid C -8:0 (8%), capric acid, C-10:0,(7%), lauric acid C-12:0, (49%), myristic acid C-14:0(8%), palmitic acid C-16:0 (8%), stearic acid C-18:0 (2%), oleic acid C-18:1 (6%) and 2% of C-18:2 linoleic acid.

Phytochemical studies of the coconut fiber (mesocarp) ethanolic extract revealed that the presence of phenols, tannins, leucoanthocyanidins, flavonoids, triterpenes, steroids, and alkaloids[27], while a butanol extract recovered triterpenes, saponins, and condensed

tannins.[28]

- **Identification Tests(physical, chemical)Tests for Chemical Constituents**

1. Dragendroffs test for alkaloids

The coconut oil extracted was heated in a water bath in the presence of sodium hydroxide (10M solution of NaOH) This converted the coconut oil into lauric acid and glycerin as two distinct layers and then lauric acid was separated.

Extraction

Coconut oil is traditionally extracted by boiling coconut milk to evaporate the water, leaving the oil behind. In order to extract approximately 14 L of coconut milk, the processes last for an hour or until all the oils get separated from the milk.

9. Jasmine oil

Chemical Constituents

More than 100 constituents have been found in various jasmine samples (especially concretes, absolutes and other extracts), with the main chemical components being benzyl acetate, linalool, benzyl alcohol, indole, benzyl benzoate, cis-jasmone, geraniol, methyl anthranilate, α-terpineol, cis-3- hexenyl benzoate, eugenol.

Identification of chemical constituents

- **Froth test:** 2ml sample+ 2ml water. Shake well.
- **Benedicts test for carbohydrates**

Sample+ Benedict's reagent.

Reference

Nigam MC, Misra LN. (1980) Chemistry of jasmine oil: a review. Current Research in Medicinal and Aromatic Plants, 2, 37-44.

B) Formulation

o **Reference Method**

- Method of herbal hair oil preparation
- Triturated in the mortar & pestle and mixed with Almond oil. The above content was boiled for 15 min and filtered through a muslin cloth. To the filtrate, coconut oil was added to the makeup volume. Finally, a small amount of flavoring agent (Jasmine oil) was added.

- The oil is prepared by immersing dried Amla fruits in a base oil for a few days.The base oil can be coconut, sesame or mineral oil. This process of soaking the fruit helps it in releasing its own oil which is later filtered and purified. In Ayurveda, gooseberries are said to contain kashaya or astringent properties.

o **Followed Method**

- The various ingredients used in the formulation of herbal oil are presented in thetable.
- Accurately weigh all the dried and fresh herbs such as **Amla, Bhringraj, Hibiscus, Neem, Bramhi** and **Camphor** were grinded in the mixture and wasmixed in 63% of oils. The above content was boiled for 15 min. The whole mixture was allowed to Macerate, soak and Precipitate for 5 days. Then it wasfiltered through muslin cloth. To the filtrate coconut oil was added to make up the volume (200 ml). Finally, the herbal hair oil is placed in a container.

Ingredients	Quantity for 100ml	Quantity for 200ml
1. Amla	15%	30%
2. Bhringraj	7%	14%
3. Hibiscus	5%	10%
4. Neem	5%	10%
5. Bramhi	7%	14%
6. Camphor	1%	2%
7. Sesame oil	20ml	40ml
8. Coconut oil	q.s.	q.s.
9. Jasmine oil	10ml	20ml
Total	100ml	200ml

C) Evaluation

Sr. No	Evaluation Test	Normal Range	Obtained Range
1	Organoleptic Evaluation • Colour • Odour • Texture		Greenish brown Aromatic, pleasant Characteristics Smooth
2	Physicochemical Evaluation • pH value • Washability • Solubility	----- Washable with soap Soluble	5-6 Washable withsoap Soluble
3	Other Evaluation Tests • Skin/ Eye irritation • Nature of Hairafter Washes	No Harmful Effect Soft Manageable	No HarmfulEffect Soft Manageable

1) *Saponification Test*

- **Procedure: Blank.**

i. Take 25ml of 0.5N KOH in 250ml Volumetric flask.

ii. Make it 250ml with distilled water upto mark (shake well).

iii. Transfer 25ml of above solution into conical flask. Add 2-3 drops of Phenolphthalein indicator.

iv. Fill 0.1 N HCl in Burette upto '0' mark (remove air bubble from Burette tip pressing cork).

v. Do Titration of Titrand against Titrant. End point will be Pink to Colourless (note reading).

