



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

“FORMULATION AND EVALUATION OF POLYHERBAL HAIR OIL”

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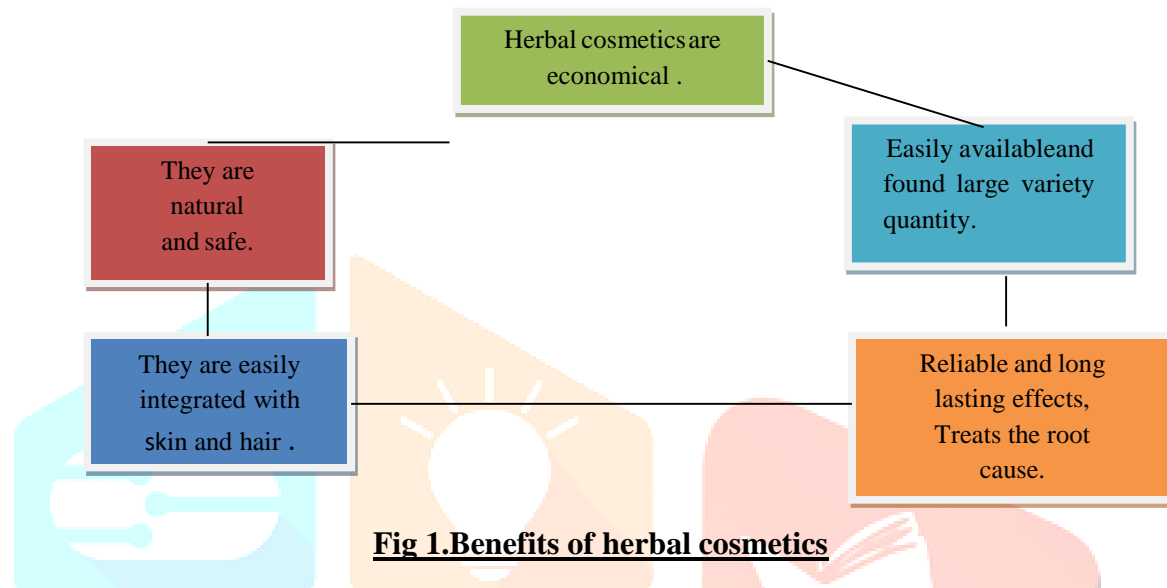
ABSTRACT - Human hair is very important to our personalities, and we use a lot of cosmetics to take care of it. There are some synthetic medications for hair loss that display serious adverse effects in addition to not providing a lasting cure. Compared to synthetic formulations, herbal formulations always have action and have fewer or no negative effects. The purpose of this study was to evaluate the value of polyherbal hair oil in treating common hair issues such as alopecia, baldness, hair loss, gray hair, dryness, and most types of dandruff. The composition contains a variety of natural substances, including coconut oil, camphor, curry leaves, almond, garlic, mehendi powder, neem, and castor oil. For the sebaceous glands to continue functioning normally, all substances give vital elements such as vitamins, antioxidants, proteins, trapezoids, and numerous essential oils. The created oil was assessed based on a number of criteria, including skin irritation test, pH, viscosity, acidity, saponification, and refractive index. It was discovered that every parameter matched criteria and was in good condition and the findings were determined and presented in this work. The values obtained from it are found to be close to the standard values, such as there being no grittiness or sedimentation and showing satisfactory organoleptic qualities.

KEYWORDS – Herbal hair oil, herbs, formulation, evaluation, result and discussion.

I. INTRODUCTION

One of the most vital components of the body is the hair, which affects a person's entire appearance and beauty. When it comes to hair care, we frequently use a variety of products to cleanse, alter the texture of hair, cure stressed hair, and feed the hair. One of the essential bodily elements, hair is formed from the ectoderm of the skin and functions as both a decorative structure and a sebaceous gland. The hair has no neural connections and is a dead tissue. Animals use their hair for a variety of practical purposes. It creates a cushion of protection for the head and other vulnerable body areas. The hair's curvature may also be affected by the hair's roundness, triangle shape, irregularity, or flattening. Every mammal has hair. Its primary function is to control body temperature. In addition, it serves as a way organ, reduces friction, and protects against sunlight. A person's hair color, type, and quantity can be used to determine which culture they belong to. Regardless of a person's gender identity, hairs also contribute to their self-esteem and confidence. A person's dream has always been to have black, healthy, glossy, and high-quality hair. Regardless of how long or short they are, everyone prioritizes keeping and maintaining them. Humans use a variety of strategies and cosmetics to combat this. One of them that is used to address practically all of these issues

