



Formulation And Evaluation Of Herbal Hair Serum Using *Murraya Koenigii* & *Rosa Sinensis*

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Abstract: In contemporary society, the demand for cosmetics has surged, with individuals increasingly utilizing various products to enhance their appearance and maintain a youthful demeanor. The significance of cosmetics in daily life is undeniable, particularly as consumers gravitate towards herbal options, which are perceived to offer reduced side effects and enhanced safety. Among the various aspects of personal care, hair, as an essential component of the human body, serves not only a protective function but also contributes to an individual's aesthetic appeal. This study aims to develop an herbal hair serum suitable for daily application, utilizing a blend of various herbs. The research focuses on evaluating the properties of the cosmetic serum to identify the optimal formulation. Three distinct serum formulations (F1, F2 & F3) each varying in excipient concentrations, were created. Comprehensive assessments were conducted, encompassing physical appearance, pH level, homogeneity, viscosity, spreadability, and antifungal activity. Results indicated that the F1 formulation met established standards, exhibiting satisfactory characteristics. The findings of this research underscore the effectiveness of herbal formulation F1 in enhancing hair quality and consistency, suggesting promising avenues for future development in herbal cosmetic products.

Keywords: Herbal cosmetics, hair serum, formulation, safety, efficacy, daily use.

INTRODUCTION

Cosmetics encompass a broad array of products aimed at enhancing or transforming the appearance of various features, including the face, skin, hair, and nails. Their uses extend beyond mere beautification, serving important roles in hygiene and protection as well. The cosmetic industry stands as a vast and diverse sector, presenting an extensive selection of items tailored for specific needs, ranging from

skincare and makeup to haircare and fragrances. As trends evolve, this ever-expanding market continues to innovate, reflecting society's changing ideals of beauty and self-care.^[1]

Hair growth is a complex process governed by a finely tuned cycle that researchers are still unravelling. This cyclical pattern includes the stages of hair shaft formation, growth, and eventually, shedding. Typically, human hair goes through three distinct phases: anagen, catagen, and telogen. The anagen phase of hair growth is defined by the formation of a complete hair shaft from the follicles, which means that hair length, in the absence of cutting, is directly linked to the duration of this phase. Research has shown that as individuals age, the length of the anagen phase begins to decrease, resulting in hair that becomes progressively thinner and weaker over time. The catagen phase signifies the transition between the anagen and telogen stages, usually lasting around two weeks. During this phase, hair follicles begin to contract and detach from the dermal papilla, leading to the demise of epithelial cells in the follicle bulb as mesenchymal cells decrease in number. As the catagen phase progresses, the dermal papilla rises toward the hair follicle bulge. If the dermal papilla does not reach the bulge during this period, the process of follicle regeneration halts, which can ultimately lead to hair loss. Following the anagen phase, the hair cycle shifts into the telogen resting phase, which generally endures for a period of two to three months. Notably, at any moment, around 9% of the hair on the scalp finds itself in this telogen phase, a significant difference compared to the trunk, where approximately 40-50% of hairs are in this same stage of rest. During this interval, while the existing strands remain dormant, fresh hair begins to grow at the base of the follicle, paving the way for the eventual shedding of the older hairs. In summary, exogen marks a pivotal shift from the telogen phase to the start of the anagen phase. This essential transition plays a vital role in promoting the upward growth of newly developing hair, which effectively pushes out older strands, leading to their eventual shedding.^[2]

Highlights of hair serum

- a) Hair serum is an essential styling product that creates a protective layer on the hair's surface.
- b) This liquid formulation boasts a consistency that is thicker than water, providing both style and care.
- c) Beyond mere styling, hair serum serves a vital role in addressing various hair concerns, including dryness, lack of lustre, and manageability issues
- d) . This versatile product is instrumental in promoting healthier hair, making it a valuable addition to any hair care routine.
- e) Hair serums are specialized products tailored to meet various hair care objectives. Depending on their formulation, these serums can effectively reduce frizz, enhance shine, or straighten hair textures.
- f) One common type of hair serum is silicone-based, specifically engineered to create a protective layer over the hair. This formulation not only adds luster and smoothness but also provides hydration and shields against humidity and environmental pollutants

