



Formulation development of Hibiscus -Flaxseed hair gel

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ABSTRACT:

Hair loss are the common problems of today's generation for men and women both. Due to increase in pollution and chemicals which are directly or indirectly used in the form of shampoos, hair gels and other hair care products. Hair loss, hair thinning, dandruff and early whitening of hair are the most common problems faced by people. There are a variety of herbal plants which can be used to promote hair growth which provide natural minerals and oils to our hair in comparison to chemical-based products. The present work is done by formulating and evaluating Hibiscus and flaxseed herbal hair gel. The present study focuses on preparation and evaluation of herbal gel which is full of benefits as compared to other gel. Rich in fatty acids and antioxidants, flaxseed, sometimes referred to as linseed, aids in the removal of pollutants and dead cells from the scalp. Applying flax seed and fenugreek seed gel to the scalp and hair as a moisturizer can help to promote hair growth and strengthen existing hair. Also act as Antifungal, Antibacterial and Anti-inflammatory. Hibiscus rosa-sinensis is a medicinal plant member belonging to the family Malvaceae. Hibiscus rosa-sinensis is used for the treatment of various diseases including alopecia. Herbal hair gels help to overcome the various damages caused by chemical agents in various marketed products.

Keywords: Aqueous extract, Carbopol, Hibiscus, Flaxseed, Hair Gel and Herbal.

INTRODUCTION :

Alopecia is a wide issue, for both genders. In the traditional system of drug, a variety of natural origin cures shown exertion for hair growth. After a detailed literature check carried out on crude medicines reveals essential information regarding the selection of medicines for the expression of an ornamental expression for the creation of hair growth exertion. Hence, the present study was aimed to estimate the hair growth exertion of polyherbal excerpt gel, which includes attention. Traditionally, several plants and their products and extract have been used in hair gel preparation (as herbs or spices) as a mode of hair growth agent as well as a cure for some of the common illnesses that affect people. This property of curing is attributed mainly to their hair growth properties. Many reports are available where in flowers or their extracts have been shown rich hair growth properties. Hibiscus rosa-sinensis (family Malvaceae) is a woody, perennial ornamental shrub that grows abundantly in tropical climates. Previous studies have indicated H. Rosa-sinensis to possess hair growth properties and is recommended to be used as an herbal alternative to cure many diseases. On the other hand, flaxseed is known as flax. Flaxseed is considered a nutrition powerhouse for its combination of essential macro and micronutrients. These include protein, omega-3 fatty acids, fibre, and antioxidants. Based on this, the present study was aimed to preparation of herbal hair gel with extract of hibiscus rosa-sinensis and extract of flaxseed. The present study is also aim to evaluate the herbal hair gel for its pH, viscosity, skin irritation test, washability, Phytochemical analysis for the presence of compound in the sample. Looking at the above properties of hibiscus rosa-sinensis and flaxseed, the present study was planned to prepared an herbal hair gel formulation with hibiscus rosa-sinensis and flaxseed extract and to evaluate various parameter

II. MATERIALS AND METHODS :

1.Hibiscus (Rosa- Sinensis)

Hibiscus Rosa Sinensis is a member of the Malvaceae family. Numerous studies have demonstrated the anti-inflammatory, antimicrobial, antidiabetic, anti-ulcer, hepatoprotective, antifertility, and antioxidant qualities of the various components of Hibiscus rosa sinensis plants, which aid in the treatment of numerous diseases. The report suggested that it contains Tannins, Flavonoids, Steroids, Alkaloids, Saponins, Total phenols, Total flavonoids, Total proanthocyanidin. It has been also reported that it contains majorly Anthocyanins and flavonoids; cyanidin-3,5-diglucoside, cyanidin-3-sophoroside-5-glucoside, quercetin-3,7-diglucoside, quercetin-3-diglycoside.



