

Aim : - To formulation and evaluation of Antidandruff herbal hair oil

¹Darshana Panjabrao Theng, ²Komal Khushalrao Tambe, ³Nikita Gangadhar Thale, ⁴Onkar Kailash Thorat, ⁵Dr. D. k. Vir

¹ Author, ²co-author, ³Co-author, ⁴ Co-author, ⁵Principal
Pharmaceutical Department, Shree Goraksha College of Pharmacy and Research Centre, Khamgaon Chhatrapati Sambhajanagar, India.

Abstract :

Herbal cosmetics have gained popularity due to their natural origin and minimal side effects compared to synthetic products. The present study focuses on the formulation and evaluation of a Antidandruff oil for the management of common hair problems such as dandruff, hair fall, dryness, and premature greying. The formulation includes natural ingredients like neem, coconut oil, hibiscus, fenugreek, onion, Alovera and black seeds, which are rich in vitamins, antioxidants, proteins, and essential fatty acids that nourish the scalp and promote hair growth. Coconut oil acts as a carrier base, enhancing the absorption of active constituents. The prepared oil was evaluated for physicochemical parameters such as colour, odour, pH, viscosity, and saponification value. Antidandruff activity was tested against *Pityrosporum ovale* and *Candida albicans*, showing effective antifungal action. The results indicate that the formulated herbal hair oil is safe, stable, and effective for improving overall hair health and can be used as a natural alternative to chemical-based products

Keywords :

Neem, coconut oil, Dandruff, hair fall, Hibiscus, Alovera, Fenugreek seeds

Introduction

Dandruff is a widely occurring scalp condition seen across the world. It is characterized by the appearance of white or silvery flakes on the scalp and is often associated with itching. In many cases, individuals suffering from dandruff also report increased hair fall [1]. Hair plays a significant role in human appearance and overall well-being [2]. Structurally, hair consists of three primary components: the bulb, a rounded structure located at the base within the dermal layer; the root, which lies beneath the skin surface; and the shaft, the visible portion that extends above the scalp [3].

The yeast *Pityrosporum ovale*, which depends on lipids for growth, is commonly associated with the development of dandruff. This study focuses on evaluating the antidandruff potential of a polyherbal oil formulated using extracts from six medicinal plants. In addition, species of *Candida* are also considered as possible contributing factors in dandruff formation [4].

With changing consumer preferences, the hair care industry has increasingly shifted toward products containing active ingredients designed to meet these demands. Within traditional Indian medicinal systems, a variety of plants and herbal formulations have long been recognized for their potential to support hair growth and improve overall hair health and quality [19].

Bio-compounds for Treatment of Various Hair Problems :-
Bioactive compounds obtained from natural sources are widely used in managing hair disorders. They help improve scalp health, strengthen hair follicles, and support healthy hair growth. These compounds are known for their antioxidant, anti-inflammatory, antimicrobial, and nourishing properties, making them useful in phytocosmetic formulations.

Common bio-compounds used in hair care include flavonoids, which protect hair follicles from oxidative stress; alkaloids, which may stimulate hair growth; saponins, which act as natural cleansers; tannins, which help control excess oil and dandruff; and terpenoids, which enhance blood circulation to the scalp and support hair regeneration [21].

Phytocosmetic formulations mainly consist of natural ingredients such as plant extracts, essential oils, fixed oils, and other raw materials like resins, waxes, and lipids that function as active components. Although these products are primarily plant-based, small quantities of synthetic substances may sometimes be included. However, due to the side effects linked to synthetic ingredients, there is a growing preference for natural oils in both pharmaceutical and cosmetic uses. Herbal ingredients can be used in various forms, including powders, extracts, liquids, essential oils, and carrier oils [22].

Hair Growth Cycle :-
 The hair growth cycle consists of four main stages: anagen (growth), catagen (transition), telogen (resting), and exogen (shedding).

The **anagen phase** is the active growth stage in which hair grows continuously at about 1 cm per month. Around 85–90% of scalp hair remains in this phase at any time. It involves rapid cell division in the hair papilla, leading to new hair formation and deeper extension of the follicle into the dermis.

The **catagen phase** is a short transitional period lasting about two weeks. During this stage, the hair follicle shrinks due to cellular breakdown, and the dermal papilla detaches, cutting off the supply of nutrients and blood to the hair strand.

The **telogen phase** is the resting stage, where the follicle remains inactive for one to several months. About 10–18% of hair is in this phase at a given time. After roughly three months, the cycle restarts with new hair growth [17].

