Extraction, Phytochemical analysis, Formulation of Herbal Hair Serum on Tridax procumbens and Fenugreek Seeds and Evaluation of Hair Growth Activity

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***Abstract*: The part of the pilosebaceous unit is the most important organ in the mammalian system that determines appearance, gender isolation, violent temperature protection, and plays a part in tone-defense. The youngish generations have started to witness severe hair loss issues due to a variety of life changes, including fatigue, anxiety, junk food consumption, use of colorful hairstyling/ coloring ways, etc. The loss of hair is generally not temporary, but rather results in alopecia. Hair root activation is necessary to boost hair growth and help hair loss. The pharmaceutical assiduity's cosmetics division is expanding daily. People use cosmetics every day. Cosmetics are meant to be used for hair, and skincare and hair colorings are each considered cosmetics that are used by everyone on a diurnal base. Herbal remedies are generally famed for having" no side goods." People deal with a variety of issues, including unseasonable greying, dandruff, hair loss, thinning, and inordinate sebum product. As a result, individualities are searching for styles to promote hair growth, help it, and take care of it. A hair serum keeps the crown nourished and healthy by locking in humidity. A factory used for remedial purposes Known as the" cotton daisy," Tridax procumbens is an Asian ayurvedic factory with a long history of traditional use. It's a member of the Asteraceae family. Phytoconstituents and pharmacological conditioning are employed in traditional drug to demonstrate and accumulate the effectiveness of Tridax procumbens, which can be used since ancient times to treat injuries, skin conditions, and to halt bleeding.also, the review offers species information to punctuate the value of shops that are affordable, helpful, and will advance unborn development. Flaxseed promotes hair development and is helpful in treating dandruff. Orange peel is rich in anti-oxidants that are veritably effective in treatment of spilt ends. Castor oil painting, Vitamin E, Hibiscus is also useful in treating dry and damaged hair, provides hydration to the crown. therefore, medication of the herbal expression using herbal products will help in treatment of colorful hair diseases. Herbal specifics are considered safer than allopathic drugs as allopathic drugs are associated with the side effects. Extraction of these composites can be done by colorful styles. For the purpose of birth that's to prize active factors from the shops, high delicacy is demanded along with different types of detergents with differing oppositeness. Maceration process is done with the help of detergent (water) with nonstop agitation for 2- 3 days. These types of ways are veritably useful in birth process. The active factors are insulated and purified for conditions. The physicochemical parameters of phrasings(pH, spreadibility, density etc.) Draize eye test, Microbial impurity, Hair growth exertion test, Stability studies were determined.**

Keywords: Maceration, Tridax procumbens, fenugreek seeds, Phytochemical analysis, Flax seeds, Vitamin E (EVION 400 mg), Castor oil painting, Orange peel greasepaint, Hibiscus greasepaint, Nigella sativum seeds, Orange oil painting, Evaluation tests, Draize Eye test, Hair growth exertion test, Microbial impurity, Stability studies.

I. INTRODUCTION

Hair serums can be formulated by using Fenugreek and Tridax procumbens to treat Dandruff, Hair fall, and other hair concerns.

Hair has a distinct chemical and physical behavior and integrated structure (1). It is a cyclical medium that involves hair shaft conflation, extension, and shedding, and hair care products are utilized to

enhance its appearance (2). Hair has a root, shaft, and tip and is composed of Anagen-is the active growth phase, Catagen-is the transitional phase where hair stops growing,and Telogen-is the resting phase before shedding. (3) The term "natural cosmetics(or) herbal cosmetics" describes goods that are created using a variety of approved cosmetic substances as well as 1 (or) more herbal ingredients that are used only to provide certain cosmetic advantages. (4) Phytochemicals from many botanical sources are used to prepare herbal cosmetics (5).