is hair oil. For hair maintenance and hair treatment, we often use a variety of synthetic materials. Occasionally, rather than addressing the specific issue, these synthetic products exhibit a few to numerous undesirable side effects. Due to their increased effectiveness, lack of negative effects, readily available materials, etc., herbal cosmetics are in great demand as a result of humanity's growing interest in them. Herbs are currently commonly used in hair care products and are widely acknowledged in contrast to synthetic ones. Both natural and synthetic substances are used in the formulation of hair oils. Hair care products that are made of chemicals or artificial materials are known as synthetic hair oils. They are applied to give hair luster, superior conditioning, and frizz reduction.



Dihydrotestosterone, a male hormone derived from testosterone, inadequate blood flow, sebum, emotional strains, stress, mental disorders, aging, infections, hormonal imbalance, polluted environment, poisonous substances, injury and impairment, and radiation are major causes of hair loss. It was advised to oil your hair every day using suitable herbs that suited other ingredients, and this practice has persisted to this day. The preparations for hair oil are included to treat split ends, dandruff, and other issues. The main purpose of hair oil preparations is to cool the scalp in order to promote luscious hair development in both men and women.

The more favored option for treating various hair conditions is herbal hair oil. They stop hair loss, enhance hair style, and encourage hair growth. For those who have hair loss, it can be a very difficult mental state. On the other side, hairlessness or hair loss includes a drawback. Each hair grows in three phases: the anagen (growth phase), the catagen (involution phase), and the telogen (rest) phase. The synthetic medication Rogaine appears to be safe for long-term use and may be a strong vasodilator. If Rogaine lotion is continued, a semi-permanent therapy with native facet effects could potentially act as a retardant. The control of hair loss is extremely difficult. Secretion medicine uses α -reeducates inhibitors and vasodilators, such as Rogaine, are widely used but ineffective in reducing hair loss or fall. To suit a beauty regimen, a variety of herbal cosmetics items are available. It is really safe for our skin to have herbs added to cosmetics. Herbal hair oil treats dry scalp and hair conditions in addition to moisturizing the scalp. It offers a wide range of vital elements needed to support healthy sebaceous gland activity and encourage the growth of natural hair. It makes your hair feel amazing and enhances its aesthetic appeal and texture. Hair oils are cosmetic preparations that are used to the hair to encourage luscious hair growth, alleviate balding, and increase hair aggression. Herbal medications used in hair oil are typically referred to as hair tonics. Hair tonics and hair grooming aids are the two primary categories into which hair care products are divided. In essence, these are oil-based preparations of therapeutic herbs. We created Poly Herbal Hair Oil to address these problems by combining different kinds of oils, such as coconut and castor, with different medications, such as amla, neem, almond, curry leaves, camphor, garlic, and mehendi powders, among others. For the sebaceous glands

to continue functioning normally, all substances give vital elements such vitamins, antioxidants, proteins, terpenoids, and numerous essential oils. The formulated oil was assessed in terms of its viscosity, pH, acidity, and saponification value, among other characteristics. Every parameter was determined to be good and compliant with the requirements.

Ingredients in herbal hair oil:

- 1) Amla
- 2) Neem
- 3) Henna
- 4) Curry leaves
- 5) Coconut oil
- 6) Castor oil
- 7) Camphor
- 8) Garlic
- 9) Almond oil

Factors of hair loss:

There are several factors for the hair loss ; some of the main factors are given below – Acute illness.