Hair originates from follicles located beneath the skin, where blood vessels provide essential nutrients required for growth [5]. Each strand passes through the four phases of the cycle, and different hairs are in different stages simultaneously [6]. Structurally, hair consists of a root embedded within the follicle and a shaft that projects above the skin surface [7].



Fig no:-1:Hair Growth Cycle

- **Hair Structure: -**

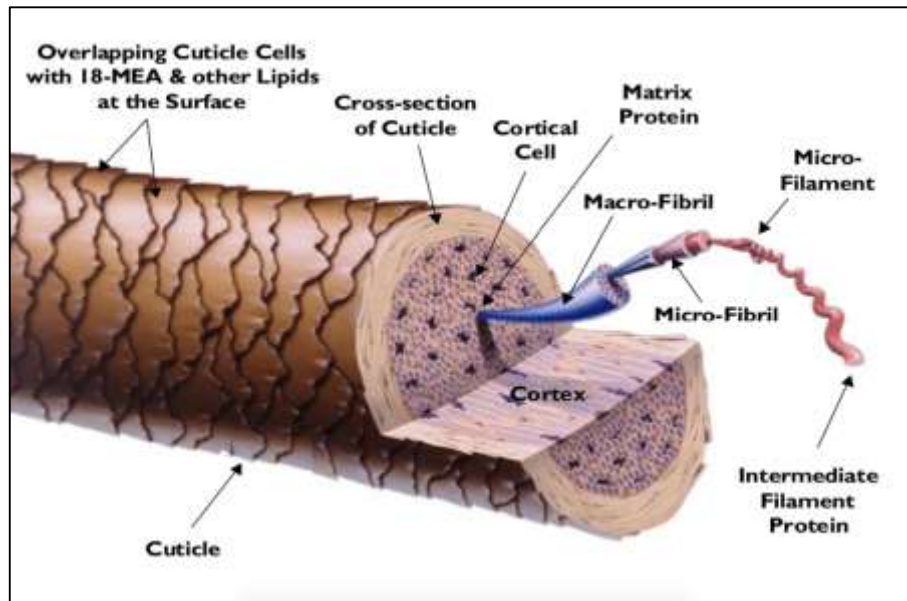


Fig no:-2. Structure of Hair

- **Based on Figure :-** The hair structure can be divided into parts above and below the skin surface.

The **hair shaft**, which is visible above the skin, is made up of three layers: the cuticle, a protective outer layer of overlapping cells; the cortex, which contains keratin and melanin and gives hair its strength and color; and the medulla, the innermost core that may be absent in fine hair.

Below the skin lies the **hair root**, which is enclosed within the follicle and helps anchor the hair to the scalp. At the base of the root is the **hair bulb**, a swollen region containing actively dividing cells responsible for hair growth.

The **dermal papilla**, located at the base of the bulb, supplies essential nutrients and blood required for hair development. Surrounding the root is the **hair follicle**, a tube-like structure that plays a key role in hair formation and growth.

The **sebaceous gland** produces sebum, which helps keep the hair and scalp lubricated. Attached nearby is a small muscle that contracts to make the hair stand upright, commonly known as goosebumps

- **Type of hair loss : -**

1.Androgenic alopecia is a hereditary form of hair loss influenced by androgen hormones, leading to gradual thinning of hair in a defined pattern.

2.Telogen effluvium is a temporary condition triggered by factors such as stress, illness, surgery, or hormonal changes, causing many hair follicles to shift into the resting phase.

3.Alopecia areata is an autoimmune disorder in which the body's immune system attacks hair follicles, resulting in patchy hair loss.

4. Traction alopecia occurs due to continuous pulling force on hair from tight hairstyles like braids, buns, or ponytails over a long period.

5. Anagen effluvium refers to sudden hair loss during the active growth phase, commonly associated with chemotherapy or radiation exposure.

6. Cicatricial alopecia, also known as scarring alopecia, involves inflammation that permanently damages hair follicles and replaces them with scar tissue.

