



Formulations and Evaluation of protective role of Flaxseed Gel in hair Growth, Nourishment and Anti-dandruff activity

¹Ashiya Chaugule, ²Suyash Zinjad, Rahul Lokhande

Samarth Institute of Pharmacy, Belhe, Maharashtra., India¹,

Samarth Institute of Pharmacy, Belhe, Maharashtra., India²,

M. Pharm (Pharmaceutical chemistry) Assistant professor of Samarth
institute of pharmacy, Belhe, Maharashtra, India.

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. Gel formulations containing Carbopol 934 and in exact concentrations of 0.5% were achieved and evaluated. The evaluation of the formulations was done on various parameters like physical appearance, pH, homogeneity, viscosity, spread ability, extrudability, and stability, In vitro evaluation study. Further there is lot of scope for carrying animal studies also.

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

INTRODUCTION

Herbal medicine is a type of medicine that uses stems, leaves, seeds, flowers, roots of plants to improve the health, prevent from the disease and treat illness. Herbal medicine is obtaining from natural plants and used in treatment of various diseases. Herbal medicine is a plant-based product that shows nutritive, curative, preventive, efficacious properties. Herbal medicine is an ancient branch of ayurveda as it includes all fields of herbal medicine related to botany, medicinal plant research, pharmacognosy, phytochemistry, botanical medicines, ayurveda, agriculture science, unani medicine, chemical science, biotechnology, and biochemistry. A person who can deals with herbs or medicinal herbs, is called as herbalist. Herbal drug is natural plant product which usually do not produces dangerous harms to human health and it derived from natural origin so it is used in higher amount in day-to-day life. Herbal products are likely to become an important alternative to standard medical therapies. With increasing, safety, efficacy of herbal medicine so it can be easily available for marketing in all over the world. Flaxseed is as an important functional food ingredient, because of its rich contents of α -linolenic acid (ALA), omega-3 fatty acid, fiber and lignans. Alpha linoleic acid is another type of omega-3 fatty acid found in plants. Alpha-linolenic acid is known to reduce hyperpigmentation and inhibit melanin production. Alpha linoleic acid shows anti-inflammatory property and it provides nourishment and nutrients to scalp. In flaxseed oil, flax and fibers lignans have shown potential health benefits such as in reduction of cardiac disease, atherosclerosis, diabetes, cancer, arthritis, osteoporosis, autoimmune and neurological disorders. Apart from this, flaxseed is full of fatty acids and anti-oxidants which help to remove toxins and dead cells from the scalp. Antioxidant produces by flaxseed is lignans. Lignans may help to suppress or inhibit other bacterial growth and also help to prevent cancer. Flax seed gel can be applied to scalp and hair as moisturizer that can help to stimulate hair growth and improve the strength of hair. Flaxseed benefits for skin and hair include strengthening the origins of hair which reduce hair fall. Flaxseed is act as antioxidant which can help to remove toxins and dead cells from the scalp. The flaxseeds produce a vegetable oil known as linseed oil. Flaxseed hair gel is natural herbal product which is help in nourishing the hair and shows anti-dandruff and hair growing effect. Flaxseed hair gel is made by simple boiling procedure, so it is less in cost and easy to handle. Flaxseed hair gel eliminates a dandruff

from scalp and protective for hair and provides healthy growth.



Fig:1 Flaxseed Herbal hair Gel

FLAXSEED BENEFITS FOR HAIR:

The following ingredients can offer specific benefits for your hair:

Omega-3 fatty acids: omega 3 fatty acid provides vitamins, proteins and nutrients to hair and scalp. Omega 3 fatty acid inhibit hair follicle inflammation and help in reducing hair loss. It promotes circulation in the scalp that may effective in hair growth.

Antioxidant: Antioxidant produces by flaxseed is lignans. lignans may help to suppress or inhibit bacterial growth. Lignans may help in regeneration of hair and reduces hair loss.

B vitamins: Flaxseed is a consistent source of vitamin B. Vitamin b is a group of nutrients that are recognized for making hair stronger and healthier at a more rapid rate.