- Autoimmune disorder
- Chemicals
- Hair dye
- Poor blood circulation
- Nutritional deficiencies
- Diabetes
- Chemotherapeutics agents
- Hair loss from childbirth
- Hair styling products
- Hair styling techniques
- Other fungal infection
- Physical trauma to scalp

Advantages of Polyherbal hair oil:

- 1) Prevents Greying and acts as a protective sheath



Fig 2

Early aging of the hair is typical in both adults and children. It happens when the meal that has been digested lacks protein and vitamins. On the other hand, graying hair could be caused by genetic factors. The same melanin that gives skin its color also provides hair its color. The skin pigment melanin determines the color of hair. Hair turns black when there is a high concentration of melanin in the scalp; when there is not enough, graying occurs.

2) Prevent Dandruff



Fig 3

A dry scalp is the cause of dandruff. Dandruff is caused by a stretched and broken dry scalp. Hair breakage and hair loss are caused by dandruff because it irritates the scalp and the hair roots. Thus, the primary cause of hair loss is dandruff. These are dead cells that cause embarrassment over one's character. When dandruff is present, the oil-secreting glands located at the scalp's epidermal cells either produce little or no natural oil.

3) Shine and luster



Fig 4

Most appealing aspect of healthy hair is its shine. When hair is healthy, it shines. We define "healthy" as proper diet and cleanliness. Heat damage to hair results in split ends and brittleness. The hair becomes irregularly distributed and loses its thickness. Frequent oiling prevents hair from being tangled in a single strand like lint. Your hair gets luster and gloss from oil, which also nourishes and holds broken hair together.

4) Strengthen Hair Protein

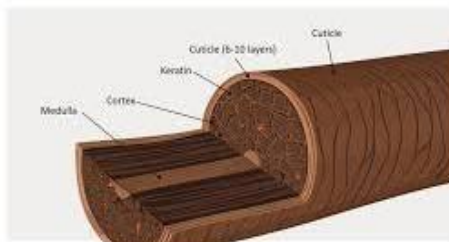


Fig .5

The roots of hair, a protein strand, are found beneath the epidermal cells. Regular oiling nourishes the hair follicle. Weak hair protein causes hair to become brittle and result in baby hair. Castor, almond, and olive oils—among other hair oils—help the protein restore its previous power.

5) Relax mind and body



Fig. 6

Using heated oil to massage the scalp and hair can help restore the nutrients lost as a result of chemical treatments. Additionally, it calms brain nerves, which improves blood flow to the head. By fortifying the roots, regularly oiling hair before washing and wrapping a hot towel over the head for 20 to 30 minutes will facilitate improved absorption.

6) Prevent bacterial and fungal infection



Fig 7

When bacteria or fungi infiltrate the pores on the scalp, it can cause moderate to serious issues. These microorganisms offer sustenance and create an ideal habitat for the development of dandruff and lice on hair, and may be the primary factor in hair fall or loss. You need to see a dermatologist if there are red spots on your scalp and it is becoming sensitive. By regularly rubbing honey into your hair, you may treat bacteria and provide your scalp the nutrients it needs to keep hydrated and healthy.

7) Hair growth



Fig 8

Hair grows when they are given enough nourishment to sustain. Although, hair is just a protein strand, it also requires regular feed of vitamins and other essentials. Massaging twice a week will regain whatever hair loses in the process of curling, ironing and chemical treatments.

Limitation of hair oil :

Overnight hair oiling can clog our pores and might even attract dirt, etc. Ideally, you should apply oil to your roots 3-4 hours before washing your hair. Oily hair often attracts dust, dirt, and even microorganisms. Oiling oily hair can further clog pores which is common with oily hair.

II. HERBAL INGREDIENTS

1. Amla^[3]

Synonyms:- Emblica, Indian goose berry, amla.

Biological source:- This consists of dried, as well as fresh fruits of the plant *Emblica officinalis* Gaerth (*Phyllanthus emblica* Linn.)

Family :- Euphorbiaceae.

Uses:-

- It nourishes the hair growth . It allows the natural texture and natural oil to hair , retained for a healthy shine and appearance.
- It controls hair loss . It contains fatty acids that moisturizes the hair . Fatty acids penetrate through the scalp to remove dryness and dandruff.
- It contains antioxidant properties which strengthens the roots of the hairs . It acts as a conditioner that gives hair a natural shine and bounce.



