To Study formulation and evaluation of herbal hair oil

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Abstract-Pharmacognosy is the branch of pharmacy that deals with herbs. This medicinal plants are utilized for preparing and manufacturing myriads of medicines. Beside this, herbs are used for beautification of body, preparation of cosmetics, flavouring and colouring agent. The main aim of present study involves preparation and evaluation of herbal hair oil by using fresh parts of various plants. In the present study herbal Hair oils were formulated. Loss of hair or alopecia is a universal problem that has been estimated to affect between 0.2 and 2% of the world's population. It is therefore necessary to discover natural remedies of plant origin having hair growth promoting potential to replace the synthetic one for the treatment of alopecia. People in the tropical countries have effectively used coconut oil to promote hair growth and development as a traditional hair grooming practice.

Hair oils are widely used by the consumer of the cosmetic industries. The hair oil samples comply for the requirements of color, odour, PH, Viscosity, Density, acid value etc. Present investigation was undertaken to standardize the selected herbal hair oils on physicochemical parameters and some standard. Excellent results were seen in formulation prepared by boiling method of oils preparation technique The prepared herbal hair oil are subjected to phytochemicals screening, general characterization, physical, chemicals testing.

The herbal oil were prepared according to Indian pharmacopoeia standard. The formulation consists of the herb such as bulb of Amla, Hibiscus, Aloe vera, Jasmine, Fenugreek, Onion, Curry leaves, Black cumin, Almond oil, Til oil, Coconut oil,etc In addition, it is assessed for stability study In conclusion, the prepared herbal hair oil is utilized to promote hair growth, for supplementation of vitamins and minerals, preventing dandruff, split ends and alternative choice from hazardous chemicals.

Key words: Hair oil, Hair growth, Amla, Hibiscus, Bringhraj, Aloe vera

1.INTRODUCTION

Hair oils are the hair care preparations used for the prevention and treatment of baldness and other ailments. They also promote the luxurious growth of hairs. Hair oil containing herbal drugs are used as hair tonic. Hair care products are categorized into two main category, hair tonics and hair grooming aids. These are basically the extracts of medicinal plants in an oil base.

Hair plays an important role in human life. In India the traditional process is the preparation of hair oils put together with various hair growth promoting drugs. Indian women are known for their long, shiny and healthy hair, so it is not surprising that hair care features prominently in their self-care rituals. The Charaka Samhitha (the definitive book on Ayurvedic medicine) describes the importance of oiling the hair and scalp to maintain good hair health and prevent hair loss. The daily hair oiling was recommended with appropriate herbs filled to suit others constituents and this practice also continuous until today. The hair oil preparations are included to treat various dandruff, hair fall process, split ends etc. The hair oil preparations are mainly used to cool the scalp for luxurious growth of hair in both men and women. The major problems associated with hair grooming are reduced pigmentation and greying, split ends, dandruff and falling of hair (Adhirajan et al., 2001) [1] leading to premature balding. Multiple factors including genetic predisposition, hormones, environmental exposure, medications, and nutrition predominantly contribute to hair loss (Hosking et al., 2018) [28] . Certain pathological conditions, use of chemotherapeutic agents and dermatological disorders can also cause hair fall (Madnani and Khan 2013) [38] . Various synthetic formulations such as Finasteride and Minoxidil, a vasodilator medication known for its ability to slow or stop hair loss and promote hair regrowth are widely used for treatment of alopecia but do not cure the condition permanently.

Pharmacological approaches based on such drugs have limited potential considering the side effects such as allergic reactions associated with them (Satish et al., 2015) [58]. For this reason, the attention has been recently focused on the discovery of new and safer remedies, often exhibited by natural products. It is therefore necessary to discover natural remedies with hair growth promoting potential to replace the synthetic one with hair tonics of plant origin for the treatment of alopecia. Applying oil to the scalp and hair before bath is a regular practice in India to enhance lubrication and maintain hair health. Fregonesi et al. (2009) [24] analysed oils derived from various natural sources and observed that oil treatment reduced the combing force percentage and the formation of split ends in the hair Hair oils also facilitate scalp treatments and control of alopecia (Maria, 2015) [42].