Fiber: Fiber is the most significant for the hair health. Fiber is made from some protein it significantly known as keratin. Many hair products in the market are enhanced with added fiber for minimizing hair damage. Fibers are very effective in camouflaging hair loss.

Vitamin E: Vitamin E is antioxidant is readily available in flaxseed and is vital for hair growth. Vitamin E blocks erosion on scalp tissues and preventing hair loss. Vitamin E is best known vitamin for hair growth. Vitamin E stops hair fall and provides nourishment to hair. Vitamin E help to maintain a healthy hair.

Aloe vera:

Aloe vera 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.

Benefits of Aloe vera for hair:

Straighten the hair:

Aloe vera contain minerals and many active ingredients that can help in hair strengthening.

Helps to prevent itchy scalp:

Seborrheic dermatitis is a very common inflammatory condition of skin that can affect the scalp and cause dandruff. Aloe vera protect the scalp from Seborrheic dermatitis infection and decrease the scaliness and itchiness.

Protection from UV damage:

Aloe vera prevents the scalp from UV damage. UV rays can cause to hair and leads to lose of hair shine and color and make it rough, in this condition aloe vera is applying to maintaining hair shine and roughness. Aloe vera is also essential in preventing the hair from UV damage.

Hair growth:

Aloe vera improves hair growth and prevent them from hair loss. Aloe vera contain vitamin A, C, E that promoting healthy hair growth.

MATERIAL AND METHODS:**MATERIAL:**

Flaxseed which produces from local farm in India. Carbopol 934, Polyvinylpyrrolidone (PVP), triethanolamine, polyethylene glycol 200, Methyl paraben and glycerin, distilled water, Aloe vera.

METHOD:**Preparation of hair gel base:**

Weighed the Polyethylene glycol 0.7 ml, methyl paraben 0.18mg and glycerin 30 ml were dissolved in 45 ml of water in a 250 ml beaker. Then above mixture was stirred by using mechanical stirrer at high speed up to 800 rpm. Appropriate quantity of 2gm Carbopol 934 and 2 gm polyvinylpyrrolidone (PVP) were added slowly in the beaker containing above mixture of solvent with continuous stirring. Then 0.5 ml triethanolamine (gelling agent) was added slowly with continuous stirring until gel was obtained. In this way prepared 5 different formulations of hair gel base in which the concentration of Carbopol 934 were changed. Prepared 5 different concentrations of containing Carbopol hair gel base Formulations like F1, F2, F3, F4, F5 and these different formulations concentrations mentioned in table 1. These above formulations stored at room temperature for 24 hrs. until further evaluations. After storing for 24 hrs. from this above 5 gels the F1 Carbopol gel base formulations containing 2 gm Carbopol 934 showed smooth and too thick gel to handling and it is perfect as compare to other concentration. So, among these 5 formulations the F1 formulations which contains 2 gm Carbopol is results good so it was carried out or further studies. The gel formation was better observed after 24 hours. The F1 gel preparation containing 2g of Carbopol 934 were formed unchanging and smooth gel, that did not liquify and the appearance is also unchanged even after 24 hrs.

Preparation of aloe vera pulp:

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 were blended until it's frothy and liquefied and stored the pulp in refrigerator.

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 polyethylene glycol 0.7 gm were dissolved in about 45 ml water in a beaker. Then the mixture was stirred at high-speed by using mechanical stirrer. 2g Carbopol 934 and 2 gm of Polyvinylpyrrolidone were added slowly in the beaker containing above mixture while stirring. Then triethanolamine was added slowly with continuous stirring to obtain gel structure. Then 30 ml aloe vera pulp & 1 to 2 drop of sandal wood oil added slowly by stirring continuously and stored the gel at room temperature. In this way prepared 5 different concentrations of hair gel formulations by varying in the concentration of aqueous flaxseed mucilage like 5%,10%,15%,20%,25% and it was introduced into Carbopol gel base Formulations and other ingredients also added in it and stirred up to 1 hr. So, obtain 5 different formulations like F1C1, F2C2, F3C3, F4C4, F5C5. These 5 different formulations contents mentioned in table 2. These different gels were stored at room temperature for 24 hrs. until further evaluations. After 24 hrs. among these above formulations the F1C1 formulation shows the good stability, viscosity, physical appearance, homogeneity and other parameters. So according to evaluation results, among these 5 formulations F1C1 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

EVALUATION OF HERBAL HAIR GEL FORMULATIONS:**Physical Appearance:**

The color of the herbal gel formulations was found to be pale yellow with translucent appearance which was found to be smooth on application. This result is mentioned in table 3 & 4.