Tridax procumbens Linn, (Asteraceae) family, sometimes referred to as Mexican Daisy and Coat buttons, has other names in various languages, such as ghajadvu and ghaburi in Gujarati, ghamra in Hindi, tridhara in Bengali, and kambarmodi, jakhamjudi, and tantani in Marathi. (6). Tridax procumbens Linn is an Ayurvedic herb that also exhibits a wide range of pharmacological effects, such as vasorelaxant, anti-inflammatory, anti-diabetic, antioxidant, hepatoprotective, immunomodulatory, and analgesic (8). It is used to treat skin conditions, hair growth issues, and wounds in traditional medicine. In addition to growing widely in tropical Africa, Asia, and Australia, it is available throughout the year and in the majority of the nation.Numerous chemical components, including flavonoids, essential oils, saponins, terpenoids, and tannins, have been found and isolated in the plant's flowers and other aerial parts. (7)

The annual diploid fenugreek (Trigonella foenum-graecum), also referred to as "methi," is a member of the "Papilionaceae" subfamily of the "Fabaceae" family. It is a part of the bordering countries' native culture. stretching from the Mediterranean Sea's eastern coast to Central Asia (9). A plant has been utilized for centuries in Chinese medicine, traditional Tibetan medicine, and Indian Ayurvedic treatment. Fenugreek seeds are shown in recent research to be beneficial for a number of conditions, including successfully lowering blood sugar and cholesterol in both humans and animals. It has a strong global demand in the food, pharmaceutical, and nutritional sectors. Fenugreek has been used extensively in industry (10). The pharmacological effects of T.foenum graecum include anti-diabetic, anti-cancer, anti-fungal, antipyretic, and antibacterial properties. It also used for its anti-lice, anti-dandruff, hair growth, and calming effects. (11) Alkaloids, flavonoids, steroids, saponins in steroidal hormones, and other active ingredients are found in the plant. This contains 0.015 percent volatile oils, as well as vitamins A, B1, C, and nicotinic acid. (12,13,14)

II. MATERIALS AND METHODS

Plant Material

Tridax procumbens leaves and Fenugreek seeds were collected from Andhra Pradesh SRI VASAVI ISTITUTE OF PHARMACEUTICAL SCIENCES COLLEGE region West Godavari (dist) Tadepalligudem, (India).


Image-1:Tridax procumbens Image-2: Fenugreek seeds

III. METHODS FOR EXTRACTION

3.1- Maceration For Tridax Procumbens

Maceration is a straightforward technique for extracting raw drugs for use in subsequent pharmaceutical production. This method of extracting phytochemicals from plant material at room temperature is inexpensive. The Tridax procumbens plant material is coarsely powdered after being dried in the shade.

Subsequently, 50g of powder is weighed and placed to a conical flask containing(water) used as a solvent for 2-3 days with constant stirring. A pure liquid is created after filtering. Afterwards, the solvent evaporation process is carried out through further distillation. (15)

3.2- Maceration For Fenugreek Seeds

The maceration process was used to extract the fenugreek seeds. The fenugreek seeds were first cleaned, dried, and crushed. Distilled water was used as the solvent. Crushed fenugreek seeds were combined with water in a clean container in a 1:10 ratio (1 part seeds to 10 parts water). Swirling the mixture helps to distribute the seeds evenly

throughout the water. The mixture must stand at room temperature for 72 hours. The active components in the fenugreek seeds now permeate the water and create a fenugreek extract. Next, then A pure liquid is produced after it has been filtered. After that, proceed with the distillation process to evaporate the solvent. The extract was stored in a sterile, closed container away from direct sunlight to prevent the degradation of its active components. (16)

Image-3: Maceration process for Tridax procumbens and fenugreek seeds

IV. PRELIMINARY PHYTOCHEMICAL SCREENING FOR TRIDAX PROCUMBENS

S.NO	TEST	RESULT
1	Test for Alkaloids	(+)
2	Test for Flavonoids	(+)
3	Test forSaponins	(+)
4	Test for Tannins and Phenolic compounds	(+)
5	Test for Steroids	(+)
6	Test forGlycosides	(-)
7	Test for Carbohydrates	(+)
8	Test for Terpinoids	(+)

V. PRELIMINARY PHYTOCHEMICAL SCREENING FOR FENUGREEK SEED EXTRACT

S.NO	TEST	RESULT
1	Test for Carbohydrates	(+)
2	Test for Alkaloids	(+)
3	Test for Saponins	(+)
4	Test for Flavonoids	(+)
5	Test for Steroids	(+)
6	Test for Tanins and Phenolic Compounds	(+)

VI. PROCEDURE FOR HERBAL HAIR SERUM:

Procedure for preparation of 25ml of Herbal hair serum is divided into five parts.