Fig-1 Hibiscus (Rosa- Sinensis)

Uses of Hibiscus rosa sinensis

Leaves and flowers can be used as a hair growth promoter . It is used to prevent premature greying and to treat scalp disorders. It considered as a natural emollient hair conditioner and was used in hair washes, treatments and vinegar rinses for the hair 13,14. Hibiscus rosa sinensis flower are promising sources of potential antibacterial value and may be efficient as preventive agents for some diseases

2.Flaxseed (Linum usitatissimum)

In languages, flaxseed, also known as linseed (Linum Usitatissimum), is commonly referred to as Alsi, Jawas, or Aksebija. Flax (Linum usitatissimum) belonging to family Lineaceae. Rich in nutritional fibre, protein, and fat is flaxseed. The composition of flaxseed can vary with genetics, growing environment and method of seed processing 16. Flaxseed (also known as linseed) is emerging as an important functional food ingredient because of its rich contents of α -linolenic acid (ALA, omega-3 fatty acid), lignans, and fiber 17. Flaxseed oil, fibres and flax lignans have potential health benefits such as in reduction of cardiovascular disease atherosclerosis, diabetes, cancer, arthritis, osteoporosis, autoimmune and neurological disorders.



Fig-2 Flaxseed (Linum usitatissimum)

Uses of Flaxseed

Rich in fatty acids and antioxidants, flaxseed aids in the removal of pollutants and dead skin cells from the scalp. You can use flax seed gel as a moisturizer on your hair and scalp. Aid in promoting new hair development and strengthening existing hair. Topical formulations come in the form of oils, creams, ointments, pastes, and gels; among these, gels are becoming more and more well-liked these days due to their increased stability and ability to offer controlled release in comparison to other semisolid preparations . The gel formulations can provide better absorption characteristics and hence the bioavailability of drug.

3.Fenugreek (Trigonella foenum-graceum)

Fenugreek, scientifically known as Trigonella foenum-graecum, is a versatile herb native to the Mediterranean region and South Asia. It has been used for centuries in traditional medicine and culinary practices. Fenugreek seeds are rich in essential nutrients, including proteins, vitamins, minerals, and antioxidants. These seeds also contain compounds such as flavonoids, alkaloids, and saponins, which contribute to their potential benefit to hair health.



Fig-3 Fenugreek (*Trigonella foenum-graceum*)

Uses of Fenugreek

Fenugreek hair oil boosts blood circulation and helps reduce dandruff. Fenugreek seeds are rich in protein, and nicotinic acid content, renowned for their capacity to fight hair fall and dandruff. It also treats dryness of hair, controls balding, and hair thinning. Also act as anti-inflammatory, antibacterial, antifungal.

Method of preparation Hair gel

Step-1: Preparation of Hibiscus extract :

Weigh 5gm of hibiscus powder and transfer into beaker containing 100ml of methanol. Solvent containing hibiscus was kept for 6 days with occasional stirring. The mixture was filtered after 6 days. The filtrate was stored in fridge.



Fig-4 Hibiscus flowers and Dried Petals



Fig-5 Powder of petals



Fig-6 Kept 6 days in ethanol



Fig-7 Hibiscus extract

Step- 2 : preparation of flaxseed and Fenugreek extract

Weigh 5gm of Flaxseed and 3 gm of Fenugreek seed. Make powder of this mixture. Transfer in to 100 ml water Transfer the beaker containing flaxseed into water bath. Boil it, with constant stirring until a thick mucilage was prepared. Then the mucilage was strained using suitable sieve.



Fig 8 Flaxseed & Fenugreek coarse powder



Fig 9 - Boil with water, filter & Extract

Step-3: Preparation of gel and incorporation of extracts**Fig- 10 Chemicals & Ingredients**

Name	F1	F2	F3	F4	F5
Carbopol 940(gm)	0.5	1	1.5	2	2.5
Methyl Paraben (gm)	7.5	7.5	7.5	7.5	7.5
Water(ml)	30	30	30	30	30
Glycerol (ml)	3	3	3	3	3
Triethylamine (ml)	0.5	0.5	0.5	0.5	0.5

Table 1: Quantity of ingredients for herbal hair gel

NAME OF INGREDIENTS	F ₁	F ₂	F ₃	F ₄	F ₅
Hibiscus Extract	5%	10%	15%	20%	25%
Flaxseed + Fenugreek Extract	5%	10%	15%	20%	25%
Aloe Gel (Gm.)	1	1	1	1	1
Methyl Paraben (Gm)	7.5	7.5	7.5	7.5	7.5
Water (ml)	30	30	30	30	30
Glycerol (ml)	3	3	3	3	3
Triethylamine (ml)	0.5	0.5	0.5	0.5	0.5
Carbopol (gm)	0.5	1	1.5	2	2.5