Herbal cosmetic are highly used due to their less adverse effects and the ingredients used are easily available. 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) [1].

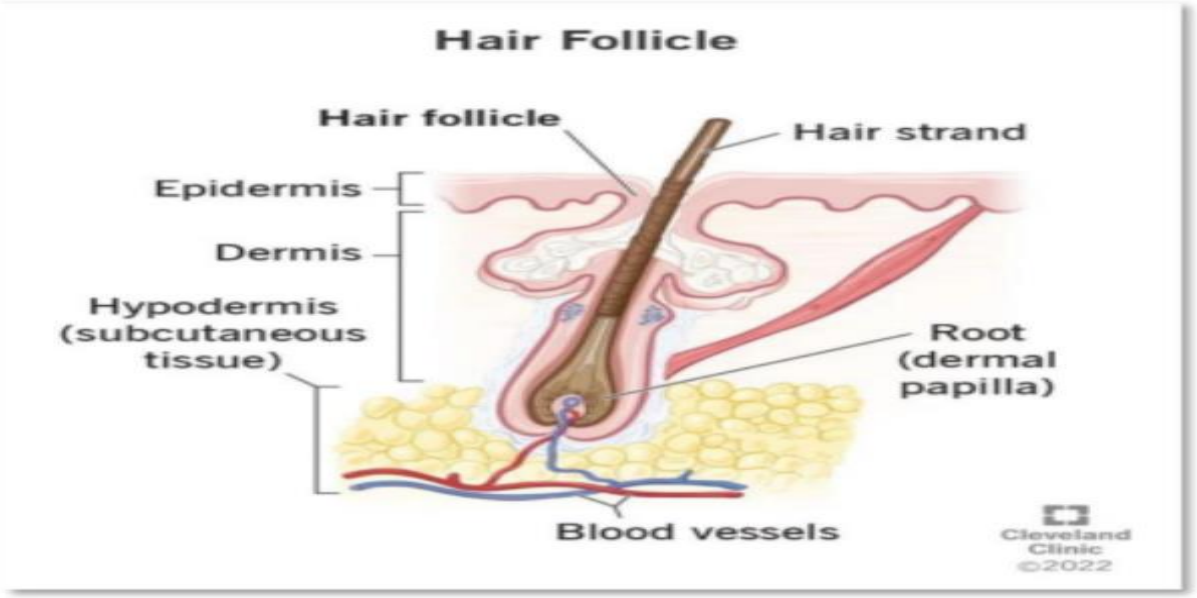
Hair loss is a dermatologic disorder, and the surge for discovering natural products with hair growth promoting potential is continuous. Each hair. Grows in three cyclic phases' viz., anagen (growth), catagen (involution) and telogen (rest). Hair Is made up of two structures:- Hair follicle Hair follicles are structures within your skin that grow your hair. You're born with millions of hair follicles in your skin. You can't pull out hair follicles. Damaged hair follicles lead to hair loss or reduced hair growth.

Symptoms of hair follicle conditions?

- Hair loss, thinning hair or limited hair growth.
- Pimples, fluid-filled bumps or blemishes on your skin
- Swelling (inflammation).
- An itchy rash.
- A wound that isn't healing, has a yellow crust or leaks a white to yellow fluid (Infection).

Hair follicle Structure of the hair Human hair is divided into two parts Hair root – (roots are underground)- located below the epidermis. Hair shaft- located above the epidermis.

1. <u>Hair Root:-</u> Hair follicle-pocket in the skin or scalp that contains the hair root. Hair bulb- lowest part of a strand of hair; thickened, club-shaped. Dermal papilla- small, cone-shaped elevation located at the base of the hair follicle that fits into the hair bulb Arrector pili muscle- small, involuntary muscle in the base of the hair follicle.



when it contracts, we get goose bumps. Sebaceous glands- oil glands in the skin that are connected to the hair follicles; secretes sebum (fatty, oily substance)

2. Hair shaft The hair shaft is the part of the hair that is made up of three layers of keratin. Those layers are;-

i. The inner layer:- Also called as medulla. Depending on type of hair, the medulla is not always present.

ii. The middle layer:- This is called the cortex which makes the majority of the hair shaft.

iii. The outer layer:- Also called as cuticle, which is formed by tightly packed scales in an overlapping structure that resemble roof shingles.