Solution-1:

1. Take a beaker and add 25gms of Flax seeds in 100ml of distilled water and apply heating.
2. Continue heating until clear, slight viscous gel is formed.
3. Filter the gel by using muslin cloth.
4. Add 2 capsules of Vitamin E (Evion 400mg) and add 2ml of cold pressed castor oil to the obtained gel.
5. After that add Tridax procumbens extract drop wise until homogenous solution is obtained.
6. Mix the solution by using magnetic stirrer for 15min.

Solution-2:

1. Take a beaker, add 25gms of dried fenugreek seeds in 60ml of distilled water and boil the solution for 5min.
2. Filter the solution and add 15gms of orange peel powder.
3. Additionally add some amount of distilled water into the solution in order to make free from any lumps.

Solution-3:

1. Take a beaker and add 35gms of Hibiscus powder is dissolved in 100ml of distilled water.
2. Heat the solution until requisite colour is obtained.
3. Filter the solution by using muslin cloth and stored at room temperature.

Solution-4:

1. Take a beaker add 50gms of Nigella sativum seeds and add 100ml of distilled water.
2. Heat the solution for 5min.
3. Filter the solution and stored at room temperature.

Solution-5:

1. Take a beaker, and add solution 1 and solution 2 with continuous stirring with a magnetic stirrer.
2. After that add solution 3 and solution 4 drop wise until suitable colour is obtained with continuous stirring by using a glass rod.
3. To this solution, add 2ml of Triethanolamine- acts as a preservative and add 2 – 3 drops of orange oil- which acts as a perfuming agent.
4. Mix the solution by using magnetic stirrer for 10min.
5. Store the obtained serum in well closed container. (17)

Formulation table:

S.NO	INGREDIANTS	QTY (%)	PROPERTY
1	Tridax procumbens extract	q.s.	Hair growth stimulant
2	Orange peel (powder)	15gm	Anti-oxidant
3	Trigonella foenum-graeceum (seeds)	25gm	Hair growth stimulant
4	Linum usitatissimum (seeds)	25gm	Gelling agent
5	Hibiscus rosa sinensis (powder)	35gm	Colouring agent
6	Castor oil	2ml	Hair growth stimulant
7	Vitamin E	2ml	Anti-oxidant
8	Triethanolamine	2ml	Preservative
9	Orange essential oil	2-3 drops	Perfuming agent
10	Distilled water	q.s	Vehicle
11	Nigella seeds (Black seeds)	50gm	Anti-oxidant Anti-Inflammatory

VII. EVALUATION OF THE HERBAL HAIR SERUM

1. Physical Appearance:

To Assess the prepared herbal hair serum's texture, color, and appearance, visual tests are conducted.

2. Homogeneity Test:

After the hair serum was placed to a dry and clean object glass, a cover glass was sealed. Looked into were uniformity and appearance in the presence of some coarse particles. Using visual inspection, the herbal hair serum was examined for aggregates, lumps, and flocculates as well as for homogeneity.

3. Viscosity:

The viscosity of a Brookfield viscometer (RVDV-II+PRO) was measured using spindle number six. The viscosity of the beaker was tested at 10, 20, 50, and 100 rpm after 50 ml of hair serum was added. [17]

4. PH Test:

The pH 4 and pH 7 buffer solutions were used to calibrate the pH meter. After soaking in the hair serum for a few minutes, the electrode was left until the pH returned to normal.

5. Spreadability:

Spreadability was tested using the parallel plate method, which is frequently used to assess and measure the spreadability of semisolid preparations. One gram of hair serum was placed between two 20 × 20 cm horizontal plates, each of which had a 125 g upper. The spread diameter measurement took one minute. The following formula was used to calculate spreadability:

$M \times L / T = S$

where, L is the length of movement of the glass slide, M is the weight in the pan (connected to the upper slide), S is the spreadability, and T is the time (in seconds) required to completely separate the slides.

6. Sterlity test:

1% hair serum was added to the sterile discs, which were then incubated for 24 hours at 32°C as part of the nutrient agar sterility tests. (28 ,29)

TABLE: Evaluation Parameters of Herbal Hair Serum:

PARAMETERS	RESULTS
Physical appearance	Greenish -brown
Homogeneity	Good

PH*	6.7±0.022
Spreadability	Good
Draize eye test	Mild irritation
Viscosity (cps) *	10 RPM: 6800±0.011; 20 RPM: 3950±0.023
Weight of the hair (mg) on 3rd week of the treatment	229.98
Stability	Good