Table 2: Formulation herbal hair gel

Formulation of hibiscus flaxseed herbal hair gel

- Five different herbal hair gel formulations were prepared by simple gel preparation method with Carbopol 934 gel base 9.
- Take 30 ml of distilled water in a beaker. Add measure quantity of methyl paraben and glycerin measure quantity of polyethylene glycol was dissolve in 30 ml distilled water in beaker with stirring .
- Added Carbopol 934 with slowly stirring then triethanolamine was added slowly with continuous stirring to obtain gel structure.
- Finally varying concentration (5%,10%,15%,20%,25%) of aqueous extract of flaxseed and methanolic extract of hibiscus was added into Carbopol gel and stirred.
- The prepared gel formulation was stored at room temperature 8.



Fig 11 Formulation of hibiscus flaxseed & fenugreek herbal hair gel

EVALUATION OF HERBAL HAIR GEL FORMULATIONS

I. Phytochemical analysis of Hibiscus extracts

a) Detection for alkaloids

- **Dragendroff's test**- Dissolve the herbal extract in chloroform. Evaporate chloroform and acidify the residue by adding few drops of Dragendroff's reagent(Potassium Bismuth Iodide).
- **Mayer's test**-2-3 ml of filtrate with few drops of Mayer's reagent Wagner's test- 2-3 ml of filtrate with few drops of Wagner's reagent.

b) Detection for Carbohydrates

- **Fehling's test**- 1 ml. Fehling's A and 1 mL Fehling's B solutions should be boiled for one minute. Pour in an equal volume of test extract solution. 5-10 minutes in a boiling water bath.
- **Benedict's test**- In a test tube, combine an equal proportion of Benedict's reagent and test extract 5 minutes in a boiling water

c) Detection for Flavonoids

- **FeCl₃ Test**-To the alcoholic solution of the extract add few drops of neutral ferric chloride solution
- **Lead acetate solution Test**- Test solution with few drops of acetate solution(10%).

d) Detection for Phenols

- **Ferric chloride test** – Few drops of the extract were treated with 5% aqueous ferric chloride

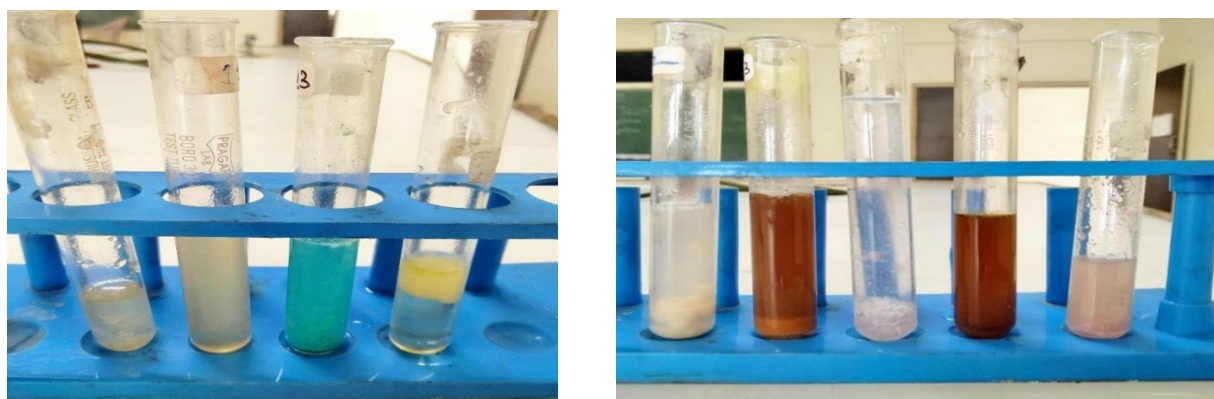


Fig.12 Phytochemical analysis of Hibiscus extracts

Phytochemical analysis of flaxseed and fenugreek extract

a) Detection for Tannins

- **Braymer's test**- 2 ml of extract was allowed to react with 10% alcoholic ferric chloride solution.

