



FORMULATION AND EVALUATION OF HERBAL HAIR GEL

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ABSTRACT :-

Herbal drugs constitute a core share of all the officially recognized systems of health in India viz. Ayurveda, Yoga, Unani, Siddha, Homeopathy and Naturopathy, excluding Allopathy. The objective of existing research is to formulate and evaluate flaxseed hair gel to nourish our hair and prevent them from dandruff. Flaxseeds comprise omega-3 fatty acids, which give energetic proteins and nutrients to hair follicles, boost circulation in the scalp, and inhibit hair follicle tenderness that inhibits hair fall. It contains vitamin E, which diminishes the influence of free radicals on the scalp and improves the hair growth and stronger hair follicles.

Dandruff is a skin condition with symptoms includes flaking and sometimes mild itchiness cause to the scalp. They are many bacteria, fungus causing scalp infections which lead to further hair problems or skin issues. There is one of the common conditions candidacies which is typically caused on the skin or mucus membrane caused by Candida. Herbal extract of flaxseed and amla found to be effective in treating Candidacies. Flaxseed (*Linum usitatissimum*) is an annual plant of the linaceae family with several biological properties such as an indirect effect on hair regrowth through the intermediary of glutamyltran peptidase. Flax seed gel has several benefits on 4C hair. The gel is rich in omega-3 fatty acids, vitamins, minerals and Lignin which nourish the hair and promote growth. The omega -3 fatty acids in flaxseed gel is responsible for moisturizing the hair. Flax seeds are one of dietary sources containing considerable amount of phenolics named lignans. The aim of this study was to evaluate the potential activities of lignin extracts as a potential source of antimicrobial agents like secoisolariciresinol diglucoside (SDG) in variables levels. In the present investigation, we present the antibacterial activity and antifungal activity of Flax seeds extracts with unique composition of different phenylpropanoid compounds. Due to the elevated level of secoisolariciresinol diglucoside (SDG), ferulic acid, p-coumaric acid, their glycosides and also their multi directional mode of action the Flax seeds (Extract) were effective in inhibiting bacterial growth and fungal growth. A polyherbal hair gel was found to be effective against candidacies along with this it nourished the hair and prevent premature graying.

KEYWORDS :-

Hair gel

INTRODUCTION: -

Hair is an integrated system with specific chemical and physical behavior. It is a complex structure composed of multiple morphological components that work as a unit. All hair has a shaft and a root. The shaft is the visible part of the hair that attach to the skin. Hair roots are located within the skin and reach the deeper layers of the skin. It is surrounded by hair follicles (coverings of skin. and connective tissue) that are also connected to sebaceous glands. Each hair follicle is connected to a small muscle (pillor muscle) that can straighten the hair. Many nerves also end in hair follicles. These nerves sense hair movement and are sensitive to even the slightest breeze. At the hairline, the hair root spreads into a sound bulb. There is a dermal papilla inside the hair bulb, which supplies blood to the hair root. New hair cells are constantly forming in the hair bulb near the papilla. The hair shaft of mammals is divided into three main regions:

- a)Cuticle
- b) Cortex
- c)Medulla



FIGURE NO – 1 HAIR ANATOMY

Hair growth cycle:

The hair produced by a follicle often needs to change and follicles possess a unique mechanism for this, the hair growth cycle. This involves destruction of the original lower follicle, and its regeneration to form another, which can produce hair with different characteristics. Thus, post-natal Follicles retain the ability to recapitulate the later stages of follicular embryogenesis throughout life. Exactly how differently sized a hair can be to its immediate predecessor is currently unclear because many changes take several years. Hairs are produced in anagen, the growth phase.