VIII. TEST FOR THE SENSITIVITY OF THE EYE (DRAIZE EYE TEST)

The ocular sensitivity of three rabbits was assessed in order to calculate the average sensitivity result. In physiological NaCl, the rabbits were observed after 30, 60, 120, 240, one, two, three, and four days after receiving a single drop of hair serum in their left eye (the right eye is used as the control). Scores for the conjunctiva, iris, and cornea were developed. (20)

Image-4: Draize Eye Test

IX. HAIR GROWTH ACTIVITY TEST

On the right and left foot of the rabbits' shaved backs, three 4x4 cm portions of a single rabbit were used for this test. After three to five minutes, depilatory cream (Veet cream) was used and the region was washed with water until all hair was gone. Next, an antiseptic of 70% ethanol was added. The rabbit was abandoned for a whole day prior to any action evaluation. Treatment 1 served as the standard control as no intervention was performed, while Treatment 2 served as the positive control and was supplemented with hair serum containing the test substance. Again, since there was no intervention, treatment 1 was the standard control, and treatment 2—in which the test sample was exposed to hair serum—was the positive control. After then, the rabbit received 0.1 ml of each drug twice a day for three weeks. The first day that the hair serum was used was day 0. (21, 22)

X. QUALITATIVE ASSESSMENT OF HAIR GROWTH

The hair growth analysis was qualitatively measured in three groups (Group I: Normal control; Group II: Negative control; Group III: Positive control (Herbal hair serum)) using visual inspection of two criteria: initial hair growth time (the minimum amount of time required for hair to grow on the shaved area, as indicated by the darkening of the skin color indicating initial hair growth) and completion time for hair growth (the minimum amount of time needed for the entire shaved area to be covered with new hair). Each group consists of three rabbits. (23)

XI. OBSERVATIONS OF THE GROWTH OF HAIR

Using Mitutoyo Digimatic wireless calipers, ten randomly chosen hair strands were removed from each box on days 7, 14, and 21. The hair was then pulled out, straightened, and taped to the tape, and its average length was measured to see if there was a statistically significant difference between the research region and the control. (20, 24).

XII. . HAIR WEIGHT MEASUREMENTS

On day 21, the hair was removed, weighed, and statistically measured to determine the weight of each box. (19, 25).

XIII. MICROBIAL CONTAMINATION

The amount of microbial contamination was assessed by spreading a thin loopful of hair serum over nutritive and Sabouraud agars and incubating it for 48 hours at 37°C. Four milliliters of sterile Ringer solution containing 0.25% Tween 80 were used to dissolve one gram of material in order to determine the degree of contamination. 0.5 ml was mounted on the appropriate solid medium using the viable surface approach after achieving sufficient dilutions in the same dispersion vehicle. After the required incubation, colonies that appeared were tallied. (27, 28).

XIV. STABILITY STUDIES

The herbal hair serum showed no physical instability over the study time, and there was no appreciable difference in pH before and after the examination. (26,27).

XV. STABILITY STUDY ON HERBAL HAIR SERUM

pH*		Viscosity at 100 rpm (centipoise) *	
Initial	Final	Initial	Final
6.7±0.022	6.6±0.012	1110±0.002	1124±0.117

CONCLUSION

Tridax procumbens with fenugreek seeds Herbal hair serum has been shown to provide a range of essential nutrients needed to support the growth of natural hair and preserve the sebaceous glands' optimal function. The usage of herbal cosmetics in the healthcare and personal hygiene systems has changed dramatically. As a result, the herbal cosmeceutical individual care or personal health care industry is giving the manufacturing of cosmetics based on herbs a lot of attention. The market is now growing quickly and has a lot of promise for the years to come. In addition to providing nutrients necessary for preserving healthy, gorgeous hair, the use of bioactive ingredients in cosmetic formulations improves physical attributes. The created herbal hair serum has a good effect on the mechanism of hair development and increased consistency, it may be concluded. Because medicinal herbs have a decreased risk of side effects and hypersensitivity reactions, they have been used to treat hair issues since ancient times. To encourage hair growth, the Indian traditional medical system suggests a number of herbal remedies. What's best is that herbal extracts will provide enough nutrients and microprotein supplements for hair, making it safe and healthy. Herbal cosmetics have gained popularity in the personal care industry and are in high demand in daily life due to their lack of parabens and sulphates.

HUMAN AND ANIMAL RIGHTS

Neither humans nor animals were used in the investigations that served as the foundation for this study.

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