7. Itchy patches and hair loss, mainly seen in children [19].

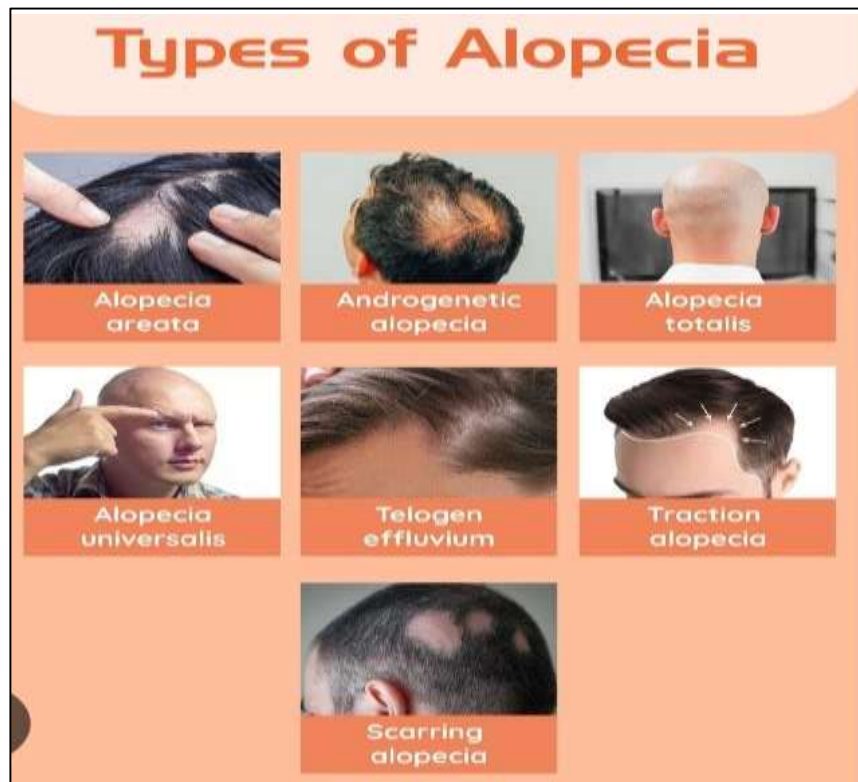


Fig 3:-Types of Alopecia

• **Material** **Method** **Collection** **of** **Plant** **Material** **:-**
Hibiscus **Petals:**
 Hibiscus oil is prepared from fresh petals of *Hibiscus rosa-sinensis* (family Malvaceae). The plant is known for strengthening hair roots, while its flowers and leaves, rich in flavonoids and amino acids, help nourish the hair and improve thickness [8].



Fig.no: -4,Hibiscus Petenals

Uses: -

- 1.Hibiscus flowers and leaves are rich in bioactive compounds such as flavonoids and amino acids that help strengthen hair follicles and nourish the scalp.
- 2.These constituents support healthy hair growth, provide deep hydration to hair strands, help control dandruff and scalp irritation, delay premature aging of hair, and may reduce the risk of progressive hair loss

• **Neem leaves:-**

Leaves of *Azadirachta indica* (family Meliaceae), whether fresh or dried, are widely used for their beneficial effects on skin and hair, particularly due to their anti-inflammatory and antifungal properties[9].



Fig.no 5:-Neem Leaves

Uses: -

Recent scientific investigations have demonstrated that the plant contains various bioactive constituents exhibiting insect-repellent, insecticidal, antifeedant, nematicidal, and antimicrobial activities.

Additionally, the seed oil has been reported to possess spermicidal properties[23]

- **Black seeds: -**

Seeds of *Nigella sativa* (family Ranunculaceae) are widely utilized in hair care formulations because of their antioxidant, anti-inflammatory, and antimicrobial activities, which support scalp nourishment and encourage healthy hair growth[10].



Fig no 6: -Black Seeds

Uses: -

Enhances overall hair condition, reduces hair shedding, helps manage acne, exhibits antiinflammatory effects, and assists in maintaining normal blood glucose levels[13].

- **Alovera** Synonym: *Aloe barbadensis* Miller, Synonym: *Aloe barbadensis* Aloe vera is a compact succulent plant with little or no stem, usually reaching a height of 60–100 cm[11].Its leaves are thick, fleshy, and vary from green to grey-green sometimes with white speckles, and the plant is extensively grown and distributed Worldwide[12].



Fig .no 7:-Alovera

Uses: -

proteolytic enzymes which repairs dead skin cells on the scalp. It also feat as a great conditioner and leaves your hair all smooth and shiny. It bolsters hair growth, prevents itching on the scalp, reduces dandruff and conditions your hair[25].

- **Fenugreek seeds: -**

Fenugreek (*Trigonella foenum-graecum*, Family: Leguminosae) contains bioactive compounds like saponins, flavonoids, and alkaloids that support hair health. It helps improve scalp circulation, reduce dandruff, and strengthen hair due to its rich protein and nicotinic content[13].



