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RESEARCH ARTICLE

Formulation and Evaluation of Herbal Hair Serum in Treatment of Various Hair- Related Problems

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ABSTRACT:
In this expeditious world, cosmetics are in great demand. Cosmeceuticals in Pharmaceutical industry is booming day-by-day. Cosmetics are used on daily basis. Cosmetics are intended for skincare, hair care, nails and for teeth as well. Also, to take the note, toothpastes, hair oils, hair dyes are classified into the cosmetics that is been used by every individual on everyday basis. The synthetic or chemical products have side effects and adverse effects of when used, thus now people have high approach towards organic, natural and herbal formulations that show no or minimum side effects. Generally herbal preparations are known for its "No side effect" property. Various problems are experienced by the people such as hair fall, split ends, dandruff, increased sebum production, hair thinning, premature hair greying etc. Thus, people are looking for ways to increase hair development, their prevention and care. A hair serum helps to lock the moisture and keep the scalp hydrated and healthy. Trigonella foenum graecum (Fenugreek) is a popular homemade remedy for hair growth and also improves hair density. Flaxseed is beneficial in treatment of dandruff and boosts hair growth. Citrus sinensis is rich in anti-oxidants that are very effective in treatment of spilt ends. Ginger has high content of gingerol which improves the blood circulation and boosts hair growth. Castor oil, Vitamin E, Hibiscus is also useful in treating dry and damaged hair, provides hydration to the scalp. Thus, preparation of the herbal formulation using natural products will help in treatment of various hair diseases.

KEYWORDS: *Trigonella foenum-graecum, Zingiber officinale*, Flaxseeds, Citrus Sinensis, castor oil.

INTRODUCTION:
Hair plays vital role in human body. As hairs are considered to be one of the essential parts that complement the beauty of a person, it is important to take right care of the hairs. Hair can be defined as- "improved epithelial structure formed as a result of keratinization of germinative cells", hairs are the outgrowths from the follicles present on the skin[1]. Hair is found on scalp, skin, and face and so on.

Human hair is considered as one of the symbol of beauty in humans and the scalp is an important element for hair growth. It is the skin composed of soft tissue layers that covers the cranium and area of the head where hair grows. The scalp is constituted by numerous hair follicles and sebaceous glands. The pH of scalp is 5.5 and that of hair shaft is 3.67[1]. The presence of sebaceous glands along with the cyclic changes that occur in the environment make it more susceptible to mycotic infections like excessive dandruff, tinea captitis, scalp psoriasis, scalp folliculitis, head lice and even alopecia[2].

MATERIALS[3, 4, 5]

1. Reetha:
Botanical name: *Sapindus mukorossi*
Family - Sapindaceae
Synonym – Ritha, Aritha, Indian soapberry, soapnut, washnut, soapberry.

Biological source - It is obtained from the dried fruit of *Sapindus mukorossi* and *Sapindus trifoliatus*.

Chemical constituents:
Saponins like oleanane, dammarane, triterpenes, etc.

Uses: Surfactant, anti-inflammatory, fungicidal, etc.

2. Orange Peel:

Botanical name: *Citrus sinensis*

Family - Rutaceae

Synonym – Orange or sweet orange

Biological source – It is obtained from the orange peel which is dried or fresh outer part of the pericarp of ripe or nearly ripe fruits of citrus sinensis.

Chemical constituents – limonene, (S)-linalool, pectin, octanal, decanal, essential alcohols, etc.

Uses – Anti-oxidant, anti-inflammatory, Orange oil as perfuming agent.

3. Fenugreek:
Botanical name: *Trigonella foenum- graceum*
Family – Leguminosae
Synonym – Methi, Methika, Alholva, Chandrika.
Biological Source – It is obtained from the dried seeds to Trigonella foenum- graecum.

Chemical constituents- Vitamin B, alkaloids, flavonoids, saponins, etc

Uses – Hair growth stimulant, antibacterial.

4. Flaxseeds:
Botanical name: *Linum usitatissimum*
Family – Linaceae
Synonym- Linseed, flaxseed
Biological source - It consists of *the dried fully ripe seeds of Linum usitatissimum Linn*.

Chemical constituents – alpha-linoleic acid (ALA), omega-3 fatty acid, lignans, etc

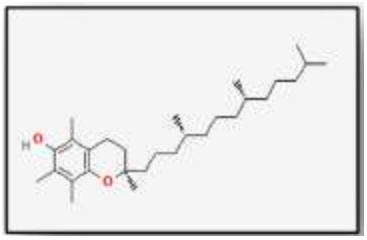
Uses – Anti-inflammatory, anti-oxidants, hair growth stimulator.

5. Hibiscus:
Botanical name: *Hibiscus Rosa sinensis*
Family – Malvaceae
Synonym – Hibiscus, Hibiscus mutabilis, Roselle.