- **Procedure: Test.**

i. Transfer 25ml of 0.5N KOH in R.B.F containing oil sample.

ii. Fit R.B.F with water condenser keeping in water bath i.e. (Reflux assembly). Reflux for 1.5 hrs., cool it.

iii. Transfer RBF content in 250ml of Vol. Flask & make it 250ml with distilled water upto marks (shake well).

iv. Suck up 25ml of above solution & transfer in Conical flask, add Phenolphthalein indicator & Titrate the Titrand against 0.1N HCl, end point is Colourless.

Saponification test sample titration

2) ***pH Test***

Two-three drops of the solution were taken and then they were poured on the litmus paper. Hene the results were observed.

pH Test

3) ***Test for Viscosity***

- The viscosity of herbal oil was determined using Ostwald's viscometer. Take the specific gravity bottle, rinse it with distilled water, dry it in oven for 15 minutes, cool, close it with cap and weigh it (a). Now fill the same specific gravity bottle with the sample and close it with cap and again weigh it (b). Determine the weight of sample per milliliter by subtracting the weight (b-a).

4) ***Test for Specific Gravity***

Specific gravity, ratio of the density of a substance to that of a standard substance. The usual standard of comparison for solids and liquids is water at 4 °C (39.2 °F), which hasa density of 1.0 kg per litre (62.4 pounds per cubic foot).

5) ***Determination of Acid value***

- 1g of **oil sample** in conical flask.
- 50ml of Ethanol (as organic solvent)
- Add in conical flask
- Then add Phenolphthalein indicator (2.3)
- 0.1N KOH/ NaOH, fill into Burette.
- Get titrated up to Pink colour.
- Note reading.
- For confirmation repeat 3 times.

6) ***Sensitivity Test***

The prepared herbal hair oil was applied on 1cm skin of the hand and exposed tosunlight for 4-5 minutes.

7) ***Tests for Chemical Constituents***

Different chemical tests mentioned in the various reference books were performed and the results were observed and recorded.

III) *RESULTS*

A. Identification and Phytochemical Screening

1. Amla

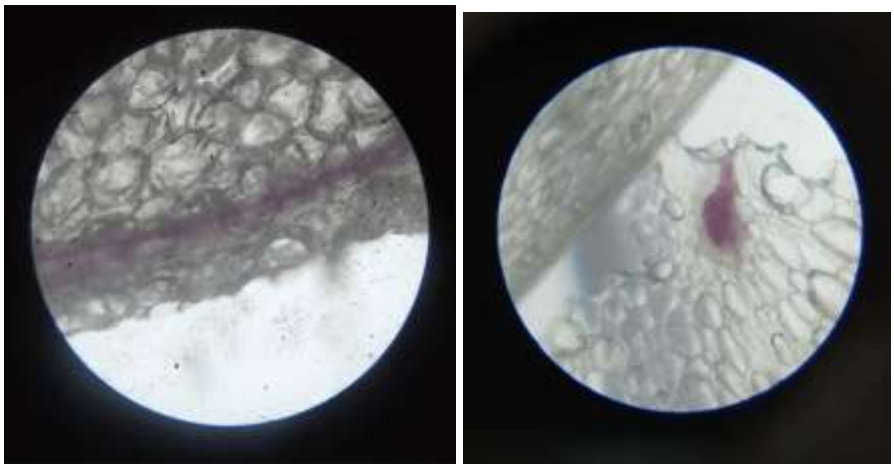
Organoleptic Characters

Colour	Green changes to light yellow or brick redwhen matured.
Odour	Odourless.
Taste	Sore and astringent.
Shape	The fruits are depressed, globose.
Size	1.5 to 2.5 cm in diameter.
Extra Features	Fruits are fleshy obscurely four-lobed with6-trygonus seeds. They are very hard and smooth in appearance.

Microscopy

TS of Amla

TS of pericarp of fruit shows epicarp consisting of a single layer of epidermis, cell appearing tabular and polygonal in surface view; cuticle present; a few small rosette crystals of calcium oxalate present in epidermal cells; mesocarp cells tangentiallyelongated parenchymatous and cell with walls showing irregular thickenings; ramnified vascular elements occasionally present, lignified having wide lumen; stone cells present, either isolated or in small groups toward endocarp; pitted fibers with walls appearing serrated due to the pit canals leading into lumen, present (Ayurvedic Pharmacopoeia of India, Part I, Volume VIII, First edition 2011).