Fig.no 8: -Fenugreek Seeds Uses: -

Fenugreek seeds are rich in proteins and bioactive compounds that help promote hair growth, reduce hair fall, and support healthy scalp conditions. They also assist in regulating blood sugar levels and improving digestion[24].

- **Coconut Oil: -**

Coconut oil from *Cocos nucifera* is rich in lauric acid, which penetrates the hair shaft to moisturize and reduce damage. It also acts as a carrier and supports healthy hair growth[14].



Fig.no 9: -Coconut Oil

Uses: -

Helps reduce hair breakage while maintaining adequate moisture in the hair strands. It also protects hair from structural damage and protein loss, particularly when wet. Additionally, it provides a protective barrier against environmental stressors such as pollution, wind, and UV radiation[13].

Onion

Biological Source: *Allium cepa* Family: Alliaceae Onion juice contains a high amount of sulfur compounds that help strengthen hair, reduce hair fall, and support healthy hair growth[13].



Fig. no 10:-Onion Uses

Uses :-

Extra sulphur from onion juice can encourage strong, thick hair, reducing hair loss and encouraging hair development[13].

• **Marketed Preparations :-**

Several herbal hair oils are available that are commonly used for hair care:

- **Indulekha Bringha Hair Oil** – An Ayurvedic formulation containing bhringraj, amla, and neem, traditionally used to promote hair growth and reduce hair fall.
- **Kesh King Ayurvedic Hair Oil** – A blend of herbs such as bhringraj, amla, brahmi, and jatamansi, widely used for controlling hair loss and improving hair vitality.
- **Dabur Vatika Enriched Coconut Hair Oil** – Coconut oil enriched with herbal extracts like henna, lemon, and amla, known for strengthening hair and helping manage dandruff.
- **Trichup Herbal Hair Oil** – Contains ingredients like neem, bhringraj, and amla, which help maintain scalp health and reduce microbial infections.
- **Himalaya Herbals Anti-Hair Fall Oil** – A herbal formulation with bhringraj, amla, and fenugreek, commonly used to control hair fall and nourish the scalp.

• **Formulation of Herbal Hair Oil Table: -**

Sr.no	Ingredient	Quantity
1	Onion	30g
2	Neem leaves	20g
3	Aloe vera	10g
4	Black seeds	10g
5	Hibiscus petals	20g
6	Coconut oil	100g
7	Fenugreek seeds	10g

Table No 1: -Formulation Of Herbal Hair Oil

Although marketed products are effective, they may contain added fragrances or preservatives. The proposed formulation, however, aims to be completely natural and additive-free, using potent yet less-explored ingredients like Bhallataka and ginger [20].

• **Method of Preparation :-**

The required ingredients—onion, fenugreek seeds, black seeds, Aloe vera, neem leaves, and hibiscus petals—were collected and thoroughly cleaned to remove impurities. The onion was peeled and chopped, while the seeds and hibiscus petals were coarsely processed. A herbal powder was prepared by blending fenugreek, black seeds, sesame seeds, and hibiscus petals. Onion juice was extracted separately by grinding and filtering the pulp.

Coconut oil was gently heated, after which the herbal powder and onion juice were added and mixed well. The mixture was heated on a low flame for 5–10 minutes with continuous stirring to ensure proper infusion. The oil was then cooled to room temperature and filtered using a muslin cloth to remove residues. The final product was stored in a clean, airtight glass container for further evaluation [13]

• **Evaluation Parameters of Herbal Hair Oil :-**

Organoleptic Evaluation:

The formulation was examined for physical characteristics such as colour (visual observation), odour (smelling), grittiness (by touch), and sedimentation (after standing overnight) [14].

Physicochemical Evaluation:

The oil was analyzed for parameters including pH (ideally 5–7), viscosity, specific gravity, acid value, and saponification value to assess quality and stability [15].

Phytochemical / Functional Evaluation:

Qualitative analysis confirmed the presence of compounds like alkaloids, flavonoids, tannins, phenols, steroids, glycosides, and saponins [16]. Functional properties included antifungal activity (neem, black seeds), hair growth promotion (onion, hibiscus), and conditioning effect (Aloe vera, coconut oil).

Additional Tests :-

Stability studies were performed at different temperatures to observe changes in colour, odour, and phase separation. Skin irritation tests checked for redness or sensitivity. Spreadability was evaluated between glass slides, while washability determined ease of removal. Antidandruff activity was assessed against dandruff-causing microbes.