Fig 9. amla

2. Neem^[3]

Synonyms:- Azadirachta indica, margosa , nimtree or Indian lilac.

Biological source:- It consists of leaves and other aerial parts of Azadirachta Indica.

Family:-Meliaceae

Uses:-

- Treats dandruff and itchy scalp - Neem gets rid of dandruff for good and soothes and moisturizes the dry and itchy scalp.
- Promotes hair growth- Neem helps reduce hair fall and promote the growth of new hair.
- Prevents premature graying - Antioxidants in neem leaves prevent the premature graying of hair

- Treatment of lice – It contains compound like azadirachtin that are known to disrupt the life cycle of lice . It further suffocates adult lice.



Fig 10.Neem

3. Henna [18]

Synonyms:- Lawsonia inermis L , Lawsonia alba .

Biological Source :- It consisting of fresh and dried leaves of Lawsonia inermis .

Family :- Lythraceae

Uses:-

- Henna for Hair Growth :- Henna assists in increasing hair growth tremendously. Henna has a direct effect on the scalp , helping to improve follicle health. This prevents and corrects hair thinning as well as hair fall.
- Henna for Hair Fall:- Hair fall is reduced and healthy hair growth is promoted and used to improve scalp health, regulated pH levels and unclogged pores . Henna not only promotes quicker hair growth , but also enhances the texture of our hair.
- Henna for Hair colour:- Henna is natural hair colouring solution for grey hair.
- Henna for shiny Hair:- Henna provides conditioning that adds luster , shine and hair volume while promoting healthy hair development .
- Henna for Strong Hair :- Henna aids in sealing of hair cuticle , resulting in hair that is difficult to break . This does assist to improve the elasticity of the hair and makes it stronger.



Fig 11.Henna

4. Curry Leaves [19]

Synonyms:- Murraya koenigii , Mitha neem , Kurry patta .

Biological source :- It is obtained from dried leaves of Murraya koenigii.

Family :- Rutaceae

Use:-

- **Improve hair follicles:-** Enhance the quality of hair follicles by removing dirt and deadskin and providing nutrients to strengthen the roots.
- **Boost hair growth :-** Stimulate the scalp to boost the rate of hair growth by enhancing blood circulation.
- **Reduce scalp irritation :-** Eliminate scalp irritation by cleaning product build up to give you fresher hair .
- **Prevent premature hair graying :-** Hair retain the natural color of the hair by preventing premature graying due to stress , smoking , and alcohol.
- **Provide nourishment and moisture :-** Provide moisture and nourishment to boost the hair elasticity and strength.



Fig 12. Curry leaves

5. Garlic [20]

Synonyms:- Allium , Lasan .

Biological source :- It consisting of ripe bulbs of Allium Sativum .

Family :- Liliaceae.

Uses :-

- Garlic has high content of minerals like calcium , zinc , and sulfur , which are essential for hair growth .
- It is antimicrobial and helps kill germs and bacteria that can cause damage to the scalp and inhibit hair growth.
- The selenium content in garlic helps stimulate blood circulation for maximum nourishment.
- It helps purify the hair follicles , strengthen them , and prevent clogging , curbing hair loss.
- It helps calm aggravated scalp and treats issues such as dandruff.
- Raw garlic is highly enriched with vitamin C , which is great for the health of our hair . It boosts collagen production which helps with hair growth .



Fig .13.Garlic

6. Camphor [21]

Synonyms :- Gum Camphor, Kampfer, Karpoora, Karpuram .

Biological source :- It is obtained from wood and bark of tree cinnamomum camphora.

Family :- Lauraceae .

Uses :-

- **Improve hair texture :-** Camphor improves the blood circulation . Its soothes irritate scalp and that gives better hair texture. The emollients in hair moistures the hair .
- **Boost hair growth:-** Camphor in hair oil may boost hair cuticle , which is the outer layer of hair shaft .
- **Prevents lice:-** Camphor is toxic to lice and can help to kill both lice and their eggs nits).
- **Prevents fungal infection:-** It inhibit fungal growth by reducing moisture and calming the scalp .



Fig 14.Camphor

7. Coconut oil [22]

Synonyms :- coconut butter, copra oil.