TS of Amla

Powder microscopy of fruit powder of Amalaki: In microscopic powder study it shows lignified tissues of brown in colour. Aleurone grains of green to brown colour, and prismatic crystals of silica of brown colour are seen.

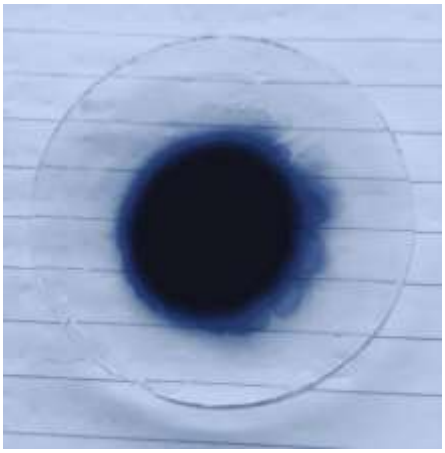
Fruit shows an epicarp consisting of epidermis with a thick cuticle and two to four layers of hypodermis; the cells in hypodermis is tangentially elongated, thick-walled, smaller in

dimension than epidermal cells; mesocarp consists of thin-walled isodiametric parenchymatous cells; several collateral fibrovascular bundles scattered throughoutmesocarp; xylem composed of tracheal elements, fibre tracheids and xylem fibres; tracheal elements, show reticulate, scalari form, and spiral thickenings; mesocarp also contains large aggregates of numerous irregular silica crystals.

Powdered Amla

Identification of chemical constituents

- **Ferric chloride test**



Ferric chloride test

The blue color is obtained.

Shows presence of Hydrolysable Tannins.

In amla there are present hydrolysable tannin.

- milky white colour confirms Tannins.

Extraction

Amla Fruit extract Blue clour obtained

Alcoholic extract of Amla Aqueous extract of Amla

2. Bhringraj

- **Organoleptic Characters**

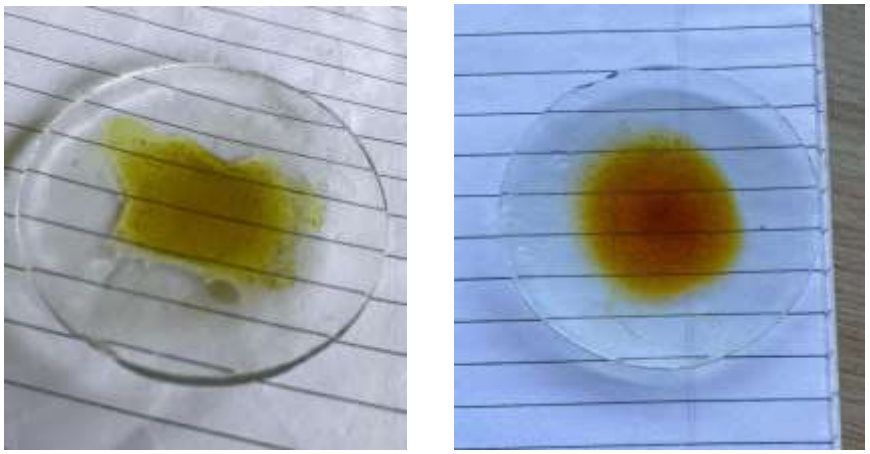
Bhringaraj is a creeping herb that grows to a height of 3 metres. It has a long stalk and white coloured flowers which are solitary, winged and about 6 to 8 mm in diameter. Theleaves are sessile, lance-shaped and arranged in the opposite orientation.

- **Microscopy**

TS of Bhringraj Stem

- **Identification Tests(physical, chemical)**

1. → Brown ppt was observed which shows presence of **alkaloids**.
2. → Blue colour was seen which mentions presence of **tannins.**
3. → violet colour was observed which states the presence of **phenol.**
4. → violet colour is seen which states the presence of **protein.**
5. → gives **yellow** colour.