2.HAIR GROWTH CYCLE

The three stages of hair growth are the

a) Anagen phase:- The anagen phase is the growth phase of the hair. The Anagen phase will last from between 2-6 years. A new hair pushes the new Hair that's growing up and out of the follicle.

b) Catagen phase:- The catagen phase is a transitional stage and 3% of all Hairs are in this phase at any given time. This phase lasts for 2-3 weeks.

c) Telogen phase:-The telogen phase is the resting phase which lasts for about 2-3 months. During the telogen phase, the hair follicle is at rest and the Club hair is completely formed. The hair growth cycle Hair oil

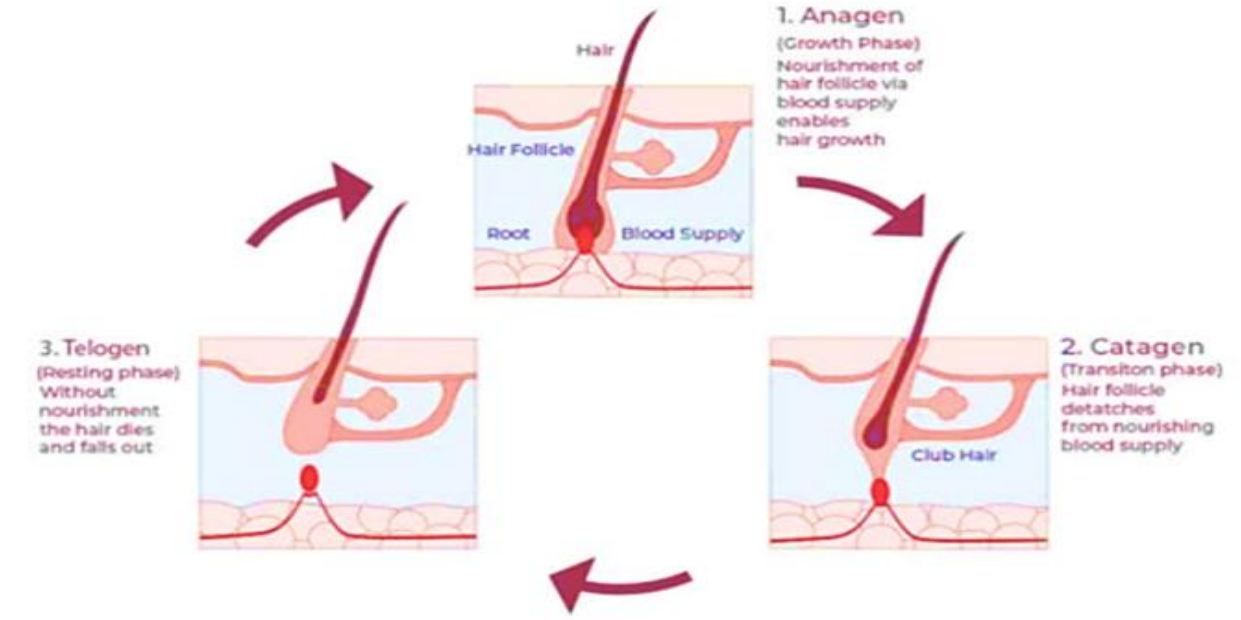


Fig. Hair growth cycle

Hair oil

• Hair oil are hair care products. 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.

• Hair oils are the hair care formulations applied for cure of hair disorders such as baldness, greying of hairs, hair falling, and dryness of hairs

• The hair oils are used for dressings and nourishing the hair. This preparations is generally used to increase the growth of hair and to make them healthy.

• Herbal hair oil not only moisturizes scalp but also reverses dry scalp and dry hair condition.

• It provides numerous essential nutrients required to maintain normal functions of sebaceous gland and promote natural hair growth.

• Hair oil is an oil-based cosmetic product intended to improve the condition of hair. Various types of oils may be included in hair oil products. These often purport to aid with hair growth, dryness, or damage.