- g) For optimal results, it is recommended to apply serum to damp hair. Hair serums are suitable for an array of hair types, including straight, wavy, curly, and coil hair.^[3]

Advantages of hair serum

- a) Hair serum is an effective solution for achieving smoother, softer, and silkier hair.
- b) It gives protection from environmental factors, and provide essential hair care routine.
- c) Serving as both a pre-styling treatment and a finishing product, hair serum can be utilized before or after the application of heat styling tools.
- d) Benefits of hair serum is its ability to control frizz.
- e) The anti-frizz properties not only tackle unruly strands but also contribute to an improved texture.
- f) Hair serum plays a crucial role in reducing tangles and promoting shine.
- g) It acts as a protective barrier against damage, safeguarding your hair's health and vitality.
- h) Protect hair from damage^[3]

Side effects of hair serum

- a) Regular use and excessive application of hair products can compromise hair health, resulting in dryness over time.
- b) Applying serum directly to the scalp may trigger inflammation.
- c) Furthermore, the silicones contained in many hair serums can pose long-term risks to hair integrity.
- d) To maintain optimal hair condition, it is advisable to refrain from scalp application, as this may lead to oiliness and potential inflammatory issues.

Benefits of using hair serum

- Multi-Purpose A hair serum addresses multiple issues, not just one. It's often referred to as the all-in-one remedy for all your hair challenges. With just a few drops, you can easily turn a bad hair day into a great one, giving your locks a fresh and vibrant look.
- Protects Hair: By creating a protective layer on each strand, hair serum serves as an excellent defense against heat, sun exposure, dirt, dust, and pollution. This protective barrier helps to prevent damage, which is why it's recommended to apply a heat-protecting serum before using styling tools.
- Enhancing Hair Radiance with Serums: Hair serums play a pivotal role in achieving a luminous and lustrous appearance. The specialized layer created by these serums serves as a light reflector, imbuing the hair with a radiant shine. Rich in amino acids, hair serums are particularly beneficial for protecting coloured and chemically treated locks.
- Mitigating Hair Breakage and Fall: A common concern associated with tangled hair is the increased risk of hair loss during the detangling process. Hair serums function as lubricants, easing the

struggle of detangling and thus minimizing hair fall. This results in healthier hair with reduced breakage.

- **Ideal for Dry and Frizzy Hair:** For individuals with dry and frizzy hair types, hair serums are especially advantageous. They lock in moisture, resulting in smooth and shiny hair, transforming the overall texture and appearance.
- **Nourishing and Managing Hair:** Beyond adding shine, hair serums also nourish and revitalize brittle and damaged hair by filling in follicular cracks. This improvement in manageability allows for more effortless styling, saving valuable time and effort.^[3]

MATERIALS AND METHODS

Curry leaves

Curry leaves were collected from kuruppampady and is authenticated as *Murraya koenigii* by Mr. Arjun Thomas, HOD Department of Botany, ST. Albert's college Ernakulam, Kerala.

Hibiscus

Hibiscus flower was collected from cherukunnam and as authenticated as *hibiscus rosa sinensis* by Mr. Arjun Thomas, HOD Department of Botany, ST. Albert's college Ernakulam, Kerala.

INGREDIENTS FOR HAIR SERUM

Curry leaves

In an herbal hair serum, curry leaves are primarily used as a natural ingredient to promote hair growth, strengthen hair follicles, and improve overall scalp health due to their rich content of antioxidants, vitamins (like Vitamin B and C), and protein, which help nourish and condition the hair strands, potentially reducing hair fall and promoting thicker, healthier hair.



Figure no:1

Curry leaves are renowned not only for their distinct flavour but also for their impressive nutritional profile, which includes a variety of carbazole alkaloids attributed to their intricate chemical composition. The antioxidant-rich nature of curry leaves plays a crucial role in scalp health by providing moisture and aiding in the removal of dead hair follicles. Furthermore, their high content of beta-carotene

and protein is particularly advantageous for preventing hair loss and thinning, given that hair is primarily composed of protein. The significant amino acid profile present in curry leaves further enhances their ability to strengthen hair follicles, promoting overall hair vitality and growth.^[5]

Hibiscus

Hibiscus flowers are used to promote hair growth, prevent hair loss, and treat dandruff. Hibiscus is rich in vitamins, minerals which provide nourish to the hair and scalp.