Dragondroff Test FeCl3 test

- **Identification of chemical constituents in extract**

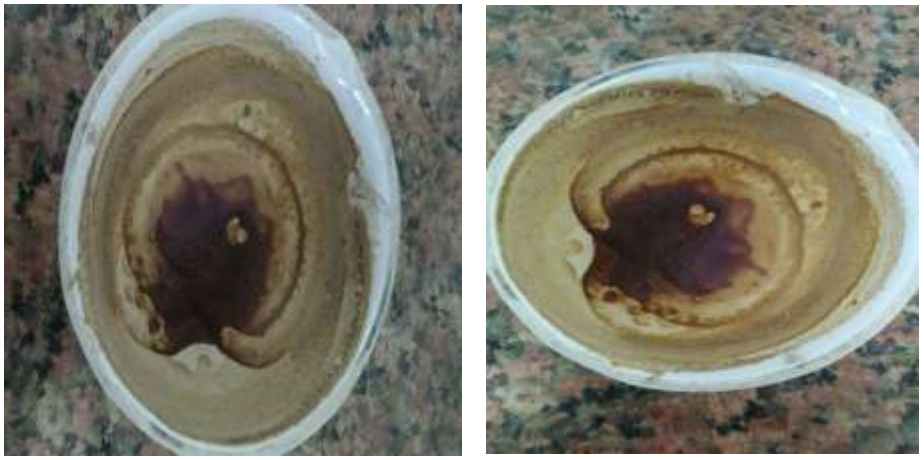
i. → Brown ppt. (**alkaloids**).

ii. → Blue Colour. (**Tannins**).

iii. → Violet. (**Phenol**).

- **Extraction**

Bhringraj Water Extract



Alcoholic extract of Bhiringraj Water extract of Bhringraj

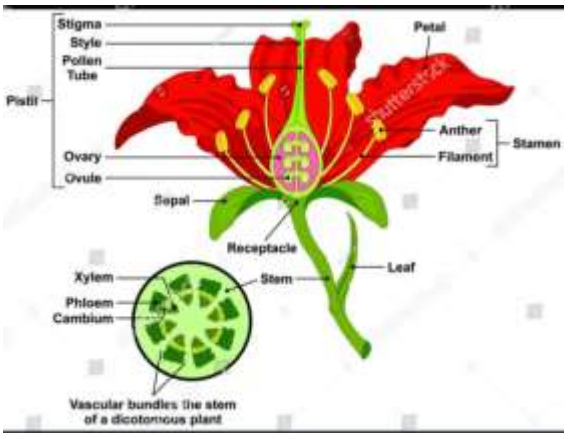
3. Hibiscus

Organoleptic Characters

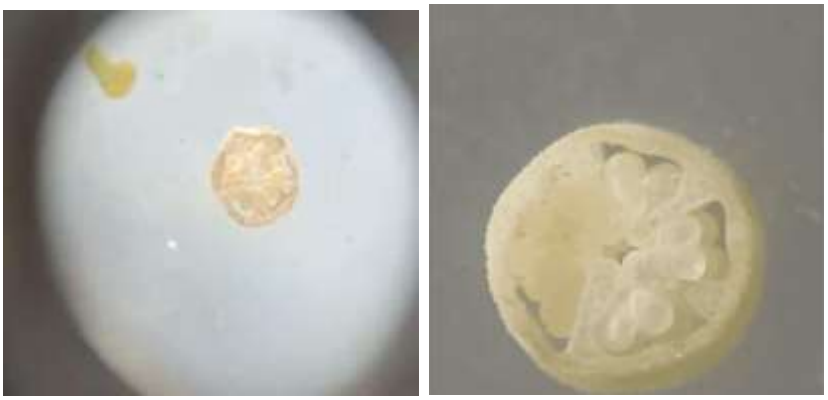
The large, trumpet-shaped flowers have five or more petals, and come in a range of colors, including white, pink, orange, red, yellow, purple, and multi-hued patterns.

Hibiscus leaves are ovate, simple and 8 to 10.5 cm long. They are spirally arranged around a long stalk. The flowers are bisexual, large and showy, grow up to 25 cm wide, stalked and arising singly from the upper leaf axils. The five free petals joined at the base may be white, yellow or red colour.

Microscopy



LS of Flower



TS of Hibiscus

Identification of chemical constituents

1) => dark Blackish blue or green color. => Indicate presence of **Polyphenolic compound**.

Ferric Choloride Test

Extraction

Hibiscus alcohol Hibiscus water

4. Neem

Organoleptic Characters

Neem is evergreen but can shed most of its leaves under dry conditions. The compound (pinnate) leaves are alternate, 20–40 cm long, with 20–30 dark green, serrated leaflets, each about 3–8 cm long. The terminal leaflet is often absent. Young leaves are reddish to purplish in colour.

Identification of chemical constituents

i. => Form Reddish Brown colour Indicated Presence of **Terpenoids**.

Neem Chloroform H2SO4 test

ii. => green colour is obtained.