Biological Source :- Coconut oil is the oil expressed from the dried solid part of endosperm of coconut, *Cocos nucifera* L.

Family :- Palmae.

Uses :-

- **Lice prevention** :- One small study found that when combined with anise in a spray, coconut oil was 40% more effective at treating head lice than the chemical permethrin .
- **Sun protection** :- UV filters can help protect your hair from sun damage. Some in vitro and skin studies have found coconut oil to have a sun protection factor of 8, so putting it on your hair could be useful
- **Dandruff treatment** :- Dandruff can be caused by an overgrowth of fungus or yeast on the scalp. While no studies have examined coconut oil specifically, it has antimicrobial properties and could be useful for treating dandruff .
- **Hair loss prevention** :- Excessive grooming can damage the hair shaft, which in extreme circumstances can cause hair loss. Coconut oil can help keep your hair in good condition and prevent this.

**Fig 15.Coconut oil****8. Castor oil** [23]

Synonyms :- Ricinus oil , Palm of Christ , Oleum ricini .

Biological Source :-Castor oil is fixed oil obtained from seeds of Ricinus Communi.

Family :- Euphorbiaceae

Uses :-

- It increases blood flow to the scalp, which promotes healthier hair.
- Applying castor oil just once a month can boost hair growth up to five times the usual rate.
- It can moisturize a dry, irritated scalp.
- Castor oil's antibacterial and antifungal properties can reduce dandruff.
- It can help grow hair in other parts of the body, like the eyebrows and eyelashes.



Fig 16.Castor oil

9. Almond oil ^[24]

Synonyms :- Prunus amygdalus , Prunus dulcis , sweet almond .

Biological source:- Almond oil is fixed oil obtained from the seeds of Prunus amygdalus (Rosaceae) var. dulcis (sweet almonds) or P. amygdalus var. amara (bitter almonds).

Family:- Rosaceae

Uses:-

- softens hair :- Almond oil is an emollient, it can fill in gaps in your hair at a cellular level. That makes your hair feel smoother to the touch. Using almond oil on our hair gives it a softer texture over time.
- Hair growth :- almond oil can make hair stronger and less prone to split ends, which means your hair growth won't be slowed by losing hair that becomes damaged. Almond oil contains high amounts of vitamin E, which is a natural antioxidant Trusted Source.
- Treats scalp conditions :- Almond oil can also be used as treatment for flaky scalp (seborrheic dermatitis) and scalp psoriasis. Rubbing a small amount of almond oil directly on your scalp increases blood flow to the area and introduces powerful antioxidants to the skin on your head.