**FIGURE NO- 2 HAIR GROWTH CYCLE****TABLE NO -.1 TYPES OF HAIR**

TYPE 1 STRAIGHT		
A	Straight fine/thin	Hairs tend to be very soft, shiny, oily and poor at holding curls.
B	Straight medium	Hair characterized by volume and body.
C	Straight coarse	Hairs tend to be bone straight and difficult to curl.
TYPE 2 WAVY		
A	Wavy fine /thin	Hair has definite “S” pattern and is usually respective to variety of styles.
B	Wavy medium	Tend to be frizzy and little resistant to styling.
C	Wavy coarse	Very frizzy with thicker waves often more resistant to style.
TYPE 3 CURLY		
A	Curly loose	Curly hairs that usually present defiantly in “S” pattern.
B	Curly tight	Tighter like a spiral.
TYPE 4 KINKY		
A	Curly soft	Hairs tends very fragile tightly coiled and future curly pattern.
B	Curly wiry	Less visible no curly pattern.
C	Curly wiry	Curly pattern.

Functions of hair gel:-

Hair gel is used for men and women to create hair styles, from mild to extreme. Styles include slicking hair back, sticking hair straight up as in a Mohawk style, keeping curls in place or keeping hair straight, making hair have a "bed head" look (tousled but stylish, as if the person just rolled out of bed), side swept bangs, "preppy" styles, "punk" styles and many, many more. You can use as much product or as little as you like, since it depends on the length and amount of hair that is being styled.

Diseases of hair

- Deformity of bubble hair.
- Hair loss (alopecia).
- Hair casts (remaining portions of the inner root sheath lost).
- Hirsutism (intense hair growth on body regions that typically have little hair).
- Hair that falls out too soon.
- Pattern loss of hair.
- Trichotillomania, or the disorder of hair pulling.

MATERIAL AND EQUIPMENT : -

- 1) **FLAXSEED:-** Flaxseed has long history of use in India and flaxseed preparations are particularly considered for its nutrients and therapeutic property . In Southern India, flaxseed is partly being consumed by at lower levels as flaxseed chutney. *Linum Usitatissimum* L, the linseed producing plant belongs to the family Linoceae. Flaxseed gel has several benefits on 4C hair. The gel is rich in omega-3 fatty acids, vitamins, minerals and Lignin which nourish the hair and promote growth.

The omega-3 fatty acids in flaxseed gel is responsible for moisturizing the hair. The presence of vitamin E in flaxseed provides nutrition to the scalp and reduces free radical damage. Flaxseed is rich in omega-3 fatty acids It can also reduce inflammation "It nourish dry, damaged hair, and fatty acids have been touted for their ability to provide moisture."Flaxseed gel helps hair grow faster and longer by providing nourishment to the hair follicles. Vitamin E is antioxidant it reduces the effects of free radicals on your

scalp, thereby promoting hair growth. Adequate vitamin E intake may also promote stronger hair follicles

Common names: Flax seed, linseed, Alsi or teesi (Hindi, Gujarati, and Punjabi), Ali vidai in Tamil ,Atasi and Jawas in Marathi, Tishi in Bengali, Pesi in Oriya, Agasi in Kannada, Aviseginzalu in Telugu, and Cheruchanavithu in Malayalam.

Biological Source:Linseed is the dried, ripe seed of *Linum usitatissimum* Linn. Linseed oil is obtained by expression of linseeds, belonging

family Linaceae.

Scientific name : *Linum usitatissimum*

Kingdom: Plantae

Order: Malpighiales

Family: Linaceae

Genus: *Linum*

Species: *L. usitatissimum*



Figure no.2-Flaxseed

Uses-

-Helps improve circulation of head.

-Promoting hair growth & slow down hair breakage.

-flaxseed is fatty acids & anti-oxidant Flaxseed oil, fibers & flax health, benefits as reduction of cardio-vascular disease, cancer, arthritis

-Rich in vitamin E both Skin hair health.

-Flaxseed emerging functional Food ingredient because rich content 7x-linoleic acid lignans & Fiber

2) Aloevera.

