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Research

A REVIEW ON FORMULATION AND EVALUATION OF POLYHERBAL ANTI–DANDRUFF HAIR SERUM

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Abstract

The growths of malassezia species and on overabundance of sebum production are the main causes of dandruff, a common scalp condition marketed by flaking, itching, and irritation. The creation and testing of a polyhebral anti-dandruff hair serum using natural substances with antifungal, anti-inflammatory and conditioning qualities is the main goal of this study. In order to achieve a stable and aesthetically pleasing formulation, the serum was made with herbal extracts of neem (Azadirachta indica), marigold (Tagetes erecta), orange peel (Citrus sinensis), castor oil (Ricinus commmunis) and camphor (cinnamomum camphora), as well as appropriate excipients like triethanolamine and a gelling agent. Extraction of active phytoconstituents, concentration optimization and homogenization to attain consistent consistency were all steps in the formulation process. Numerous physicochemical criteria, such as pH, viscosity, speradability, homogeneity, appearance and stability studies under various temperature circumstances, were assessed for the produced serum. The agar well diffusion method was used to measure antifungal activity against fungi that cause dandruff. In comparison, to the control, the polyherbal serum showed notable antifungal efficacy, good stability and satisfactory physicochemical characteristics. Hair follicle feeding, fungal growth inhibition, and decreased scalp irritation were all facilitated by the herbal ingredients' synergistic activity. According to the study's findings, the polyherbal anti-dandruff hair serum is safe, efficient, and appropriate for daily use. It provides a natural substitute for synthetic anti-dandruff products with few adverse effects.

Keywords: Polyherbal formulation; Anti-dandruff hair serum; Malassezia; Azadirachta indica; Tagetes erecta; Citrus sinensis; Ricinus communis; Cinnamomum camphora; Antifungal activity; Physicochemical evaluation; Herbal cosmetics; Scalp care.

INTRODUCTION

Many people view hair as a representation of vitality, attractiveness, and individuality. Beyond its aesthetic value, hair serves vital physiological and defensive purposes, such as protecting the scalp from UV rays, environmental harm, and small physical trauma. A balanced and nourished scalp is the cornerstone of good hair. A number of problems can develop when the environment around the scalp is altered by internal or external sources. Dandruff is one of the most common and recurring conditions that affects people of all ages. Pityriasis capitis, another name for dandruff, is characterized by excessive dead skin cell shedding from the scalp along with irritation, dryness, and itching. Despite not being a life-threatening condition, it has a major impact on social interactions, self-confidence, and personal comfort. The overabundance of lipophilic fungus from the genus Malassezia is the main cause of dandruff. Although these microbes are naturally found on the scalp, they over proliferate in favorable environments such elevated sebum production, hormone imbalance, stress, poor hygiene, pollution, and climate change. These fungi's metabolic activity produces irritant byproducts that hasten the scalp cells' turnover and produce noticeable flakes. Dandruff has become more common in modern lifestyles due to a number of factors, including increasing dust and pollution exposure, inconsistent hair care practices, psychological stress, the use of harsh cosmetics, and nutritional inadequacies. The illness necessitates ongoing care because it is frequently chronic and prone to relapse. Medicated shampoos and topical therapies containing synthetic antifungal agents such zinc pyrithione, selenium sulphide, and ketoconazole are common examples of conventional therapy methods. Although these medications are clinically helpful in lowering the fungal load, frequent and continuous use of them might have negative side effects include brittle hair, dry scalp, irritation, sensitivity, and, in certain situations, the development of resistance. Furthermore, consumers' focus has changed toward safer, plant-based alternatives as they become more conscious of chemical toxicity and environmental sustainability. Due to its natural origin, low side effects, eco-friendliness, and compatibility with the skin and scalp, herbal cosmetics have become incredibly popular in recent years. Medicinal plants have long been used in traditional medical systems to cure scalp infections and preserve the health of hair. Herbal formulations usually contain several bioactive substances that work in concert to produce broad-spectrum benefits, in contrast to synthetic formulations that frequently target a particular pathway. In addition to treating the underlying cause of dandruff, this all-encompassing method enhances hair texture and scalp nourishment. In particular, polyherbal preparations are predicated on the idea that a blend of various medicinal plants has more therapeutic efficacy than a single herb. Flavonoids, alkaloids, Terpenoids, tannins, and essential oils are examples of phytoconstituents that work in concert to provide better antifungal, anti-inflammatory, antioxidant, and calming effects. By lowering the necessary concentration of each component, this synergy lowers the possibility of discomfort and improves safety. The current study focuses on the creation and assessment of a polyherbal anti dandruff hair serum made with three carefully chosen natural ingredients: Citrus sinensis (orange peels), Azadirachta indica (neem leaves), and Tagetes erecta (marigold). These plants were picked because of their established therapeutic benefits and long history of use in hair care. Marigold has strong antibacterial, anti-inflammatory, and calming properties. In addition to reducing dandruff-related redness and itching, its flavonoids, carotenoids, and essential oils help soothe inflamed skin. It is well known that neem possesses potent antifungal and antibacterial qualities. Neem, which is rich in substances like azadirachtin and nizamuddin, efficiently prevents the formation of fungi that cause dandruff and purifies the scalp. Often seen as a by-product of agriculture, orange peels are a great source of antioxidants, natural acids, and vitamin C. They improve the gloss of hair, assist regulate excessive oil production, and have a revitalizing impact. These three herbal compounds work together to tackle oxidative stress, inflammation, fungal development, and excess sebum all at once, offering a complete approach to dandruff care: There are other benefits to using a serum as the dosing form. Hair serums are spreadable, non-greasy, and lightweight formulas that enable even application across the scalp. Serums improve user compliance because they don't leave residue or block pores like heavier oils do. The liquid consistency guarantees targeted distribution to the scalp surface and improves absorption of active constituents. Additionally, by adding shine and smoothness to hair strands without making them sticky, serums improve cosmetic attractiveness.