Ammonia Chloroform Test

5. Brahmi

Organoleptic Characters

a. Flowers: Colour Consistency Odour: Blue or white Soft, smooth Slightly aromatic Bitter.

b. Leaves: Colour Consistency Odour Taste: Greenish brown Smooth Pungent Bitter-astringent

c. Stem: Colour Consistency Odour Taste: Brownish green Soft, smnooth PungentBitter.

1. Powder Microscopy

(a) Prismatic crystals (b) Tannin (c) Annular vessels (d) Pitted vessel were observed.

Brahmi Powder Microscopy

2. Forth Test: Formation of Honeycomb like forth was seen which indicates **Saponins** were present.

Forth Test

Extraction

Alcoholic extract of Bramhi

Water extract of Bramhi

6. Camphor

Organoleptic: Camphor appears as a colorless or white colored crystalline powder with a strong mothball-like odor. White to pale yellow crystalline solid, Camphoraceous aroma. Colour: Colorless or white, crystalline material.

A. Identification Tests(physical, chemical)

1. Wagners test

Yellow to brown ppt. **Alkaloids** present.

Wagners test

2. Haggers for alkaloids

Pale yellow colour. **Alkaloids** present.

Haggers Test

7. Sesame oil

- **Organoleptic**

Sesame flower, Behbahan

Sesame seeds occur in many colours depending on the cultivar. The most traded variety of sesame is off-white coloured. Other common colours are buff, tan, gold, brown, reddish, gray, and black.

Tests for Chemical Constituents

a. Pale yellow color. **Alkaloids** present.

Mayers Test Sesame

8. Coconut oil

- **Organoleptic**

If you regularly use coconut oil, then you will identify the adulterated oil in just a second by taking a look at it. Adulterated coconut oil is a little yellow in colour while pure one is almost transparent. You can also put some oil in a container and let it still for about 10minutes.

- **Tests for Chemical Constituents**
  - **Dragendroffs test for alkaloids**

Reddish brown color obtained, **Alkaloids** present.

Dragendroffs test

- Coconut oil contains a high amount of **lauric acid.**

9. Jasmine oil

Morphology*:* An evergreen scrambling shrub, ca. 4 m in length, with slender, spreading and tomentose branches. Leaves opposite, simple; petioles 7 mm long, tomentose; blades ovate, apex acuminate, base subtruncate to cordiform, marginsentire.

Identification of chemical constituents

- **Froth test:** Foam formed. **Saponins** present.

Froth test

- **Benedicts test for carbohydrates: carbohydrate** present yellowish colour seen.

Benedicts test

- ***Observations of Physical Properties of all drugs***

I. Loss on drying

Sr. No.	sample	Petri plate(g)	Weight (g)	15 min	30 min	45 min	60 min
1.	Neem	32.24	35.00	34.13	34.06	33.90	33.90
2.	Hibiscus	46.30	48.38	48.27	48.24	48.12	48.17
3.	Amla	47.41	49.56	49.45	49.44	49.41	49.42
4.	Bhringraj	32.26	34.25	34.19	34.18	34.17	34.16
5.	Brahmi	30.90	32.96	32.19	32.85	32.85	32.87

Calculation

Sr. No.	Sample	15 – 60 min	Result (g)
1.	Neem	34.13 - 33.90	0.23
2.	Hibiscus	48.27 - 48.17	0.10
3.	Amla	49.45 - 49.42	0.03
4.	Bhringraj	34.19 - 34.16	0.03
5.	Brahmi	32.91 - 32.87	0.04

II. Extractive value

Sr. No.	Drug	Wt. of empty China Bowl ‘a’(g)	Combined wt.‘b’ (Bowl + drug) (g)	Extract wt. ‘b-a’ (g)	%Extract value
1.	Brahmi (alc)	44.27	44.36	0.09	0.36
2.	Brahmi (aq)	55.09	55.17	0.08	0.32
3.	Amla (alc)	49.43	49.86	0.43	1.72
4.	Amla (aq)	45.53	46.00	0.47	1.88
5.	Bhringraj (alc)	54.79	54.88	0.09	0.36
6.	Bhringraj (aq)	54.79	54.92	0.13	0.52
7.	Hibiscus (alc)	55.30	55.44	0.14	0.56
8.	Hibiscus (aq)	55.30	55.55	0.25	1