Aloevera is a natural remedy which help to reduce dandruff and nourishes the hair. It produced from the farm in batches. It locally available for various purpose because it contains many properties like vitamins, minerals and other ingredients which is essential for healthy hair growth and provide nourishment. Aloe vera is a herbal drug and containing efficacious properties and less side effect, so it has been widely used. Aloe vera is directly applied on scalp to relief from dandruff, so it is protective for hairs. Aloe vera is support in preventing the formation of dandruff and hair dryness. Aloe vera contain vitamin, enzymes, minerals, salicylic acid, amino acid, saponin, lignin, sugar due to this it efficacious for skin hydration. Aloe vera prevents the scalp from dandruff and protective for hair.



Figure no.3-Aloevera

Biological Classification-

Kingdom – Plantae

Scientific name - Aloe barbadensis

Order - Asparagales

Family - Xanthorrhoeaceae

Genus – Aloe

Species - A. Vera

Uses-

- Strengthen and repair hair strands.
- Deep cleans oily hair .
- Calms an itchy scalp.
- Controls greasy hair.

- Hair growth.
- Relief from scalp itching .
- Protection from uv damage.
- Strengthen hair.

3)Rose Water-

Rose water is a mild astringent which may help to reduce oiliness and dandruff. It has anti-inflammatory properties, which may make it beneficial for certain scalp conditions, like psoriasis and eczema. Many women with curly hair swear by rose water's ability to calm down frizz and add shine.



Figure no.4-Rose water

Kingdom –Plantae

Subkingdom- Tracheobionta Vascular Plants

Division -Mangnoliophyta

Class: Magnoliopsida

Order :Rosales

Family : Rosaceae

Genus: Rosa meldomonac

Species: Rosa

Uses-

- -Hydrating and add moisture to damaged dry hair.
- -Rose water mild astringent with anti-inflammators.

4) Almond Oil:

The nourishing oil can soften and strengthen your hair. It's rich in vitamin B-7, or biotin, so almond oil helps to keep hair and nails healthy and strong. It can also help protect your hair from sun damage, with a natural SPF 5. You can use almond oil as a scalp treatment.



Figure no.5 Almond Oil

Botanical name-Prunus Dulcis

Kingdom -Plantae

Subkingdom- Tracheobionta Vascular Plants

Division –Mangnoliophyta Flowering Plants

Materials Used:

Flaxseeds were procured from the local organic farm, Bengaluru, India. Carbopol 934, Methyl paraben and Reagents use were either analytical or laboratory grade.

The gels formed using 0.5g carbopol were found to be very thin that liquefied within 4 to 5 hours of preparation. The gel formed using 1g carbopol gel formation was better to some extent but the problem of liquefaction after 24 hours was observed. The gel formulation containing 1.5g of carbopol formed uniform and smooth gel that did not liquefy even after 24 hrs. With 2g carbopol the gel formation was better to some extent but problem was too thick to handled. Whereas gel containing 2.5g carbopol was too thick to be handled. Among the Five formulations, gel containing 1.5g carbopol (F3) was optimized.

Research Through Innovation

Table no.2-Material and profile

Ingredient	Role of ingredient
Flaxseed	Scaly scalp
Almond oil	Smoothing agent
Rose water	Perfume
Vitamin E	Maintain hair growth
Carbapol 934	Gelling agent
Methyl paraben	Preservative

Experimental work:-

Extraction process -

1) All of the flaxseeds used in the extraction were acquired from a local store. For extraction, it was important to use a mechanical flaxseed preparation technique. Because hull separation could pose a technical challenge and crushing the seeds would result in the extraction of other substances, such as proteins, which are primarily found in the endosperm, lowering the quality of the mucilage extract, therefore the extraction from the whole seed was suitable. It is also not a good idea to extract mucilage from the meal after the oil has been extracted since this will result in protein extraction. As a consequence, flaxseed mucilage extraction from the entire seed was successful.