Consumers today want multipurpose goods that blend elegant cosmetics with therapeutic performance.

Thus, the creation of a polyherbal anti dandruff hair serum satisfies the need for formulations that are safe, efficient, and visually beautiful. In addition to controlling dandruff, the formulation attempts to maintain ideal pH, balance the scalp, lessen irritation, and encourage healthy hair development. This study aims to close the gap between natural medicines and formulations with scientific validation by fusing traditional herbal knowledge with contemporary cosmetic science. Sustainability is a key component of this study. Utilizing natural extracts and plant-based substances promotes the production of environmentally friendly products and lessens dependency on artificial chemicals that could pollute the environment. Making use of orange peels, which are frequently thrown away as waste, also emphasizes the ideas of resource optimization and value addition. These methods support ethical production methods and sustainable cosmetic innovation. Systematic evaluation is necessary to guarantee the manufactured serum's efficacy, safety, and quality. The prepared formulation is evaluated for physicochemical characteristics like pH, viscosity, spread ability, and homogeneity as well as organoleptic characteristics like color, odor, and appearance. To assess changes under various storage settings, stability studies are carried out. Tests for antifungal activity are also conducted to verify its effectiveness against organisms that cause dandruff. These assessment procedures guarantee the herbal formulation's fitness for real-world use and give it scientific confirmation.

ADVANTAGES

- Get rid of excessive dryness.
- Reduce dandruff.
- It prevents hair loss.
- Lessen the itchiness in your scalp. Keeping the scalp free of infections.

DISADVANTAGES

- Effectiveness: Herbal remedies might not be as quick or effective for some people as chemical-based therapies.
- Allergic response: It's crucial to carefully read the contents list because some people may experience an allergic reaction to even natural ingredients.
- Fragrance: Not everyone like the powerful scents of herbal medicines. A herbal serum's viscosity might vary, but a liquid or watery consistency is preferable for hair.
- Reduced shelf life: Because herbal formulations don't contain potent synthetic preservatives, they may not be as stable.
- Raw material variability: The strength and quality of herbal components can differ.

TYPES OF SERUM:

1. Oil Based Serum
2. Water Based Serum
3. Spray Serum
4. Silicone Based Serum
5. Serum For Other Issues

1. OIL BASED SERUM:

- Contains natural or mineral oils (argan, coconut and jojoba).
- Provides deep nourishment and moisture.
- Reduces dryness and add shine
- Suitable for dry, thick and damaged hair.
- Helps to strengthen the hair shaft by forming a protective layer around each strand.