• Herbal hair oil not only moisturize scalp But also reverses dry scalp & dry hair condition. It provides numerous essential nutrients required to maintain

normal function of Sebaceous Gland & promote normal hair growth.

Hair oil should have the following properties

- They should give luster to the hair.
- Retain them soft and flowing.
- Invigorate their growth.
- Keep the brain cool.
- Should not be sticky.

Benefit of hair oil

- Promote the hair growth thickness of hair.
- For Longer & stronger hair
- Maintaining the health of your hair.
- Maintaining the colour of your hair.
- It stimulates hair growth.
- Improves hair growth.
- Prevents dandruff
- Offers shine glow.
- Stress relief.

3. DRUGS WITH THEIR INFORMATION

3.1 Amla

Fig. 1

Rank	Scientific name & Common Name
Kingdom	Plantae
Division	Dried fruit
Family	Euphorbiaceae
Genus	Phyllanthus
Order	Malpighiales
Species	P.Emblica
Biological name	Phyllanthus Emblica
Other names	Indian gooseberry, Bhumi amla, Bhumyamalki

Amla in the form of an oil or as the main ingredient in hair products at health food and beauty stores. Those who follow ayurvedic medicine, or ayurveda, believe all parts of the tree have medicinal properties. Amla fruit contains a lot of vitamin C, minerals, and antioxidants. Followers of ayurvedic medicine say the fruit is excellent for boosting hair health and increasing hair growth.

Amla has antibacterial and antioxidant properties that can help promote the growth of healthy and lustrous hair (Turner, 1996) [66]. The fruit extract is useful for hair growth and reduce hair loss (Dhanukar and Thatte, 2000) [18]. Amla maintains the hair colour and prevents premature greying and strengthens the hair follicles (Singh et al., 2011) [61] .Phyllanthusemblica L. is a potent inhibitor of 5α-reductase, which promotes the growth of the hair. Thus, amla is an ideal component that can be selected in traditional recipes for herbal hair oil.

3.2 Hibiscus

Fig.2

Rank	Scientific name & Common Name
Kingdom	Plantae
Family	Malvaceae
Subfamily	Malvoideae
Order	Malvales
Species	H. Rosa-sinensis
Botanical name	Hibiscus rosa-sinensis
Other names	Hibiscus arnottii Griff. Ex Mast. Hibiscus boryanus DC.

The leaves and flowers of Hibiscus rosa sinensishave been reported to possess hair growth promoting and anti-greying properties in traditional literature. The flowers and leaves are traditionally used as a shampoo plus conditioner after grinding into a fine paste with water. Hibiscus leaves and flowers are rich in anthocyanins and phenolics, minerals like calcium,

phosphorus and iron, vitamin B1, riboflavin, niacin and vitamin C which stimulate and promote thicker hair growth and prevent premature greying of hair (Adhirajan et al., 2003) [2]. Phytosterols, triterpenoids and flavanoids found in flower extract are advantageous for hair growth (Agrawal et al., 2016) [3] .

Uses:- Stops hairfall, Prevent premature graying,Thicken hair and add volume .

3.8 Coconut Oil

Fig. 8

Botanical name	Cocos nucifera
Kingdom	Plantae
Order	Arecales
Family	Arecaceae
Genus	Cocos
Species	C.nucifera

Coconut oil nourishes the scalp and proffer shine to the hairs. Coconut oil is predominantly made up of a medium-chain fatty acid called lauric acid. This gives coconut oil a long, straight structure, which is more easily absorbed deep into the hair shaft. Moisturizes. The lauric acid in coconut oil has nourishing properties that are especially prone to soak into the strands of your hair. Coconut oil absorbs into your hair quickly, providing moisture to tame frizz and heal breakage Active constituents:- Fatty acids, capric acid, lauric acid **Role** Masks, hair, Moisturizes hair Seal hair, Promote the hair growth, Moisture the hair follicle.

Herbal formulations always have attracted considerable attention because of their good bustle and comparatively lesser or nil side effects with synthetic drugs (Banerjee et al., 2009) [8-9]. The hair care industry has become aware of this consumer demand and hence, delivering active formulations and promoting their adoption is necessary. By keeping these points in view, a study was conducted with an objective to develop polyherbal hair oil from Virgin coconut oil, and nine locally available herbs at Regional Agricultural Research Station, Pilicode, Kerala, India.