Biological source – It is obtained from the petals of flower of Hibiscus Rosa sinensis.
Chemical constituents – Vit. A, C, amino acids, alpha hydroxyl acids, etc.
Uses – Hair growth stimulator, anti-dandruff, colouring agents.

6. CASTOR OIL:
7. Botanical name: *Ricinus communis*

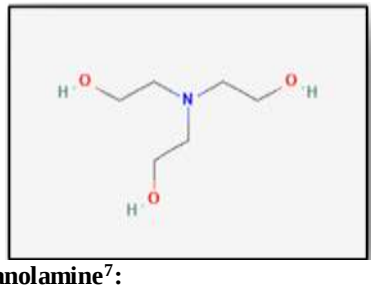
Family – Euphorbiaceae
Synonym - Ricinus oil.
Biological source - Castor oil is the fixed oil obtained by the cold expression of the seeds of Ricinus communis.
Chemical constituents – 80% riconeleic acid, fatty acids such as isoricinoleic, linoleic, stearic and isosteric acids.
Uses – Hair growth stimulator, anti-dandruff, anti-inflammatory, provides required nourishment to hair root.



8. Vitamin E[6]:
Synonym – (+)-α-Tocopherol; D-α-Tocopherol

Chemical constituents:
It is composed by tocopherols and tocotrienols, which is group of compounds with neuroprotective properties. For hair, vitamin E is a source of supplement that improves hair growth by increasing capillary circulation in the scalp, thereby help improving hair volume. Vitamin E is a physiologically essential micronutrient and has been applied in various fields including medicine, pharmaceutics, cosmetics and foods.

Uses- Anti-oxidant agent, prevents premature hair greying.



9. Triethanolamine[7]:
IUPAC name - 2,2′,2″-Nitrilotri(ethan-1-ol)
Other name- 2,2′,2″-Trihydroxytriethylamine
Chemical formula - $N(CH_2CH_2OH)_3$
Molar mass- 149.190 $g \cdot mol^{-1}$
Uses- Preservative

Collection And Authentication:

- **Reetha Extract[8]:**

1. The dried fruit of Reetha (Sapindus mukorossi) was collected from local Ayurvedic Pharmacy store in Sawantwadi.
2. The fruit were then crushed using Mortar & Pestle.
3. Seeds from the dried fruit were separated.
4. Then, the powdered pericarp was subsequently maintained for ethanol extraction for 6 hours continuously using magnetic stirrer.
5. Later, the resulting extract was filtered using filter paper.
6. The resulting solution was then stored and used further in the preparation of herbal hair serum.

- **Phytochemical test for detection of Saponin in soapberry[9]:**

Foam test –
Take 5ml of solvent extracts in a test tube and add drop a sodium bicarbonate, shaken vigorously and kept it stands for 3mins. Development of cloudy white precipitate indicated that the occurrence of saponins.

Figure 1: Phytochemical test

Formula:

Table 1. Formulation table

Sr. No	Ingredients	Qty (%)	Property
1.	Sapindus mukorossi extract	q.s.	Surfactant
2.	Citrus sinensis (powder)	35	Anti-oxidant
3.	Trigonella foenum-graecum (seeds)	6	Hair growth stimulant
4.	Linum usitatissimum (seeds)	35	Gelling agent
5.	Hibiscus rosa sinensis (powder)	10	Colouring agent
6.	Castor oil	2	Hair growth stimulant
7.	Vitamin E	4	Anti-oxidant
8.	Triethanolamine	4	Preservative
9.	Orange essential oil	4	Perfuming agent
10.	Distilled water	q.s.	Vehicle

- **Procedure for Herbal Serum:**

Procedure for preparation of 25ml of Herbal hair serum is divided into four parts:

Solution 1 –

1. In a beaker, add 5g flaxseeds in 50ml distilled water and apply heat.
2. Continue heating until clear, slight viscous gel is formed.
3. Filter the gel using muslin cloth.
4. To the obtained gel, add 1 capsule of Vitamin E (Evion 400mg) and 1ml of cold pressed castor oil.
5. Mix the solution using magnetic stirrer for 30 minutes.
6. After, add reetha extract drop wise until homogeneous solution is obtained.

Solution 2 –

1. In a beaker, add 1g of dried fenugreek seeds in 20ml of distilled water and boil the solution for 5 mins.
2. Filter the solution and add about 5g of orange peel powder and keep the mixture at room temperature.
3. Additionally, add distilled water to the solution in order to make a solution free from any lumps.

Solution 3:

1. In a beaker, add 2g of Hibiscus powder in 40ml of water.
2. Heat the solution until requisite colour is obtained.
3. Filter the solution and store.