2. WATER BASED SERUM:

- Light weight and non-greasy formula.
- Absorbs quickly into hair and scalp.
- Controls frizz and provide hydration.
- Best for fine or oily hair types.
- Adds natural shine without weighing the hair down or making it look flat.
- Helps in detangling and improves manageability, making styling easier.
- Maintains scalp freshness by preventing excess oil buildup and stickiness.
- Suitable for daily use, as it provides balanced moisture without clogging hair follicles.

3. SPRAY SERUM:

- Available in spray form for easy application.
- Gives even distribution on hair.
- Used for heat protection and detangling.
- Adds light shine and smoothness.

- Provides quick refreshment to dull or dry hair without the need for washing.

4. SILICONE-BASED SERUM:

- Forms a protective coating on hair strands.
- Reduces frizz and tangling.
- Protects from heat and environmental damage. Provides instant smooth and glossy finish.
- Provides quick refreshment to dull or dry hair without the need for washing.
- Minimizes hair breakage during combing and styling by reducing friction between strands.
- Leaves no heavy residue, making it ideal for layering with other styling products.

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Fig1: TYPES OF HAIR SERUM

MATERIAL

S.NO	Herb Name	Benefits	Source of collection
1	Marigold Flower	Promote scalp health. Reduce dandruff	Marigold flower are collected from local farms and gardens
2	Neem	Reduce hair fall Antifungal property	Neem are collected from farms.

3	Castor oil	Anti-oxidant Hair shinier.	Castor oil are collected from medical Store.
4	Citrous Sinesis	Rich in vitaminc Nourish hair	Citrous sinesis peel are collected from fruit shop
5	Camphor	Anti-fungal property to reduce dandruff	Camphor are collected from general store.
6	Triethanolamine	Act as a preservative.	Triethanolamine are collected from the laboratory.

METHODS

S.NO	EQUIPMENT NAME	COMPANY/MANUFACTURER	COUNTRY
1.	Magnetic stirrer/mixer	Remi elektrotechnik Ltd.	India
2.	Mechanical over head stirrer	Borosil scientificLtd.	India
3.	Hot air oven	Labtronics	India
4	Laboratory test sieve	Jayant test sieves	India
5	Electronic weighing Balance	Shimadzu corporation	Japan
6	Digital ph meter	Eutech instruments	Singapore

7	Clarity test apparatus	Veego instruments corporation	India
8	Brookfield viscometer	Brookfield engineering	USA
9	Water bath	Thermo scientific	USA
10	Glassware(Beaker,conicalflask)	Borosil glass works Ltd.	India

METHODOLOGY

1. Preparation of plant extract Marigold flower, Neem.

Collection: Collect fresh marigold flowers in garden or any place.

Cleaning: Remove dirt, insects and any debris from the flowers. This is typically done by gently Rinsing the petals with clean water and allowing them to dry naturally.

Drying: Using dried flowers, this are air dry or use a dehydrator. Or also put in sunlight for 24 Hr.

2. Preparation of plant extract:

1. **Marigold Flower:**

The marigold flower leaves were cleaned with running tap water to eliminate dust particles and Shade dried at room temperature for 3-4 weeks. Mixer are use to a coarse powder, which was then passed through a #40 mesh screen. The powdered was then extracted using cold maceration With ethanol to obtain their separate extract. 15 gm of dried marigold flowers are macerating 60 ml of ethyl alcohol in conical flask at least 24 hours shack it occasionally. After 24 hours, the mixture was filtered by a simple filtration procedure, and the filtrates were collected in separate Vessels. To obtain the extract, the solvent was filtered and stay at room temperature.

2. Neem Leaves: The neem leaves were cleaned with running tap water to eliminate dust particles and shade dried at room temperature for 3-4 week to make powder use mixer or grinder, which was then passed through a #40 mesh screen. The powdered was then extracted using cold maceration with ethanol to obtain their separate extract. 15 gm of dried neem powder were macerated in 62 ml of ethanol in a separate conical flask. After 24 hours, the mixture was filtered by a simple filtration procedure, and the filtrates were collected in separate vessels. To obtain the extract, the solvent was evaporated from the filter under reduced pressure by using rotary evaporator at 45-50ºC.