4. PREPARATION OF HERBAL EXTRACTS

All the fresh herbs are weighed accurately according to the ratio presented in Table 1. Virgin coconut oil is added to a vessel on the proportion fixed and heated on a medium low flame. When oil is hot, grated amla fruit and small onion is added to it first, because of their higher water content. Mix it well for some time and then add the remaining ingredients like hibiscus, curry leaf, Aloe vera, henna, bhringraj, tulsi, neelaamari and heated further in virgin coconut oil with constant stirring for about 20-30 min. The mixture has to be stirred continuously and carefully to avoid sticking to the bottom of the vessel when the moisture present in the herbs gets evaporated. A piece of cotton cloth is dipped into the mixture and taken out to conduct flame test to know whether moisture has completely got evaporated from it. The correct stage of finishing the extraction of herbs in virgin coconut oil is until the entire drugs are extracted and when the entire moisture is removed. At this stage, there won't be any cracking sound while boiling and the heat source is closed and left it for cooling. The mixture containing Virgin coconut oil and the herbs is filtered by straining through a muslin cloth or stainless steel mesh. Finally, the mixture is filtered again using filter paper to get the pure oil in homogenous condition. Lavender oil was added to the extracted oil for fragrance in the ratio proposed after which it was filled in glass bottle.

5. EXPERIMENTAL SECTION

Plant Material: The crude herbal drugs are collected from the surroundings of Tirumala hills of Tirupati, A.P. and were authenticated by K. Madhavachetty, Asst. Professor, Dept. of Botany, S V University, Tirupati.

Reparation of Polyherbal Hair Tonic

Introduction In India preparation of hair oils blended with various hair growth promoting drugs is an age old process. In many old literatures hair tonic preparations

are included to treat various dandruff and hair fall process.

The hair oil preparations are mainly intended to cool the scalp and for luxurious growth of hair in women. Various types of oils like coconut oil, mustard oil, Hence coconut oil enriched with herbal drugs is best mentioned method for thick hair growth. For this process of obtaining polyherbal hair tonics, coconut oil is extracted initially and simultaneously the required crude drugs are collected and dried. Coconut oil extraction processes Coconut oil is extracted from the kernel or meat of matured coconut harvested from the coconut palm. In the wet process, coconut milk is made first and then the oil is extracted from the milk.

Coconut kernel is shredded, mixed with a little water, and then squeezed or pressed to extract the oil. The resulting oil or water mixture produces coconut cream or coconut milk depending on the percentage of oil. The coconut milk is then allowed to separate naturally. Since oil is lighter than water, the oil rises to the surface. This takes 12 to 24 hours. The oil can then be skimmed off. This is the traditional method of making coconut oil from coconut milk commonly used by many people for making the oil at home.

Other methods incorporate heating, fermentation, refrigeration, or centrifugal force to separate the oil from the water.

Some minor heating is generally done afterwards (often in a low temperature vacuum chamber) to drive off excess moisture and produce a more purified product and to extend shelf life.

In the dry process the oil is extracted directly from the kernel. The coconut kernel is first shredded and dried in an oven to about 10 to 12% moisture.

The dried, shredded coconut is then placed into a press and the virgin oil is expelled. Methods used for preparation of herbal hair tonic If the coconut oil is blended with various drugs which has medicinal activity then it is termed as hair tonic. It is prepared by the following mentioned processes.

- **Cloth method**
- **Paste method**
- **Direct boiling method**

1.Cloth method:

The dried drug was weighed and tied in a muslin cloth. This cloth was then hanged in coconut oil base, with continuous boiling, stirring and finally the oil was filtered.

castor oil, olive oil are applied to scalp in admixture with suitable herbal drugs. Of all these coconut oil is the best suitable oil base due to its effective activity and also economical compared to other oils.

2.Paste Method:

Paste method was used where fresh fruit or pulp or the desired part of the plants were converted into paste with very little amount of water and kept overnight After this the wetted drug was mixed in coconut oil base and boiled with continuous stirring at a constant temperature, until the water droplets in oil stop knocking and the drug has completely extracted in the oil. The Oil was then filtered through a muslin cloth.