Figure no:2

Hibiscus extracts are widely used for their nourishing properties, which is characterized by a rich array of vitamins, minerals, and antioxidants. The natural ingredients in hibiscus improves the strength of hair follicles, reduces hair breakage, and promote healthy hair growth.^[6]

Almond oil

Almond oil is of beneficial nutrients for hair care, consisting of Omega-3 fatty acids, phospholipids, vitamin E, and magnesium. Almond oil not only nourishes and strengthens hair but is also used for hair loss and hair damage. A small amount of it gives silkiness and shine This oil is richness in vitamin B-7, or biotin, which is beneficial for maintaining the health and strength of hair and nails. Other than all of this almond oil provides protection against sun damage, featuring a natural SPF. Moreover, almond oil is versatile and can be utilized as a scalp treatment, further enhancing its benefits for holistic hair care.



Figure no:3

Coconut oil

Coconut oil, obtained from mature coconuts are of two main types: copra oil and virgin coconut oil, both with similar fatty acid profiles. Lauric acid is the fatty acid, that act as both medium- and long-chain. It may reduce hair damage from protein loss during grooming and UV exposure, they decrease protein loss in both undamaged and damaged hair used as a pre-wash and post-wash treatment.



Figure no:4

Glycerine

Glycerine serves multiple functions, including acting as a denaturant, fragrance component, hair conditioning agent, and humectant. It is a naturally occurring substance found in all animal and plant matter. They moisturize and maintain hydration to prevent breakage and enhance shine, strengthen, control frizz, and provide antimicrobial protection



Figure no: 5

Acacia

Obtained from the gum of the Acacia Senegal plant, this remarkable substance is renowned for its ability to create a protective moisturizing barrier around the hair. This barrier not only enhances the hair's elasticity, making it more resilient and less prone to breakage, but it also fortifies the strands, providing strength from the roots to the tips.



Figure no: 6

Tween 20

Tween 20 is a nonionic detergent and emulsifier safe for skin and hair. It also enhances product transparency and spreadability on the skin. Tween 20 improves the ease with which products can be applied, allowing for a more uniform distribution across the skin or hair.