Advantages of Herbal Hair Oil :-

Herbal hair oils help control dandruff without synthetic chemicals and exhibit antifungal properties. They nourish the scalp, strengthen hair roots, and promote healthy hair growth. Regular use reduces itching, dryness, and irritation while improving hair texture and shine. These oils are generally safer, with fewer side effects, and also help reduce hair fall associated with dandruff.

Conclusion :-

The study shows that the formulated herbal antidandruff hair oil is safe, effective, and suitable for hair care. Its natural ingredients provide antidandruff activity while nourishing the scalp and hair. Evaluation confirmed good physicochemical properties and stability. Overall, it offers a natural alternative to synthetic products with minimal side effects and has potential for future cosmetic and pharmaceutical use.

• Reference: -

1. Paul KJ, Bhattacharya N, Preparation of herbal shampoo, Indian J of Exp. Biology, 1999 (40):1307 – 1309.
2. <https://www.tsijournals.com> ,Int.J.Chem.Sci:10(1),2012,349-353
3. Jain PK, Joshi H, Dass DJ. Drug that causes hair loss and promotes hair growth - A Review. International J Res Pharma Biomed Sci. 3(4): 2012; 1476-82.
4. Vijaya Manohar, Cass Ingram, Judy Gray, Nadeem Thalpur A, Antifungal activities of origanum oil against Cadida, Molecular and cellular Biochemistry, 2001 (228): 111-117. 5.Purwal L, Prakash SB, Gupta N, Pande MS. Development and Evaluation of Herbal Formulations for Hair Growth. EJournal Chemistry. 5(1): 2008; 34-38.
6. Cotsarelis G, Millar SE. Towards a molecular understanding of hair loss and its treatment. Trends Molecular Med. 7(7): 2001; 293-300.
- 7.Suman, K. G., Kumar, B., & Mukopadayay, S. (2022). Herbal hair oil: A review. International Journal of Health Sciences, 6(S2): 13449–13465.
- 8.Adiraja N, Kumar TR, Shanmugasundaram N, Babu M. In vivo and in vitro evaluation of hair growth potential of Hibiscus rosasinensis Linn. Journal of ethnopharmacology. 2003 Oct 1; 88(23):235-9.
9. Mathur S, Kachhwaha S. Neem tree: amazing beauty component in skin and hair care. Advances in Pharmacology and Toxicology. 2015 Dec 1; 16(3):31.
10. Indian Herbal Pharmacopoeia
- 11.https://en.m.wikipedia.org/wiki/Aloe_vera.
12. Malik Itrat, Zarnigar, Aloe Vera: A Review of Its Clinical Effectiveness, International Research Journals of Pharmacy, ISSN: 2230-8407, 2013.
- 13.Ms. Swarali M. Patil1, Ms. NikitaS. Patil2, Ms. SnehaS. Patil3, Mr. YashrajC. Patil4, Mrs.Karthika Gouthaman5
14. 14.Kokate, C.K., Purohit, A.P., Gokhale, S.B. – Pharmacognosy
15. 15.Indian Pharmacopoeia 2007; Volume I.
- 16.Textbook of Cosmetic Formulation by Balsam & Sagarin
17. <https://youtu.be/MSA7UwIy9zI>
18. 5. Nema, R. K., & Jain, A. K. (2008). Formulation and evaluation of herbal hair oil. International Journal of Pharmaceutical Sciences and Drug Research, 1(1), 30-32.
19. Sabarwal N, Varghese D, B rakesh, K anjali, J ashish, J sanjay, Development and evaluation of polyherbal formulations for hair growth activity: PHCOG J, 2009; 1(2):165170.
20. Mr.Amey S. ingole Student of p.wadhvani college of pharmacy yavatmal Mr.Swarag A. raut Student of p.wadhvani college of pharmacy yavatmal Mrs.Vedanti S. Student of P.wadhvani college of pharmacy yavatmal Mr. Ajinkya V. Gulhane Asst professor, department of pharmaceutical quality assurance p Wadhvani college of pharmacy yavatmal Dr. Manisha D. Kitukale Principal,P.Wadhvani College of Pharmacy,Yavatmal,India.
21. Trease, G.E., & Evans, W.C. Pharmacognosy. Saunders Elsevier.

22. Nikhil Sharma, Shaily Mishra* Dr. Shamim Ahmad
23. Dr. J. J. Magdum Trust's, Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti, Shirol, Kolhapur, Maharashtra, India.
24. Kokate, C. K., Purohit, A. P., & Gokhale, S. B. Pharmacognosy, 55th Edition, Nirali Prakashan.
25. Pawan Maurya, Om Prakash Maurya* and Shashikant Maury