b) Detection for Saponins

- **Foam test**-1 mL of extract was diluted with distilled water to 20 mL and shaken in cylinder for 15 minutes.

c) **Detection for alkaloids**

- **Dragendroff's test**- Dissolve extract of the herbal drug in chloroform. Evaporate chloroform and acidify the residue by adding few drops of Dragendroff's reagent (Potassium Bismuth Iodide).

d) **Detection for Quinones**

- **Alcoholic KOH test**- 1mL plant extract + few mL alcoholic potassium hydroxide.

e) **Detection for Carbohydrates**

- **Fehling's test**- 1 ml. Fehling's A and 1 mL Fehling's B solutions should be boiled for one minute. Pour in an equal volume of test extract solution. 5-10 minutes in a boiling water bath.
- **Benedict's test**- In a test tube, combine an equal proportion of Benedict's reagent and test extract 5 minutes in a boiling water

II. Physical appearance

The physical appearance of the herbal hair gel formulation was checked visually for colour and feel on application. Results are as shown in table 12

a) **Homogeneity**

- After the preparation of the gel the gel was visually checked for presence of any lumps and aggregates.

b) **pH determination**

- After the preparations of different hair gel formulations its pH was determined. 1 gm of hair gel was dissolved in 100ml of distilled water and kept for 2 hrs. After 2 hrs pH was noted. The pH was determined 2 times of each herbal hair gel formulation and its average value was taken. The results are presented in table. 12

c) **Washability**

- The prepared hair gel formulation is applied on the skin and the ease and extent of washing with water is checked normally.

d) **Spreadability**

- 2 gm of hair gel was placed between 2 glass slides. 500g of weight was placed on the slides. The weight was placed for specific period of time for 5 minutes. The hair gel spreads in a circular way its diameter was measured from different points.

Spreadability was calculated by using formula.

$$S = \frac{M \cdot L}{T}$$

Where, S= Spreadability, M=weight on the slide, L=Diameter of the formed circle (cm), T=time(sec)

III Skin irritation test

Applied the herbal hair gel formulation on the skin and observe for irritation, redness or rashes. 12

IV Stability study

Stability is the ability of a formulation to withstand the different environmental factors like heat, cold, moisture, humidity and should remain within its therapeutic, chemical, physical and toxicological specifications. Stability testing is to provide evidence on how the quality of a drug substance or drug product varies with time under the influence of a variety of environmental factors such as humidity and light, and enables recommended storage conditions, re-test periods and shelf lives to be established. In the present work the formulation was stored at room temperature (25–30°C) for 30 days and observed for any changes in their physical characteristics and evaluation parameters.

RESULTS AND DISCUSSION :

Phytochemical analysis of hibiscus extract.

Table 3-Qualitative phytochemical investigation of hibiscus extract

Sr.No	Plant constituents	Test performed	Results
1	Test of alkaloids	Dragendroff test Mayer's test Hager's test	+ + +
2	Test of carbohydrates	Fehling test Benedict test	+ +
3	Test for phenol	Iodine Test	+
4	Test for flavonoids	FeCl ₃ test Lead acetate solution test	+ +

Phytochemical analysis of flaxseed and fenugreek extract.**Table 4 - Qualitative Phytochemical investigation of flaxseed and fenugreek extract**

Sr.No	Plant constituents	Test performed	Results
1	Detection of tannins	Braymer's test	+
2	Detection of carbohydrates	Fehling test Benedict test	+
3	Test for phenol	Iodine	+
4	Test of saponin	Foam test	+
5	Test for alkaloids	Dragendorff test	+
6	Test for Quinones	Alcoholic KOH test	+

Sign “+” denotes presence of Phytochemical constituents and Sign “-“ denotes absence of Phytochemical constituents.