Fig 17.Almond oil

III. METHODOLOGY

1. Preparation of amla , neem extract :-

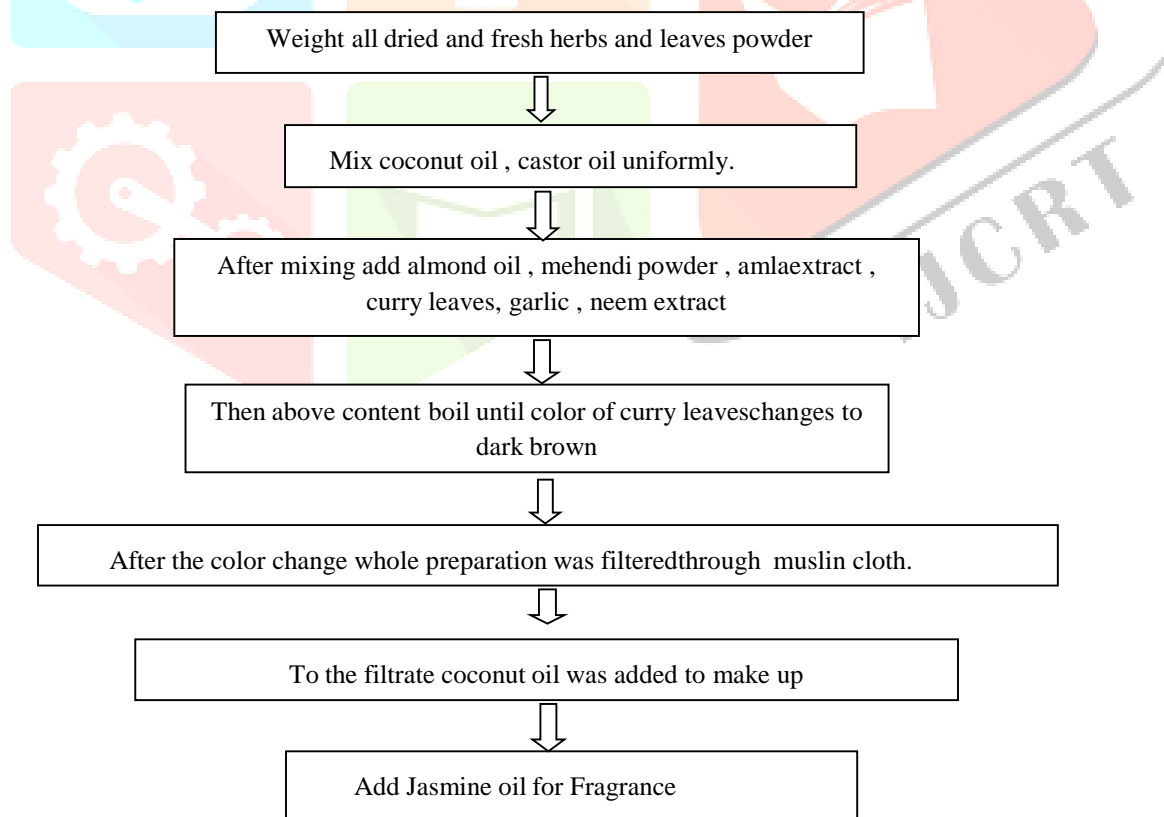
About 20 gm of dried amla and neem mixed with 96% of ethanol into the separate beaker . Then stirred gently for 30 s then stored in the room for 24 hours . The maceration result filtered using Whattman No . 1 filter paper then evaporated using water bath until thick extract was obtained .

2. Formulation of Herbal Hair oil :-

Table no. 1 Formulation of Herbal Hair Oil

Sr. No.	Ingredients	Quantity (%)
1	Amla	5
2	Almond	2
3	Garlic	1
4	Mehendi powder	2
5	Neem	2.5
6	Curry leaves	1.5
7	Camphor	1
8	Castor oil	25
9	Coconut oil	60

3. Procedure for Preparation of Hair Oil :-



4. Evaluation of polyherbal hair oil :-

❖ Organoleptic Property

1. Color: Detected by naked eyes.
2. Sensitivity: Applied to the skin and exposed to the sunlight for 5 minutes to check for any irritation over skin.
3. Sedimentation: Keep the whole preparation aside for overnight and check for sedimentation.
4. Grittiness: Rubbed to the skin and observed.
5. Wash ability – After applying herbal oil to the hair, it was washed with tap water

❖ Ph –

pH of the herbal oil was detected using pH meter.

Take the formulated oil in the beaker individually now deep the pH meter in beaker and weight for 1 minute till the readings come, as the pH meter show reading note it down individually . Before using pH meter deep it into the water.

❖ Viscosity:-

Ostwald's viscometer was used to measure viscosity.

Measurement of Viscosity Ostwald's Viscometer was used to measure the prepared herbal hair oil's viscosity at room temperature. After adding oil to the viscometer, the oil is suctioned into the upper reservoir and allowed to return to the lower reservoir. Measured is the amount of time the liquid takes to move between two engraved markers, one above and one below the upper reservoir.

❖ Specific gravity:-

Using a specific gravity bottle or a pycnometer, the specific gravity of the prepared oil was ascertained.

Two specific gravity bottles should be taken, cleaned with distilled water, dried in an oven for fifteen minutes, cooled, then sealed with a cap and weighed. Now pour the sample into the same specific gravity bottle, screw on the cap, and weigh it once more. Subtract the weight (b-a) to find the sample's weight per millimeter.

❖ Refractive index:- Using a refractometer, it was calculated-

When determining the refractive index of an organic liquid, Abbe's refractometer is utilized. The device is calibrated using a certain monochromatic light source and water as the liquid. To highlight the distinction between the bright and dark areas, use the micrometer screw. The cross wire of the telescope should be precisely on the edge separating the bright and dark sections after adjusting the refractometer scale. Following equipment calibration, repeat the procedure with other organic liquids.