Phytochemical Screening:

1. **Marigold flower:**

Test	Observation	Inference
1.Ferric Chloride Test Alcoholic extract of drug + 1% of fecl3 solution	Brownish green color	Tannin present

2.Vanillin Hydrochloride Test 1gm of vanillin + 2ml alcohol +2ml concentrate HCL+drug	Yellowish color appear	Tannin present

2. Neem:

Test	Observation	Inference
1.Ferric chloride test Alcoholic extract of drug + 1% of fecl3 solution	Brownish green color	Tannin present
2.Vanillin hydrochloride test 1gm of vanillin + 2ml of Alcohol +2ml con.HCL+ Drug	Yellowish color appear	Tannin present

RESULT AND DISCUSSION

Phytochemical Screening of Marigold Flower:

The phytochemical test of given data was done as shown in figure

Fig 2: TEST OF MARIGOLD FLOWE

Phytochemical Screening of Neem:

The phytochemical test of given data was done as shown in figure.

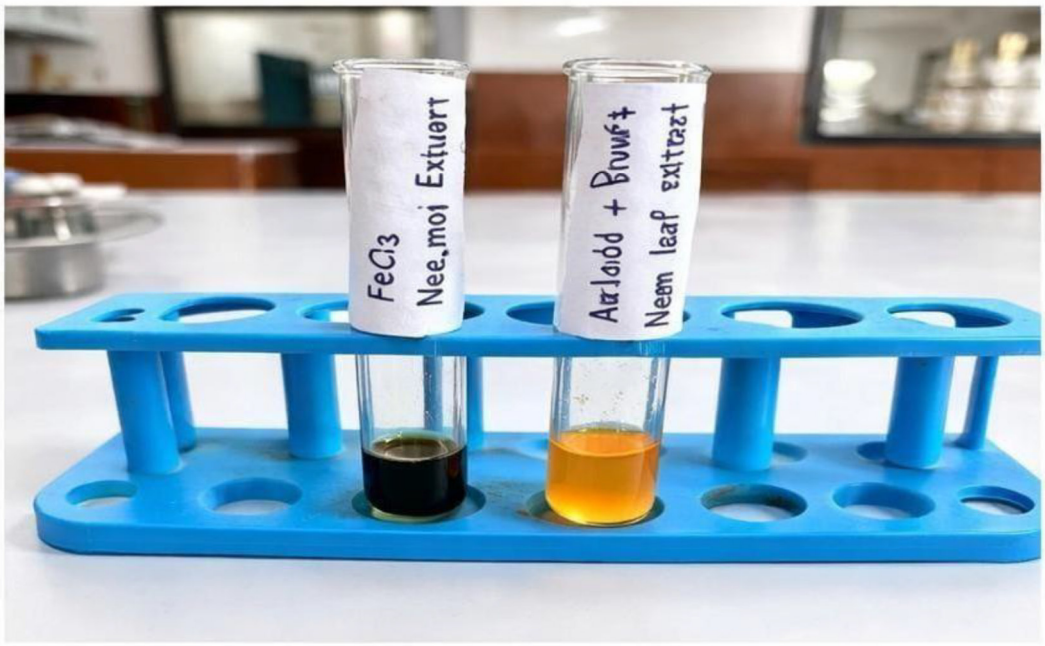

Fig 3: Test of Neem leaves

Determination of PH:

Table2: The pH meter was calibrated using a standard buffer solution

S.No	Days	Sample1	Sample2	Sample3
1	Initial	6.01	6.02	6.00
2	7days	6.01	6.02	6.00
3	15days	6.01	6.02	6.00
4	21days	6.02	6.04	6.04
5	30days	6.04	6.05	6.05

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5	30days	6.04	6.05	6.05

Organoleptic Character:
1. Color: Pale Yellow
2. Odor: Aromatic
3. Consistency: Liquid

Fig 4: Digital PH Meter

HOMOGENCITY:
To check the homogeneity of serum placed the ampoule in clarity test.
Apparatus black and white background. The result was found to be homogeneous
Solution.

Fig 5: clarity test

State of antidandruff serum:
Result: Liquid.

Wash Ability: Carried out by washing the applied serum.
Result: washable
Grittiness: By determination of visible aggregates or particles.
Result: no grifittiness
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Spread ability: The solution was spread properly on glass slide.