3.Direct Boiling Method:

The crude drugs were powdered, weighed and directly boiled in coconut oil with continuous stirring and heating until the drug had completely extracted in the oil base.

Procedure followed for the preparation of polyherbal hair tonic

For the preparation of polyherbal hair tonic the following steps are involved**.**

I. Preparation oil coconut oil base
II. Boiling of crude drug powders in coconut oil base to form enriched hair tonic.

Coconut oil is extracted from kernel by dry process and complete procedure of extraction of coconut oil from dry kernels is mentioned above. It is used as oil based and preserved. Crude drugs are processed by following methods.

i) Collection of crude drugs: Crude drugs of Neem, Hibiscus, Eclipta, Amla were collected.

ii) Drying of crude drugs: Crude drugs were dried under shade and proper aeration is provided in order to hasten the drying process. Drying under shade will retain the active constituents. Hence shade drying is preferred over artificial drying.

iii) Mixing and blending of dried crude drugs: The dried crude drugs were made into coarse powder by using mixer. Later on all these coarsely powdered drugs are passed through mesh number 80. Thus obtained powders are blended individually to get a uniform mixture.

iv) Formulating herbal hair tonic: Pure coconut oil extracted from cocosnucifera is used. Initially the oil is heated under low flame. To this hot

oil, crude drugs in required quantities were added by taking them in a muslin cloth. The crude drug mixture present in muslin cloth is dipped in hot oil. The process is continued by taking the cloth in and out of hot coconut oil under low flame. Thus the active ingredients of the crude drugs will get absorbed into the hot coconut oil. Later the hot oil is cooled and any traces of crude drug powders are removed by filtration process. Initially the oil is brown in colour. On standing of crude oil under cool place for a week turns the colour of the oil to pale green.

v) Packing of polyherbal hair tonic: The oil has pleasant smell with rejuvenating activity for hair growth. The prepared hair oil is completely obtained from natural drugs so it has no side effects and has promising results. It is packed in amber-coloured bottles and sealed tightly. Then the bottles are sealed in air tight bottles.

vi) Storage of polyherbal hair tonic: The sealed bottles are stored under cool conditions. This keeps the oil stable for longer period of time without undergoing ranicidityorsaponification

S.No	Ingredients	Quantity		
		2.5%	5%	7.5%
1.	Coconut oil	25ml	25ml	25ml
2.	Hibiscus	2.5 gms	5 gms	7.5 gms
3.	Amla	2.5 gms	5 gms	7.5 gms
4.	Neem	2.5 gms	5 gms	7.5 gms
5.	Eclipta	2.5gms	5gms	7.5gms

Formulation of Herbal hair oil

Ingredients	Quantity
Coconut oil	100ml
Almond oil	20ml
Curry leaves	3g
Jasmine	5g
Hibiscus	5g
Aloe vera	5g
Onion	10g
Amla	10g
Bhringraj	10g

6. RESULTS AND DISCUSSION

Herbal hair oil is one of the most well recognized hair treatments. Herbal hair oil not only moisturizes scalp but also reverses dry scalp and dry hair condition. It provides numerous essential nutrients required to maintain normal function of sebaceous glands and promotes natural hair growth. The herbal hair oil was prepared from the above mentioned ingredients and it was subjected to the qualitative chemical analysis for identification of various plant constituents.

The various parameters like Colour, Odour, Specific gravity (density), pH, Viscosity, Saponification value, Acid value, Refractive index and irritation testof herbal hair oil was evaluated. Anti-dandruff activity was carried out by measuring the zone of inhibition of herbal hair oil. Hair oil showed good activity

Phytochemical Evaluation of Herbal Hair Oil

Test	Observation	Results
Ascorbic acid test	Yellow colour turns blue confirmed	Ascorbic acid present and
Sulphur Test	Brown	Sulphur is present and confirmed
Saponin test	Foam gets appeared	Saponin present and confirmed

Physical Evaluation of Herbal Hair Oil

Parameters	Results
Colour	Brown
Odour	Characteristic
Specific gravity	0.845 pH 5.67
Viscosity	0.00532
Acid value	2.58
Saponification value	199.15
Refractive index	1.530
Skin irritation	No irritation