- ❖ **Acid value** – 10ml of oil was added with 25ml of ethanol and 25ml of ether. Phenolphthalein was added as indicator and titrated with 0.1M potassium hydroxide solution,

Acid value = $5.61n/w$ Where,

n = Number of ml of 0.1M KOH

w = Weight of oil

- ❖ **Saponification value** - After precisely weighing 2g of oil, it was added to a 250ml iodine flask. After adding 25 milliliters of 0.5M alcoholic potassium hydroxide, the mixture was refluxed for 30 minutes on a water bath. As an indicator, phenolphthalein was added, and 0.5M HCl ('a' ml) was used for titration. A similar blank ('b' ml) was carried out without the sample.

Saponification Value: $28.05(b-a)/w$ Where,

w = weight in grams of the solution.

IV. RESULT AND DISCUSSION

One of the most well-known hair treatments is herbal hair oil. Herbal hair oil treats dry scalp and hair conditions in addition to hydrating the scalp. It supports the growth of natural hair and offers a variety of vital nutrients needed to keep sebaceous glands functioning normally. Several herbs were used to prepare the herbal hair oil, depending on how important they were to the recipe. The evaluation of the herbal hair oil included measures such as sensitivity test, viscosity, pH, acid value, saponification test, and refractive index. As a result, the current study revealed that the synthesized herbal hair oil satisfies optimal standards. Its effectiveness is established by additional standardization and biological screening.

Table No.2 Result of evaluation test

Sr.No.	Parameters	Observation
1	Colour	Greenish brown
2	Odour	Characteristic
3	Specific gravity	0.94
4	Viscosity	0.961 Poise
5	Ph	6.8
6	Acid value	4.5
7	Saponification value	112.05
8	Irritation test	No irritation
9	Refractive index	1.402

V. CONCLUSION:-

The use of herbal cosmetics by humans has increased during the past few decades. Natural cosmetics are safer to use than traditional beauty products. The current experimental investigation has demonstrated that we can create an organic polyherbal hair oil that works well for treating a variety of hair problems, including dandruff, hair loss, lice treatment, and psoriasis on the scalp. This oil is made from multiple herbal constituents. The personal hygiene and health care system were greatly improved by the use of herbal hair oil in cosmetics. One of the most popular hair treatments is herbal oil. Utilizing several herbal components, each with unique benefits when combined well, will have a positive impact on hair growth.

The primary goal was to create a polyherbal hair oil that would strengthen and nourish hair while also solving other issues including dryness. The herbal hair oil including ingredients like coconut oil, castor oil, almond oil, henna, neem, amla, and curry leaves was shown to be effective. It was determined that the designed polyherbal hair oil has good nourishing qualities for hair. Guidelines for using herbal ingredients to prepare herbal hair oil with little to no negative effects are provided by this research. Since all of the additional substances have numerous benefits and all the parameters indicated that they are within acceptable bounds, this oil will aid in promoting healthy hair development, turning gray hair black, preventing dandruff, and producing hair that is glossy. Hair oil has therapeutic value in the treatment of numerous different illnesses. Several metrics are used to assess the herbal hair oil, and the outcomes are also compared to benchmarks.

A variety of criteria, including pH, viscosity, specific gravity, acid value, color, grittiness, sensitivity, and sedimentation, were used to formulate and assess the product. Ultimately, it can be said that the formulas of poly herbal hair oil are quite high quality. In quality control tests, our manufactured herbal oil performed similarly to commercially available oil; nonetheless, more study and improvement are needed to raise the oil's overall caliber.