Extracts

III. Moisture Content

Sr. No.	sample	Petri plate(g)	Weight (g)	15 min	30 min	45 min	60 min
1.	Neem	32.24	35.00	34.13	34.06	33.90	33.90
2.	Hibiscus	46.30	48.38	48.27	48.24	48.12	48.17
3.	Amla	47.41	49.56	49.45	49.44	49.41	49.42
4.	Bhringraj	32.26	34.25	34.19	34.18	34.17	34.16
5.	Brahmi	30.90	32.96	32.19	32.85	32.85	32.87

Calculation

Sr. No.	Sample	15 – 60 min	Result (g)
1.	Neem	34.13 - 33.90	0.23
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4.	Bhringraj	34.19 - 34.16	0.03
5.	Brahmi	32.91 - 32.87	0.04

B) Formulation

Herbal Hair Oil Formulation

C) Evaluation

1) Saponification Test

Pink Blank Pink to colourless (Blank)

End point pink to colourless

- **Estimation (Blank)**

Sr. No.	Initial Burette(ml) Reading	Final Burette(ml) Reading	Difference (ml)	Constant
1.	0.0	28	28	
2.	0.0	29.5	29.5	28
3.	0.0	26.5	26.5	

Normality of NaOH = $\frac{N\ of\ HCl\ X\ Vol.\ of\ HCl}{Vol.\ of\ KOH}$ X 10

= $\frac{0.1\ X\ 28\ X\ 10}{25}$

= **1.12N**

- **Estimation (Test)**

Sr. No.	Initial Burette (ml) Reading	Final Burette (ml) Reading	Difference (ml)	Constant
1.	0.0	29	29	
2.	0.0	30.5	30.5	30.17
3.	0.0	31	31	

- **Calculation**

Saponification Value = $\frac{m\ X\ (vb\ -\ vt)\ X\ N}{w}$

= $\frac{56.11\ X\ (28\ -\ 30.5)\ X\ 0.1}{1}$

= 56.11 X 2.5 X 0.1

= **14.027**

→ m = mol. Wt. Of Pot. Hydroxide

Vb = vol. Of 0.5N HCl in Blank test.

Vt = vol. Of 0.5N HCl in sample test.

N = exact N of HCl

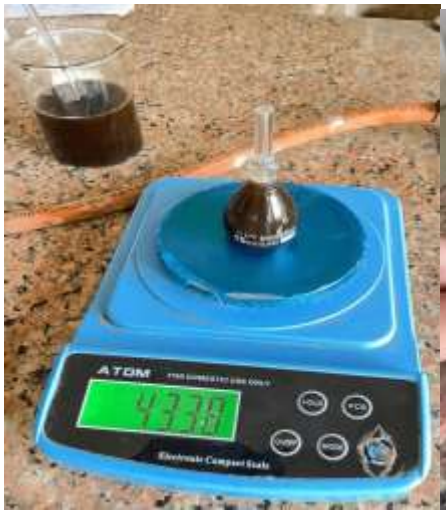
W = wt. Of substance taken for test.

2) pH Test

It was found to be **5 – 6**.

pH Test

3) Test for Viscocity



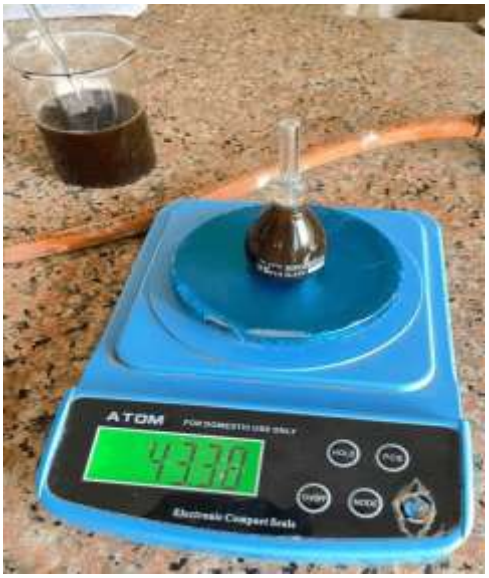
Test for Viscosity

4) Test for Specific Gravity

- Wt. Of empty bottle, 'a': 19.60g
- Wt. Of bottle with sample, 'b': 43.3g
- Wt. Of oil, 'c': b-a = 43.3-19.6 = 23.7g
- Density, ρ oil = $\frac{wt.}{vol.} = \frac{23.7}{25}$ = **0.948g/ml**
- Specific Gravity, s.g. = $\frac{\rho oil}{\rho water}$

  = 0.948/1

  = **0.948**



Test for Specific Gravity

5) Determination of Acid value

Acid value = 5.61 X n/w

- = 5.61 X 2.5/ 1
- = **14.025**

6) Sensitivity Test

No Irritation.