FIG 6: Spread ability test

Result:

Formulation and Evaluation of Herbal Hair Serum Was Prepared

Fig 7: Formulation of serums

OBSERVATION TABLE:

Evaluation	F1	F2	F3
Physical Appearance	Yellowish	Yellowish	Yellowish
PH	6.5	6.12	6.21
Homogeneity	Good	Good	Good
Spread Ability	Good	Good	Good
Skin irritation	No	No	No

REFERENCES

1. Barel AO, PAYE M, Maibach HI. Handbook of Cosmetic Science and Technology. 4th ed.
New York: CRC Press; 2014.
2. Harry RG**.** Harry's Cosmetic ology. 8th Ed. New York: Chemical Publishing Co.; 2000.
3. Wilkinson JB, Moore RJ. Harry's Cosmetic logy: The Principles and Practice of
Modern Cosmetics. London: Longman Scientific; 1982.
4. Trüeb RM, Tobin DJ. Aging Hair. Berlin**:** Springer International Publishing; 2017.
5. Draelos ZD. Cosmetic Dermatology: Products and Procedures. 2nd ed. Oxford:
Wiley- Blackwell; 2016.
6. Shuster S. The aetiology of dandruff and the mode of action of therapeutic agents. Br J
Dermatol. 1984; 111(2):235–242.
7. Piérard-Franchimont C, Piérard GE. Dandruff and seborrheic dermatitis: practical
Management. Dermatology. 2006; 212:1–6.
8. Gupta AK, Bluhm R, summer bell R. Pityriasis capitis (dandruff): etiology and treatment.
J Eur Acad Dermatol Venereol. 2002; 16(1):3–8.
9. Ravichandran G, Bharadwaj S. Formulation and evaluation of herbal hair serum. Int J
Pharm Sci Rev Res. 2019; 58(2):120–125.
10. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 55th ed. Pune: Nirali Prakashan; 2018.
11. Trease GE, Evans WC. Pharmacognosy. 16th ed. London: Elsevier; 2009.
12. Harborne JB. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis.
3rd ed. London: Chapman and Hall; 1998.
13. Mukherjee PK. Quality Control of Herbal Drugs. New Delhi: Business Horizons; 2019.
14. Evans WC. Trease and Evans Pharmacognosy. 15th ed. London: Saunders Elsevier; 2002.
15. Khandelwal KR. Practical Pharmacognosy. 23rd ed. Pune: Nirali Prakashan; 2015.
16. Bhatia SC. Textbook of Cosmetics Formulations. New Delhi: CBS Publishers; 2017.
17. Kumar S, Pandey AK. Chemistry and biological activities of flavonoids. Scientific
World Journal. 2013; 2013:162750.
18. Cowan MM. Plant products as antimicrobial agents. Clin Microbiol Rev. 1999;
12(4):564– 582.
19. Sofowora A. Medicinal Plants and Traditional Medicine in Africa. 3rd ed. Ibadan:
Spectrum Books; 2008.
20. Evans WC, Trease GE. Herbal medicines and their role in dermatology. Phytotherapy
Research. 2001; 15:79–87.
21. Ali A, Akhtar N, Khan BA. Evaluation of herbal hair formulations. Pak J Pharm Sci. 2015;

28(5):1825–1830.
22. Sahu PK, Giri DD, Singh R. Therapeutic and medicinal uses of herbal products in Dermatology. Pharmacogn Rev. 2013; 7(14):74–79.
23. Singh M, Sharma R. Herbal cosmetics: an overview. Int J Pharm Sci Res. 2016; 7(8):3243–3252.
24. Kapoor VP. Herbal cosmetics for skin and hair care. Nat Prod Radiance. 2005;4(4):306–314.
25. Dhurat R, Saraogi P. Hair evaluation methods: merits and demerits. Int J Trichology. 2009; 1(2):108–119.
26. Patil SS, Kadam VJ. Formulation and evaluation of herbal anti-dandruff preparations. Int J Cosmet Sci. 2018; 40(5):459–466.
27. Shah VP, Elkins J, Hanus J. Stability testing of cosmetic products. Int J Cosmet Sci. 2001; 23(2):53–60.OECD. Guidelines for Testing of Chemicals – Skin Irritation and Sensitization Tests. Paris: OECD Publishing; 2015.
28. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy. 4th ed. Mumbai: Varghese Publishing; 2013.
29. Aulton ME, Taylor KMG. Aulton's Pharmaceutics: The Design and Manufacture of Medicines. 5th ed. London: Elsevier; 2018.
30. Remington JP. Remington: The Science and Practice of Pharmacy. 22nd ed. Philadelphia: Pharmaceutical Press; 2013.