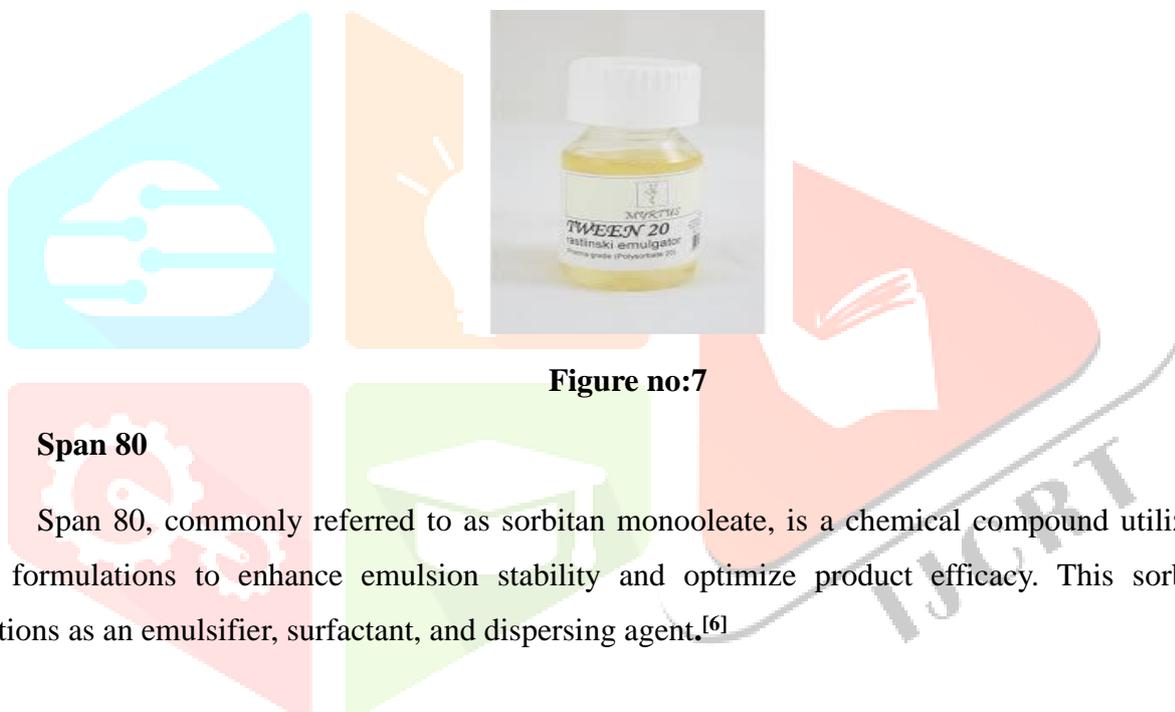


Figure no:7

Span 80

Span 80, commonly referred to as sorbitan monooleate, is a chemical compound utilized in hair care formulations to enhance emulsion stability and optimize product efficacy. This sorbitan ester functions as an emulsifier, surfactant, and dispersing agent.^[6]

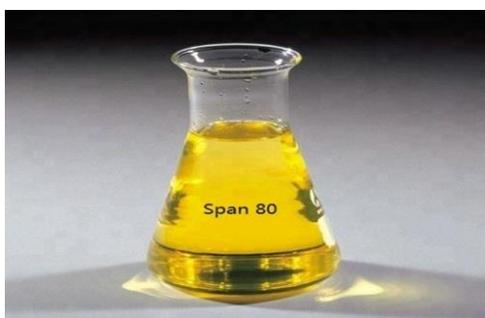


Figure no: 8

Extraction procedure

Curry leaves	Hibiscus
<ul style="list-style-type: none"> • Shade dries the curry leaves for one day • Powder the leaves into fine powders • Boil using distilled water • Filter 	<ul style="list-style-type: none"> • Fresh flowers of hibiscus • Soak in water for 24 hours • Filter

Table No.1**PROCEDURE OF HERBAL HAIR SERUM FORMULATION:**

1. Clean all the glassware and dry them properly as per SOP.
2. Measure the accurate quantity of Curry leaves extract and hibiscus extract and polymers in to a beaker.-oil phase
3. Mix thoroughly for 10 mins.
4. Measure accurate quantity of almond oil, coconut oil, Water and glycerin into another beaker- aqueous phase.
5. Mix thoroughly for 10 mins.
6. Transfer oil phase into aqueous phase dropwisely by continous mixing.
7. Transfer the final solution into container. ^[7]

PHYTOCONSTITUENTS TESTS**a. Curry leaves^[8]:**

Phytochemical constituents	Aqueous
Alkaloids	+
glycosides	+
Steroids	+
Phenols	+
Tannins	+
quinones	+

Table no:2**b. Hibiscus flower^[9]:**

Phytochemical constituents	Aqueous
Saponins	+
Phenols	+
Tannins	+
Terpinoids	+
Glycosides	+
Anthraquinones	+

Table no:3

FORMULATION OF HAERBAL HAIR SERUM

SI NO	INGREDIENTS	OFFICIAL FORMULA (100ML)	WORKING FORMULA (30ML)		
			F2	F3	F3
1	Extract of curry leaves	23.40 ml	7ml	7 ml	7 ml
2	Extract of hibiscus flower	23.40ml	7ml	7 ml	7 ml
3	Almond oil	13.3ml	4ml	4ml	4ml
4	Coconut oil	1.6ml	0.5ml	0.5ml	0.5ml
5	Glycerine	23.40 ml	7ml	7 ml	7 ml
6	Methyl paraben	3.3ml	1ml	1ml	1ml
7	Acacia	1.6 ml	0.5ml		
8	Tween 20	1.6 ml		0.5ml	
9	Span 80	1.6 ml			0.5ml
10	Distilled water	10 ml	3ml	3ml	3ml

Formulation of hair serum Table no: 4**EVALUATION OF HERBAL HAIR SERUM**

The following parameters are used to evaluate the herbal hair serum.^[10]

Physical apperance :

Physical appearance was evaluated by observation on the colour, odour and smoothness of formulated hair serum.

pH:

The pH test will be determined by using Digital pH meter. The dipper of the digital pH meter will be dip into the sample of serum formulation and the pH value will be recorded. The pH of the formulation should having acidic pH as the hair is having acidic pH around 4.5-5.5.