2) Flaxseed mucilage was extracted using distilled water in an aqueous method. Weighed the flaxseeds and put them in distilled water. Heat this mixture as well as stir it for at least 12 to 15 minutes on the magnetic stirrer. Then filter the resulting gel/extract with a clean muslin cloth.

3) The aqueous extract of flaxseed was prepared by adding flaxseeds to boiling water with constant stirring until a thick mucilage was obtained. Then the mucilage was strained using suitable sieve and stored at room temperature until further use.

Preparation of aloe vera Gel:

The leaf was peeled and prepared natural aloe vera gel, by using a small spoon or scooped and a blender. Be careful about not to include any pieces of the aloe vera skin in aloe vera pulp. Aloe vera gel was blended until it's frothy and liquefied and stored the pulp in refrigerator.

Preparation of Herbal Hair Base

The aqueous extract of flaxseed was prepared by adding flaxseeds to boiling water with constant stirring until a thick mucilage was obtained. Then the mucilage was strained using suitable sieve and stored at room temperature until further use. Herbal hair gel formulations were prepared by simple gel preparation method with carbopol 934 gel base. Measured quantity of methyl paraben and weighed quantity of sodium chloride were dissolved about 35ml water in beaker. Then the mixture was stirred at high speed using mechanical stirrer. 1.5g carbapol (optimized) and add 20% aqueous extract of flaxseed to beaker and continuous stirring to obtain gel structure. The prepared herbal gel formulations were stored at room temperature until further evaluation.

PREPARATION OF HERBAL HAIR GEL:-

The flaxseed aqueous extract was prepared by boiling 15 gm flaxseed with sufficient quantity of 250 ml distilled water with continuous stirring until thick mucilage was obtained. Then the mucilage was filter by using suitable sieve and masculine cloth and stored at room temperature. The gel was stored in room temperature until further use for Stabilization purpose. Herbal hair gel formulations were prepared by simple gel preparation method with Carbopol gel base. Measured quantity of methyl paraben 0.18 gm, glycerin 30 ml and weighed quantity of were dissolved in about 45 ml water in a beaker. Then the mixture was stirred at high-speed by using mechanical stirrer. methyl paraben were added slowly in the beaker containing above mixture while stirring. Then carbopol was added slowly with continuous stirring to obtain gel structure. Then 2.5%ml aloe vera pulp & 1 to 2 drop of Almond oil added slowly by stirring continuously and stored the gel at room temperature. In this way prepared 4 different concentrations of hair gel formulations by varying in the concentration of aqueous flaxseed mucilage like 5%,10%,15%,20%, and it was introduced into Carbopol gel base Formulations and other ingredients also added in it and stirred up to 1 hr. So, obtain 4 different formulations like F1, F2, F3, F4, . These different gels were stored at room temperature for 24 hrs. until further evaluations. After 24 hrs. among these above formulations the F1 formulation shows the good stability, physical appearance, and other parameters. So according to evaluation results, among these 4 formulations F1 is shows perfect stabilities and resulted good in evaluations study so this formulation is carried out for further marketed evaluation and formulation purpose. The prepared herbal gel formulations were stored at room temperature

Table no 3–Formulation of Herbal hair gel

Sr.no	Ingredients	F1	F2	F3	F4
1	Flaxseed %	4	3	4.5	3.5
2	Aloevera Gel %	1	1.5	2	2.5
3	Carbopol-gm	2	2	2	2
4	Methyl paraben-mg	75	75	75	75
5	Vitamin E %	0.1	0.1	0.1	0.1
6	Rose water-ml	Q.S	Q.S	Q.S	Q.S
7	Water	35	35	35	35
8	Almond oil	1	1	1	1

**FIGURE NO . 6 FORMULATION****Evaluation Parameter :-****1)Physical Appearance-**

The physical appearance was visually checked for consistency ,color and odour application of prepared base gel formulations.