Homogeneity

The gel was tested for homogeneity by pictorial inspection for the presence of any flocculates and lumps. The homogeneity was found to be excellent for the gel formulations. This result is mentioned in table 3.

pH determination: -

The pH of the herbal gel formulations was found to be in between 6.7 to 7.3, that suited for the hair The above Formulation indicating the compatibility with hair. This result is mentioned in table 3 & 4.

Extrudability:

The flaxseed gel formulations were introduced into metal tubes this tube is collapsible. Then pressed the tubes and extrude the material and evaluate the extrudability of flaxseed hair gel. The resulted extrudability mentioned in table 3 and 4.

Stability studies: -

The stability studies were directed for the formulations for a period of 3 months. No changes were found for the tested parameters like appearance, pH, at the different temperatures. The resulted Stability is mentioned in table 4.

Viscosity determination: -

The viscosity was determined by using Brookfield viscometer. Vane spindle were used for calculating the viscosity of this formulation. The formulation was filled in wide mouth container for better measurement of viscosity. The rpm of the spindle

is adjusted to 25 rpm and viscosity was recorded. The viscosity of the preparations was found in the range. From the above results it is clear that as the concentration of flaxseed gel extract increased from 5% to 20% the viscosity of the preparations also enhanced. This result is mentioned in table 3 & 4. increased from 5% to 20% the viscosity of the preparations also enhanced. This result is mentioned in table 3 & 4.

Invitro evaluation of gels:

a) Preparation of inoculum:

For evaluation of anti-fungal activity 24hr fresh culture was used.

b) Determination of zone of inhibition:

Anti-fungal activity was checked by agar well diffusion method. Previously liquefied the media was discharged into the sterile petri dish. Care was taken for uniform thickness of the layer of medium. After complete solidification, a small inoculum of candida AL buccans was spread over the agar coated with a drop of olive oil. wells were made aseptically with corn borer. The maintain distance in between the two wells is 3 cm. In to each of these two wells the gel solution was incorporated. Plates were left for diffusion for 30mins and incubated for 48 hrs. After, the plates were incubated at 30+2 or 30-2degrees centigrade for 48hrs and incubation was over, then zone of inhibition was observed. The fig 4 results shown zone of inhibition this is a area of agar diffusion method where the bacteria are unable to grow, due to presence of drug that inhibits the growth of microorganisms and this shows that the product or formulations having good anti-dandruff activity.

RESULTS AND DISCUSSION:

Physical appearance:

The color of all the herbal gel formulation found to be pale brown with translucent appearance which was found to be smooth on application. This result is mentioned in table 3 & 4.

Homogeneity:

The developed gel was verified for homogeneity by pictorial inspection for appearance and presence of any flocculates and lumps. The homogeneity was found to be excellent for the gel formulation. This result is mentioned in table 3.

PH determination:

The pH of the herbal gel preparations ranged between 6.7 to 7.3, that suited the hair, indicating the compatibility of the herbal gel preparations with the hair. This result is mentioned in table 3 & 4.



Fig:2 PH Meter

Extrudability determination:

Formulations showed the good extrudability when the gel formulation extruded from metallic collapsible tube. The gel had excellent extrudability. The resulted extrudability mentioned in table 3 and 4

Viscosity determination:

The viscosity was determined by using Brookfield viscometer. Vane spindle was used for calculating the viscosity of this formulation. The formulation was filled in wide mouth container for better measurement of viscosity. The rpm of the spindle is adjusted to 25 rpm and viscosity was recorded.

The viscosity of the formulations was found in the range of 1,50,232 to 1,52, 876 cps. From the results it is clear that as the concentration of flaxseed extract increased the viscosity of the formulations also increased. This result is mentioned in table 3 & 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, extrudability, at both the temperatures (room temperature and 40 C). The result is tabulated in table 4. The resulted stability of 3 months study is even unchanged after 3months is shown in figure 3.