Phase separation:

Prepared formulation was kept in a closed container at room temperature of 25-1000c away from light. Then phase separation was checked after 24h.

Transparency:

The transparency was evaluated by visually examine the formulations. Approximately 3ml of formulated serum was taken in a beaker and tested for transparency by visual inspection.

Spreadability:

Specifically, one gram of hair serum was placed between two vertical plates, each measuring 20 cm by 20 cm, with an applied weight of 125 grams. The spread periphery was recorded after one minute. The calculation for spreadability was executed using the following equation:

$$S = (M \times L) / T$$

S denotes spreadability

M represents the weight applied to the upper plate

L indicates the distance traveled by the glass slide

T signifies the time (in seconds) required to completely separate the plate^[11]

ANTIFUNGAL ACTIVITY STUDY

Procedure: Antifungal activity by Dual culture method

The antifungal potential of the compound was evaluated by modifying the dual culture-plate assay. The fungi were cultured on SDA media at room temperature for 5 days. The fungi were spot inoculated onto sterile SDA and incubated at room temperature. The fungi plug was placed on the opposite side of the compound, with a distance of 4cm between them. The fungi alone were inoculated as control. The growth radii of the fungi and the production of an inhibition zone were monitored at regular intervals every day and recorded until the fungi stopped growing. All control and test plates were run in triplicate.^[12]

RESULT AND DISCUSSION

Physical appearance

The physical appearance, colour, odour and texture of the prepared herbal hair serum are visually tested.



Figure no:9

SI NO	PARAMETER	RESULT
1	Colour	Yellowish brown
2	Odour	Aromatic, pleasant
3	Texture	Smooth

Table no:5

pH , Homogeneity, Irritancy, Phase separation and Spreadability test

The pH scale is used to specify the acidity or basicity of a product in order to ensure that it is safe to use.

SI NO	PARAMETER	RESULTS
1	pH	5.56
2	Homogeneity	Excellent
3	Spreadability	Easily spreadable
4	Phase separation	No phase separation

Table no:6

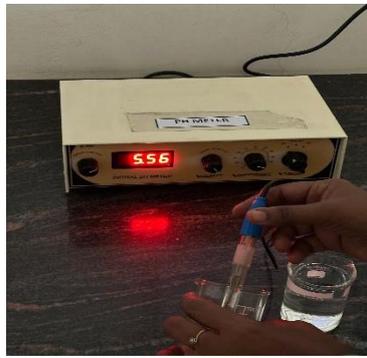


Figure no: 10



Figure no :11



Figure no:12

Antifungal activity

Antifungal activity of our herbal hair serum was proved using dual culture plate assay method. In this method we used two fungus ,Aspergillus niger and mucus. On the regular monitoring our haerbal hair serum showed antifungal activity againts the fungi mucus.



Figure No:13

CONCLUSION

In this study, the herbal hair serum was prepared by using *Murraya koenigii* and *Rosa sinensis* extract. The present study aims to assess the properties of a cosmetic serum in order to determine the most effective formulation. Three distinct serum formulations—designated F1, F2, and F3—were developed, each differing in the concentrations of excipients used. A series of evaluation tests were conducted, which included assessments of physical appearance, pH levels, phase separation, homogeneity, and antifungal activity. Among the formulations tested, F1 emerged as the superior option, successfully passing all evaluation criteria. Notably, F1 demonstrated antifungal activity against the fungus *Mucor*, as evidenced by results from the dual culture plate assay method. This research highlights the potential of F1 as an optimal formulation for cosmetic applications.

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ACKNOWLEDGEMENT

We are very glad to have the opportunity to make this project and express our profound gratitude and deep regards to our guide Mrs. Athira J Nair for her explanatory guidance, monitoring and encouragement throughout this project work. We would like to thank the people who helped directly or indirectly to complete this project. We would like to extend our gratitude to our principal, Dr. J Nandhakumar for the valuable encouragement and approval of the project work. Lastly we thank The Almighty, our parents and friends for the constant encouragement.