7) Tests for Chemical Constituents

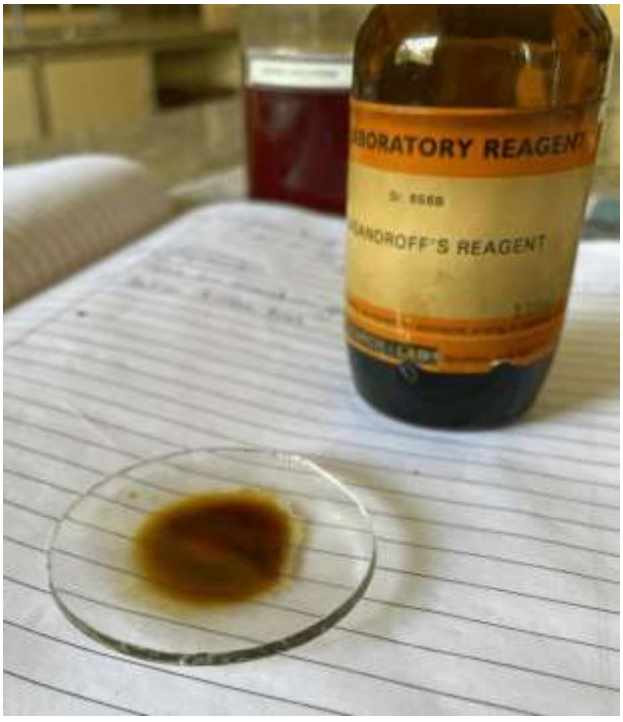
a. Mayers test for alkaloids,

Pale yellow color

Mayers test for alkaloids

b. Dragendroffs test for alkaloids

Reddish brown color



Dragendroffs test for alkaloids.

c. Wagners test,

Yellow to brown ppt

Wagners test

d. Haggers for alkaloids

Pale yellow colour

Haggers for alkaloids

e. Ferric chloride test for Tannins

Bluish colour

Ferric chloride test for Tannins

f. Terpinoids. Chloroform+ h2so4

Reddish brown colour

Test for Terpinoids

g. Froth test for oils

foam formed

Froth test

h. Benedicts test for carbohydrates

Carbohydrate present yellowish colour seen

Benedicts test

i. Test for antraquinone glycosides

pinkish colour is seen

Test for Antraquinone Glycosides

Sr. No.	Test	Standard	Observation	Conclusion
1.	Mayer's Test foralkaloids	Pale yellow color	Pale yellow color	Alkaloids were present
2.	Dragendroffs test for alkaloids	Reddish brown color	Reddish brown color	Alkaloids were present
3.	Wagners test foralkaloids	Yellow to brown ppt	Yellow to brown ppt	Alkaloids were present
4.	Haggers test foralkaloids	Pale yellow colour	Pale yellow colour	Alkaloids were present
5.	Ferric chloride. Test for Tannins.	Bluish colour	Bluish colour	Tannins were present
6.	Terpinoids. Chloroform+ h2so4.	Reddish brown colour	Reddish brown colour	Terpinoids were present
7.	Froth test for oils	foam formed	foam formed	Saponins were present
8.	Benedicts test for carbohydrates	yellowish colour seen	yellowish colour seen	carbohydrates present
9.	Test for antraquinone glycosides	pinkish colour is seen	pinkish colour is seen	antraquinone glycosides were present

Sr.No.	Parameters	Observation
1.	Colour	Greenish brown
2.	Odour	Characteristic
3.	Specific gravity	0.948
4.	Viscosity	28.44cp
5.	pH	5-6
6.	Acid value	14.025
7.	Saponification value	14.027
8.	Irritation test	No irritation

III) *Uses*

- Nature's Blend for Healthy Hair.
- Harnessing Herbal Essences for Hair Vitality.
- Herbal Infusion for Radiant Hair Revival.
- Herbal Formulation for Nourished Hair Renewal.
- Herbal Hair Oil Solution for Natural Beauty.
- Nourishing Formulation for Natural Radiance.
- Promotes Growth of New Hair Follicles.
- Smoothness of Scalp.

IV) CONCLUSION

From the Pharmacognostic Study of Crude Drugs, it was found that the observations of the Tests performed are similar to the reference Standard. Hence, these ingredients can be used for

the preparation of Herbal Hair Oil.

Hair oil was successfully prepared and passed all the tests and submitted.