Fig:3 Stability study

Invitro evaluation of gels:

a) Preparation of inoculum:

For evaluation of anti-fungal activity 24hr fresh culture was used.

b) Determination of zone of inhibition:

In this invitro study of herbal gel formulation the anti-dandruff activity was checked by agar well diffusion method. In this study the zone of inhibition was observed. Zone of inhibition is a testing and observing the microbial activity growth of microorganisms or antimicrobial agent. The fig 4 results shown zone of inhibition this is a area of agar diffusion method where the bacteria are unable to grow, due to presence of drug that inhibits the growth of microorganisms and this shows that the product or formulations having good anti-dandruff activity. And the above Formulations is good to inhibit the dandruff from scalp and protect the skin from other fungi or microbials.

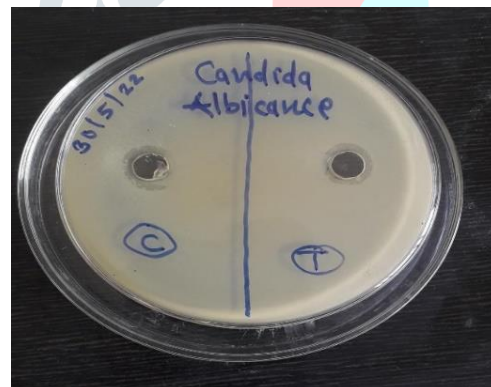


Fig:4 Invitro evaluation of gel

Table 1: Formulation of Herbal Hair gel base

Formulation Code	F1	F2	F3	F4	F5
Carbopol 934(g)	2	2.5	2.7	3	3.2
PVP (mg)	2	2	2	2	2
Methyl paraben (mg)	0.18	0.18	0.18	0.18	0.18
Glycerin (ml)	30	30	30	30	30
PEG (ml)	0.7	0.7	0.7	0.7	0.7
Triethanolamine(ml)	0.5	0.5	0.5	0.5	0.5
Water (ml)	45	45	45	45	45

Table 2: Formulation of Herbal Hair gel

Formulation Code	F1C1	F2C2	F3C3	F4C4	F5C5
Aqueous extract of flaxseed %	5	10	15	20	25
Carbopol 934(g)	2	2	2	2	2
PVP (mg)	2	2	2	2	2
Methyl paraben (mg)	0.18	0.18	0.18	0.18	0.18
Glycerin (ml)	30	30	30	30	30
PEG (ml)	0.7	0.7	0.7	0.7	0.7
Triethanolamine(ml)	0.5	0.5	0.5	0.5	0.5
Water (ml)	45	45	45	45	45

Table 3: Evaluation of herbal hair gel

Formulation	Physical appearance	Homogeneity	*pH	Extrudability	Viscosity(cps)
F1C1	Translucent, pale brown, smooth on application	Excellent	6.5	++	1,50,232
F2C2	Translucent, pale yellow, smooth on application	Good	6.8	++	1,50,692
F3C3	Translucent, pale yellow, smooth on application	Good	7.0	++	1,51,452
F4C4	Translucent, pale yellow, smooth on application	Good	7.2	+++	1,51,658
F5C5	Translucent, pale yellow, smooth on application	Good	7.4	+++	1,52,707

Table 4: Stability studies of herbal hair gel formulations for F1C1

S. No.	Parameters	Observations						
		Initial	First month		Second month		Third month	
			RT	40 °C	RT	40 °C	RT	40 °C
1	Appearance	Translucent & smooth	Translucent & smooth	Translucent & smooth	Translucent & smooth	Translucent & smooth	Translucent & smooth	Translucent & smooth
2	Color	Pale Yellow	Pale Yellow	Pale Yellow	Pale Yellow	Pale Yellow	Pale Yellow	Pale Yellow
3	PH	7.3	7.3	7.2	7.2	7.2	7.1	7.1
4	Extrudability	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent

CONCLUSIONS:

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, homogeneity, viscosity, spread ability, extrudability, 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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