VI. REFERENCE

1. Das, P., Kumar, N., Prathibha, C., Kavitha, P. N., & Saraswathi, C. D. Formulation and evaluation of poly herbal hair oil.
2. Rakesh, K., Shukla Karunakar, D. M. S., & Sharma, M. (2016). Formulation and evaluation of hair oil for hair loss disorders. Seed, 8(11.25), 12.
3. Jhadav, A. K., Surwase, U. S., & Aditya, V. T. Formulation and Evaluation of Polyherbal Hair Oil. International Journal of Science and Research, ISSN, 2319-7064
4. Jadhav, S., Patil, S., Shewale, M. A. K., & Jadhav, M. A. S. Formulation and Evaluation of Herbal Hair Oil. people, 1(2), 3-11.
5. Shah, R. R., Mohite, S. A., & Patel, N. R. (2018). Preparation and evaluation of polyherbal hair oil-an effective cosmetic. Asian Journal of Pharmaceutical Research, 8(1), 36-38.
6. Kumar, K. S., Babu, K. A., Sushma, K., & Nayak, L. Formulation of Poly Herbal Hair Oil.
7. Kumar, K. S., Gomathi, S., & Swamy, S. S. (2016). Formulation and Evaluation of Poly Herbal Hair Oil- An Economical Cosmetic. International Journal of Advanced Research in Medical & Pharmaceutical Sciences, 1, 9-14.

8. Kashid, S.U. (2021). A bucolic remedy of formulation and evaluation of polyherbal hair oil. *Asian J Pharm Clin Res*, 14(12), 50-53.
9. Pavan, S., Prathibha, C., Dr Kavitha, P. N., & Dr Saraswathi, C. D. (2021). Formulation and Evaluation of herbal hair oil. *International Journal of Pharmaceutical Research and Applications*, 6(5), 1285-1299.
10. Thorat, R. M., Jadhav, V. M., & Kadam, V. J. (2009). Development and evaluation of polyherbal formulations for hair growth-promoting activity. *Int J Pharm Tech Res*, 1(4), 1251-1254.
11. Kumar, P. S., Sucheta, S., Umamaheswari, A., & Deepa, V. S. (2010). In vitro and in vivo evaluation of anti-dandruff activity of formulated polyherbal hair oil. *J Pharm Res*, 3, 2956-2958.
12. Pavan, S., Prathibha, C., Dr Kavitha, P. N., & Dr Saraswathi, C. D. (2021). Formulation and Evaluation of herbal hair oil. *International Journal of Pharmaceutical Research and Applications*, 6(5), 1285-1299.
13. Jain, P. K., Das, D., & Jain, P. (2016). Evaluating hair growth activity of herbal hair oil. *Int J PharmTech Res*, 9(3), 321-7.
14. Thorat, R. M., Jadhav, V. M., & Kadam, V. J. (2009). Development and evaluation of polyherbal formulations for hair growth-promoting activity. *Int J Pharm Tech Res*, 1(4), 1251-1254.
15. Chhajed, M., Paliwal, P., & Dwivedi, S. (2020). Formulation Development and Evaluation of Poly Herbal Hair Oil for Hair Growth Stimulating Activity. *International Journal of Pharmacy & Life Sciences*, 11(6), 6675.
16. Siddiqui, A., Thopate, S. S., & Tekawade, R. S. (2023). HERBAL OIL: FORMULATION & EVALUATION
17. Vyjayanthi, G., Kulkarni, C., Abraham, A., & Kolhapure, S. A. (2004). Evaluation of anti-dandruff activity and safety of polyherbal hair oil: An open pilot clinical trial. *The Antiseptic*, 101(9), 368-372.
18. <https://www.vedaoils.com/blogs/essentialoils/henna-oil-for-hair>
19. <https://images.app.goo.gl/SfxZn1DofbSJHZwp8>
20. <https://www.purpille.com/magazine/article/garlic-for-hair-uses-and-benefits>
21. <https://www.purpille.com/magazine/article/hair-benefits-of-camphor>
22. <https://www.pharmacy180.com/article/coconut-oil-291/>
23. <https://www.verywellhealth.com/using-castor-oil-for-hair-growth-4172190#:~:text=It%20increases%20blood%20flow%20to,antifungal%20properties%20can%20reduce%20dandruff.>
24. <https://www.healthline.com/health/almond-oil-for-hair>
25. https://www.researchgate.net/publication/376849431_Effect_of_particle_size_on_the_phenolic_and_flavonoid_contents_of_Amla_Indian_gooseberry_extract
26. <https://www.britannica.com/science/hair-anatomy>