Color: Pale yellow

Odour: Pleasant

Consistency: Semisolid

2) Determination Of PH-

The digital PH metre was used to calculate PH of different hair gel compositions. In 100 ml of distilled water one gram of gel was dissolved and allowed to stand for two hours. The PH of hair gel formulations was measured after fully submerging electrodes the outcomes are summarized.

Result Of PH Range :

The PH and all base formulation ranged between 4.5 to 5.5 hair inducing the compatibility and herbal gel formulation with the hair.



FIGURE NO. 7 PH TEST

3) Spreadability:

Spreadability Of gel formulations was calculated on glass slide the gel is fixed between two slide 20 gm load planted on slide the time to squeeze sample to uniform thickness and time to separate the two slide second was calculated measure were taken for spreadability.

$S = M.L/T$ Where,

S= Spreadability g.cm/sec.

M =Weight on upper slide gm

L =Length of glass slide cm

T = Time taken to separate slide from one another sec

4) Skin irritation test:

The prepared herbal hair gel was applied to the hand and left in the sun for four to five minutes.



FIGURE NO . 8 SKIN IRRITATION TEST

5) Washability:

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

6)Stability Study:

The stability study was carried out for the prepared hair gel at standard room temperature of 25-30 degree Celsius for 30 days .several parameters such as physical appearance ,odour and color of prepared gel were noticed .significant changes in colour and PH of hair gel was not observed in 30 days.

7)Viscosity measurement:

A Brookfield viscometer was used to measure the viscosity of the gel created .The Brookfield viscometer was spun at 100 rpm with spindle L1. Each study was taken after the sample made equilibrium.

Table no 4:Physiochemical evaluation of formulated herbal hair gel

SR. NO	PARAMETERS	OBSERVATION
1	Color	Pale Yellow
2	Odour	Pleasant
3	Consistency	Semisolid
4	PH	4.29
5	Spreadability	22.5
6	Skin irritation test	Non –irritant
7	Washability	Shows good washability

Results And Discussion:-

1)Physical Appearance:-

The color of the herbal gel formulations F1 ,F2,F3,F4 were found to be pale brown with consistency semisolid which was found to be smooth on application.

2)Ph Determination :-

The ph of herbal gel preparations ranged between 4.5 to 5.5 ,that suited the hair ,indicating the compatibility of the herbal gel preparations with the hair.

3)Spreadability :-

The spreadability plays the main part in patient compliance and helps in uniform usage of the gel.A good gel takes less duration to spread and will have excellent spreadability .

Sr.No.	Formulation	Spreadability g/cm,sec
1	F1	2.00
2	F2	3.57
3	F3	2.25
4	F4	2.10

4)Stability Studies :-

The stability studies were conducted for the formulations for a period of 3 months.no appreciable changes were found for the tested parameters like appearance ,Ph ,spreadability at both the temperature. [room temperature]

5)Viscosity :-

Viscosity is an essential requirement for distinguishing the gels as it influences the spreadability, extrudability ,and release of the drug .The viscosity of all formulations was in the range of 8361 to 8432. **Conclusion :-**

The flaxseed hair gel formulations provide a tremendous result in treatment of the scalp and strengthens the hair thereby inhibiting the hair loss. Flaxseed hair gel also prevents the hair from dandruff. Flaxseed also acts as an Anti-dandruff agent and involved in to reduce the generation of dandruff flakes. Flaxseed hair gel is prepared by

simple boiling procedure, so it is less in cost and easy to handle. In flaxseed hair gel the aloe vera gel is also incorporated so it results in elimination of dandruff from scalp and protective for hair and provides healthy growth. The evaluation of the formulations was done on various parameters like physical appearance, pH, spread ability, and stability, In vitro evaluation study.

The evaluation results shows that the flaxseed hair gel is compatible for hair and it having less side effects and these parameters show results in standard range. Hence, there is a further opportunity for pharmacological studies in lower animals.

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