Table 4: Quality evaluation of herbal hair oil

Sl. No.	Parameter	Inference
1	Moisture content	0.21
2	Acid value	1.60
3	Saponification value	256.08
4	Specific gravity	0.916
5	pH	6.6
6	Viscosity	0.966

Moisture content:

These are important determinants of oil quality (Choe and Min, 2006) [15]. Raghavendra and Raghavarao (2011) [50] reported that hydrolytic rancidity of fats

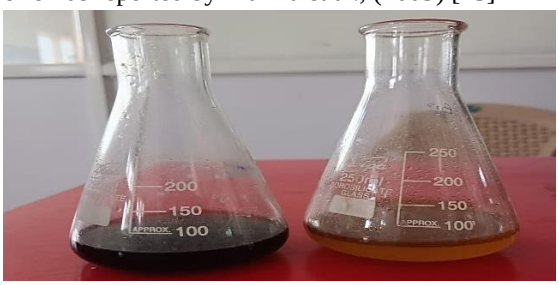
and oils are due to presence of high moisture. It is desirable to keep the moisture content low as it will increase the shelf life by preventing oxidation and rancidity processes. The moisture content recorded in the herbal hair oil is 0.21% and the values are within the set standards and hence facilitate keeping quality. Due to low moisture content, there is only minimal possibility of the deterioration of the formulate

Acid value:

This is defined as the number of milligrams of potassium hydroxide required to neutralize the free fatty acids present in one gram of fat. It is a relative measure of rancidity as free fatty acids are normally formed during decomposition of oil glycerides. More acid value indicates the higher percentage of free fatty acid leading to more oxidation and less quality of oil. Acid value calculated for the herbal hair oil sample was only 1.60. The low acid value recorded indicates that the oil contains relatively little or no water. Lower the acid value, higher the quality of oil. The observed values were in agreement with the trend reported by Kumar, et al. (2010) [36] for coconut oil (2.1mgKOH/g) based formulations. Similar results were recorded by Chothe et al. (2018) [16] and Begum and Begum (2019) [10] in Herbal hair oil.

Saponification value (SV):

This measures the average molecular weight of fatty acids present in the oil. It is directly proportional to the shorter chain fatty acids on the glycerol back bone. In this study, the herbal oil recorded a saponification value of 256.08 mg KOHg−1 oil. High saponification value indicates higher proportion of short chain fatty acids. This may probably due to the extraction of the herbal components in VCO which have a saponification value in the range of 250-260 KOH/g of oil as reported by Marina et al., (2009) [43]



Saponification test performed in laboratory to check the sap value of the oil preparation conducted on 24/01/2023 at 2.15pm in Institute of Pharmacy BadnapurJalna

Specific gravity:

Specific gravity of the herbal oil was 0.916 which are within the range proposed by BIS. It is lighter than water and is thin. This result was in agreement with that obtained by Kamal (2015) [31] for herbal hair oil.

pH:

The pH of oil was found to be 6.6 indicating near neutral value, which was relevant with human skin. Similar pH of 6.9 was recorded by Rohan et al., (2018) [55] and 6.8 by Joshi and Dyawarkonda (2017) [30] for coconut oil based herbal hair oil.

Viscosity:

Viscosity of the oil was found to be 0.966. This was in conformity with the studies conducted by Gautham et al. (2012) and Rohan et al., (2018) [55] which recorded a viscosity of 0.93 and 0.9936 respectively for herbal hair oil.

Biological Evaluation:

Primary skin irritation test conducted using the prepared formulation on intact skin of volunteers revealed that it was non irritant and was safe for use. The result thus shows the acceptance of the product in organoleptic test. The quality evaluation reveals that the levels of physicochemical and biological parameters of finished product have optimum standards which are within the safe limits.

6. CONCLUSION

Overall, the formulated herbal oil provides many nourishing value to hair such as vitamins, minerals, and essential oils. The finished product is within the limits. In conclusion, oil is beneficial to prevent hair from damage and loss caused by pollution and dull hair. And provide an alternative source from hazardous chemicals.

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