Solution 4:

1. In a beaker, add solution 1 and solution 2 with continuous stirring with a stirrer.
2. Then, add solution 3 drop wise until suitable colour is obtained and continue stirring with a glass rod.
3. To this solution, add about 1ml of triethanolamine that acts as a preservative and 1-2 drops of orange oil which acts as perfuming agent.
4. Mix the solution using magnetic stirrer for 15 minutes.
5. Store serum in well closed container.

Evaluation of Herbal Hair Serum[1]

1. Physical appearance -

The physical appearance, colour and feel of the prepared herbal serum were tested.

2. Homogeneity test

A clean and dried glass slide was smeared with the herbal serum and covered using glass cover. The appearance was investigated under the light. The serum was also visually tested for homogeneity, aggregates or floccules.

3. pH

The digital pH meter was calibrate using buffer solution of pH 4 and pH 7. Then, the electrode was soaked into serum and observed until stable readings were observed.

4. Viscosity

The viscosity of prepared formulation was determined using Brookfield viscometer. In a beaker, about 100ml of hair serum was taken and the viscosity was measured at 50 and 100 rpm using various spindle number i.e., 63 and 64.

5. Spreadability

Spreadability was measured using parallel plate method that is used to asses and measures the spreadability. Small amount of serum was pressed between two horizontal plates of dimension 20 x 20cm. the spread diameter was measured after 1 minute. Spreadability was calculated using following formula –

$S = M \times L / T$

Where, S = spreadability

M = weight in the pan (tied to the upper slide)

L = Length moved by the glass slide

T = Time (in secs.) taken to separate the slides completely.

6. Stability –

The prepared herbal hair serum was kept for a week at room temperature in a well closed container. The pH and viscosity was determined after a week and compared with the original values.

7. Microbial contamination[10] –

Cup Plate and Pour Plate Method:

Nutrient agar medium is used for the antimicrobial assay. Nutrient agar was prepared by it's prescribe procedure and autoclaved at 121°C for 45 minutes. The sterilized media was allowed to cool at 37°C - 38°C. Plate were filled with nutrient agar solution and allowed for solidification. After solidification, the microorganisms from the subculture were inoculated into the nutrient agar medium. Sub-cultured Bacteria were inoculated by striking on the surface media of the petri

plate and subjected to incubation. Later 4 wells were drawn with help of borer in each plate to receive Herbal Extract, Individual Formulation Polyherbal Formulation and the marketed reference standard. These were immediately poured into it and kept for incubation for 24 hours at 37°C for growth of microorganisms and the test and standard samples to diffuse through it. After the incubation was measured by zone meter and recorded.

Table 2. Evaluation Parameters

Parameters	Results	
Physical appearance	Brownish- red translucent solution	
Homogeneity	Good	
pH	7.50	
Viscosity (cps)	50 rpm 11.40±0.012	100 rpm 14.10±0.025
Spreadability	Good	
Skin irritation	No	
Stability	Good	

Figure 3: pH determination

Figure 4: Viscosity determination

Figure 5: Anti-microbial activity

RESULT AND DISCUSSION:

1. Physical appearance:

The physical appearance, colour and feel of the developed herbal hair serum were visually tested. There was no presence of any foreign particles. The colour observed was pale brownish to pale reddish with translucent finish which was smooth and clean on application.

2. Homogeneity:

By visual examination of serum, appearance and presence of any lumps, flocculates or aggregates was checked for homogeneity. The homogeneity of prepared serum was observed to be good.

3. pH –

The pH of the prepared herbal serum was observed to be 7.50 that are suitable for formulation.

4. Viscosity:

The viscosity of the prepared herbal was determined using Brookfield viscometer using spindle no. 62 at various rpm *viz*., 50, 100.

5. Microbial contamination:

After three days, the anti-microbial activity of the prepared herbal hair serum was observed and was founds to be about 1-2cm around the well prepared.

6. Stability:

During the research time, the formulation prepared showed no physical instability, no noticeable difference in pH before and after the study. The formulation was stable at room temperature.

CONCLUSION:

The herbal hair serum was successfully formulated and evaluated on trial and error basis. The produced herbal hair serum offers a variety of critical nutrients that are crucial for keeping healthy hair and scalp conditions, according to the research study and outcomes shown. It contains natural components that assist hair maintenance and development. The anti-oxidant properties of herbal components including orange peel powder, hibiscus powder, and vitamin E primarily function by halting the premature greying of hair. Castor oil, fenugreek, and flaxseeds are effective stimulators of hair growth. Hibiscus powder can be also employed as a colour agent in this case. When compared to synthetic chemicals, the components are not dangerous. People now days are really interested in the herbal sector. Due to its strength, effectiveness, and growing use in cosmetics, the herbal business has a promising future.

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