Physical appearance

The colour of all the herbal gel formulations H₁F₄, H₂F₄, H₃F₄, H₄F₄ and H₅F₄ were found to be light pink with translucent appearance which was found to be smooth on application. The results are shown in Table no-6.

a) Homogeneity

By visually inspecting each herbal hair gel to ensure there were no lumps, flocculates, or aggregates present, the homogeneity of the product was tested. For every formulation, the homogeneity was found to be satisfactory. The results are shown in Table no-6.

b) pH determination

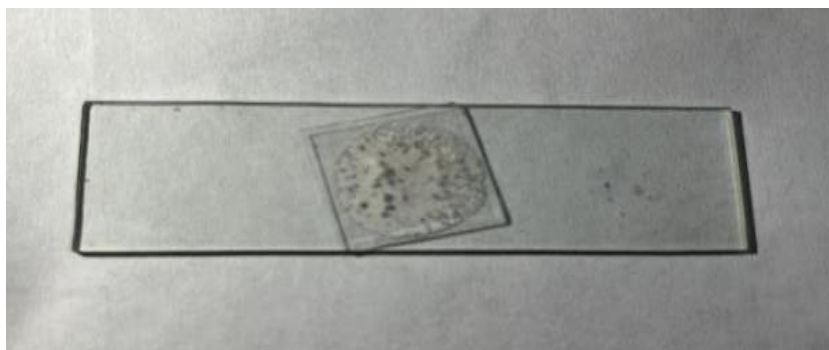
The pH of all the herbal gel formulations ranged between 6.7 to 7.3, that suited the hair, indicating the compatibility of the herbal gel formulations with the hair. The results are shown in Table no-6

c) Washability

The prepared herbal hair gel was applied then washed in water. After washing there is no trace of gel.

d) Spreadability

Spreadability plays an important role in consumer acceptability and help in uniform application. The results are shown in Table no-6.

**Fig.13 spreadability slide****e) Skin Irritation**

The prepared herbal hair gel was applied on skin of hand and exposed to sunlight for 4-5 min. It was found skin compatible and non-irritant.

f) Stability studies

The stability studies were conducted for all the formulations for a period of 3 months. No appreciable changes were found for the tested parameters like appearance, pH at both the temperatures (room temperature and 40 °C).

IV. Final Formulation of Hibiscus -flaxseed gel



Fig.14 Hibiscus -flaxseed hair gel

CONCLUSIONS :

The study was performed with an aim to develop Hibiscus Rosa Sinensis, Flaxseed and fenugreek herbal hair gel. Five different hair gel formulations were prepared. Out of five different formulation the **F5** formulation gave appropriate colour, homogeneity, pH, spreadability, skin irritation and stability study to minimized side effects of Herbal hairgel. all formulation are formulated & evaluated for every parameters. According to theevaluation parameters performed **F5** formulation was best formulation from the rest of four formulation.

The formulation of Hibiscus Rosa Sinensis and Flaxseed herbal hair gel provides a goodbase for treating the scalp and strengthens the hair thereby preventing the hair fall.

List of Figure & Table

Sr.No.	Figure No.	Name of figure & table
1	Fig no.1	Hibiscus (Rosa- Sinensis)
2	Fig no.2	Flaxseed (Linum usitatissimum)
3	Fig no.3	Fenugreek (Trigonella foenum-graceum)
4	Fig no.4	Hibiscus flowers and Dried Petels
5	Fig no.5	Powder of petals
6	Fig no.6	Kept 6 days in ethanol
7	Fig no.7	Hibiscus extract
8	Fig no.8	Flaxseed & Fenugreek coarse poewder
9	Fig no.9	Boil with water, filter & Extract
10	Fig no.10	Chemicals & Ingredients
11	Fig no.11	Formulation of hibiscus flaxseed & fenugreek herbal hair gel
12	Fig no.12	Phytochemical analysis of Hibiscus extracts
13	Fig no.13	Spreadibility slide
14	Fig no.14	Hibiscus -flaxseed hair gel
Sr.No.	Table No.	Name of Table
1	Table No.1	Quantity of ingredients for herbal hair gel
2	Table No.2	Formulation herbal hair gel
3	Table No.3	Qualitative phytochemical investigation of hibiscus extract
4	Table No.4	Qualitative Phytochemical investigation of flaxseed and fenugreek extract

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