This research provides guidelines on the use of herbal ingredients in the preparation ofHerbal Hair oil having minimal or no side effects. All the parameters showed that theyare within the limits and since all the ingredients added have many advantages, this oil will help in maintaining good growth of hair, protects from dandruff and results in Lustrous looking.

ACKNOWLEDGEMENT

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Finally, I thank all those who helped me directly or indirectly in the completion of our project.

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V) REFERENCES

1. Gautam S. Fomulation and evaluation of herbal hair oil. Int J Chem Sci, 2012; 10: 349-53.
2. Ansari S.H. and Ali M. Hair care and herbal drug. Indian J Nat Prod, 1997; 13(1): 3-5.
3. Purwal, L., Gupta, S. B. N. and Pande, M.S. Development and Evaluation of Herbal Formulations for hair growth, E- Journal of Chemisrty, Jan 2008; 5(1): 34-38.
4. Adhirajan, N., Dixit, V. K., Chandrakasan, G., Development and Evaluation of Herbal Formulations for Hair growth, Indian Drugs, Nov-2001; 38(11): 559-563.
5. Roy, R. K., Thakur, M., Dixit, V. K., Development and Evaluation of polyherbal formulation for hair growth- promoting activity, Journal of Cosmetic Dermatology, Nov-2006; 6: 108-112.

6. Nema R. Preparation, evaluation and hair growth stimulating activity of herbal hair oil. J Chem Pharm Res, 2009; 1: 261-7.
7. Gautam S. Fomulation and evaluation of herbal hair oil. Int J Chem Sci, 2012; 10: 349-53.
8. Wijaya WH, Mun'im A, Djajadisastra J. Effectiveness test of fenugreek seed (Trigonellafoenum-graecum L.) extract hair tonic in hair growth activity. Int. J. Curr. Res, 2013 Sep 20; 5: 3453-60.
9. N, Babu M. In vivo and in vitro evaluation of hair growth potential of Hibiscus rosasinensis Linn. Journal of ethnopharmacology, 2003 Oct 1; 88(2- 3): 235-9.
10. Gode V, Bhalla N, Shirhatti V, Mhaskar S, Kamath Y. Quantitative measurement of the penetration of coconut oil into human hair using radiolabeled coconut oil. J Cosmet Sci, 2012 Jan 1; 63(1):27-31
11. Jain PK, Joshi H, Dass DJ, Drug that Causes Hair Loss and Promotes Hair Growth - A Review, International Journal of Research in Pharmaceutical and Biomedical Sciences, 2012; 3(4): 1476-82.
12. Dixit V.K., Adhirajan N. and Gowri C. Development and evaluation of herbal formulations for hair growth. Indian Drugs, 2001; 38(11): 559-563.
13. Purwal, L., Gupta, S. B. N. and Pande, M.S. Development and Evaluation of Herbal Formulations for hair growth, E- Journal of Chemisrty, Jan 2008; 5(1): 34-38.
14. CK K. Purohit AP. and Gokhale SB. Pharmacognosy, 11th edition, Nirali Prakashan, 1999; 78-83.
15. Klein AD, Penneys NS. Aloe vera. Journal of the American Academy of Dermatology, 1988 Apr 1; 18(4): 714-20. 34.
16. Rathi V, Rathi J, Tamizharasi S, Pathak A. Plants used for hair growth promotion: A review. Pharmacognosy Reviews, 2008; 2(3): 185.
17. Schoff WH. Camphor. Journal of the American Oriental Society, 1922 Jan 1; 42: 355-70.
18. Sanju, N., Arun, N., Roop, K.K. 2006. Cosmetic Technology. 2nd Edition, 379-382.
19. Joshi, A.A., Dyawarkonda, P.M. 2017. Formulation and evaluation of polyherbal hair oil. International Journal of Green Pharmacy, 11(1): S135.
20. Bhatia, S.C. 2001. Perfumes, soaps, detergents and cosmetics, 639: 641.
21. Banerjee, P.S., Sharma, M., Nema, R.K. 2009. Preparation, evaluation and hair growth stimulating activity of herbal hair oil. Journal of Chemical and Pharmaceutical Research, 1(1): 261-267.
22. Mithal, B.M., Shah, R.N. 2000. A Hand Book of Cosmetics. 1st Edition, 141-142.

23. Singh, R.M. 1996. Indian Pharmacopoeia. Government of India, Ministry of Health and Family Welfare, Published by, The Controller of Publication, Edition, Vol. II.