Exploring the Antifungal and Antidandruff Properties of a Flaxseed-Based Herbal Gel: Formulation and Evaluation.

Mr. Aghav Rushikesh P. * Prof. Vyavhare Dnyaneshwar M.

Mr. Pakhare Rushikesh A. Dr. Salve Megha T.

Abstract

Dandruff is a skin condition characterized by flakes and sometimes mild headaches. There are many bacteria and fungi that cause scalp infections and lead to other hair problems or skin problems. There is one of the most common candidiasis infections of the skin or mucous membranes caused by Candida. Flaxseed and amla extracts have been shown to be effective in the treatment of Candidosis. Flaxseed (Linumu sitatissimum) is a

Annual plant of the Linaceae family that has many biological properties such as indirect hair growth through the γ-glutamyltranspeptidase mediator. Flaxseed gel has many benefits for 4C hair.

Gel, rich in omega-3 acids, vitamins, minerals and lignin, nourishes the hair and helps it grow. Omega-3 fatty acids in flaxseed gel are responsible for hair growth.Flaxseed is one of the food sources containing the most Phenolic compounds called lignans. The aim of this study was to evaluate the possible activity of Lignans as a potential source of antioxidants such as Secoisolariciresinol diglucoside (SDG) in different formulations. In this study, we present the antibacterial and antifungal activities of flaxseed extract And its specific phenylpropanoids. Due to its high content of Secoisolariciresinol diglucoside (SDG), ferulic acid, p-coumaric acid, -glucoside and different production methods in , Flaxseed (Extract) Was effective in inhibiting the growth of bacteria and fungi. Polyherbal hair gel Is proven to fight candidiasis and this nourishes the hair and prevents premature graying.

Key Words:- *Flakes seed, ferulic acid , scalp.*

Introduction –

Flaxseed (also known as linseed) is emerging as an important functional food ingredient due to its high content of linolenic acid (ALA, an omega-3 fatty acid), lignans, and fiber. Flaxseed oil, fiber, and flax lignans have health benefits such as reducing heart disease, atherosclerosis, diabetes, cancer, arthritis, osteoporosis, autoimmune diseases, and neurological diseases. Additionally, flaxseed is rich in fatty acids and antioxidants that help remove toxins and Dead cells from the brain. Flaxseed gel can be used as a conditioner on the scalp and hair, which can help stimulate growth and increase the strength of existing hair.

Main formulations include oils, creams, ointments, pastes and gels; Gels are becoming increasingly popular today because they are more stable and can provide a more controlled release than other semisolid preparations. The gel form may provide better absorption and therefore better bioavailability of the drug. 141 Gels are semisolid systems in which the liquid phase is suspended in a three-dimensional polymeric matrix (consisting of natural or synthetic resins) where a high level of physical or chemical cross-linking is achieved. 151 Gels are a new class of dosage forms made by incorporating large amounts of hydroalcoholic water into a solid network of colloidal particles that may consist of organic materials such as aluminum salts or conventional or synthetic organic polymers.

Hair scalp infection –

Dandruff is a skin condition with flaky and sometimes mild scalp symptoms. This is a Large number of bacteria, fungi that cause mental illness causing hair problems or skin problems. There are Common causes of candidiasis, which usually originates from the skin or mucous membranes caused by candida.

Since the skin is the body's defense against infections, this enzyme causes the skin condition and when it proliferates, it can become a disease. This fungus grows mainly in moist, hot and sweaty conditions. There are some areas where candidiasis is based on body parts and Constitutes about 150 species. Candida albicans is the most common. This yeast must be found in a healthy form people Symptoms vary depending on location on the body and focus on symptoms of major problems such as ulcers and white matter in the affected area. There are many allopathic treatments for this disease. Malassezia is more common in patients with large sebaceous glands (Because malassezia feeds on lipids). Folliculitis is a skin syndrome that is common among society and causes acne . However, many microbes Behave like viruses.

Staphylococcus aureus is found in most of patients with Folliculitis. [10]

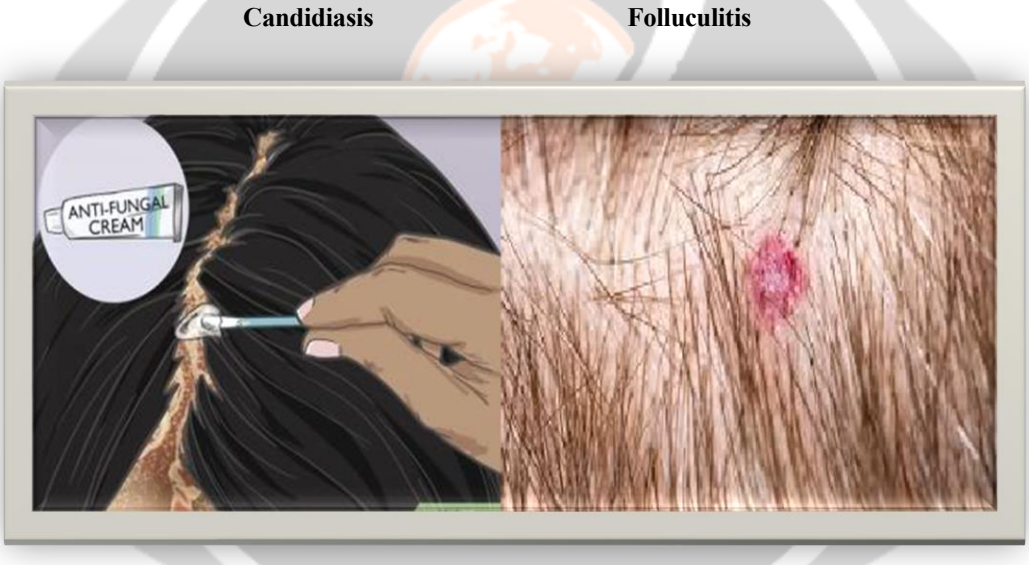

Fig. 1.1 Difference between candidiasis and folluculitis

Flaxseed preparations are highly regarded for their nutritional and medicinal properties. In South India,Flaxseeds are used as a flaxseed pickle at low levels. Linum Usitatissimum L, a flax-producing plant, belongs to the Linoceae family. Flax Seeds have many benefits for 4 C hair. The gel is rich in omega-3 acids, vitamins, Minerals and lignin, which nourish and grow hair. The omega-3 fatty acids in flaxseed gel Are responsible for hair growth. Vitamin E Found in flaxseed nourishes the scalp and reduces free radicals. Flaxseed is rich in Omega-3 acids. It may also reduce inflammation. Their ability to provide moisture. "Flaxseed Gel helps hair grow faster and longer by providing nutrients to the hair. Vitamin E is an antioxidant that reduces the effects of free radicals on your scalp, thus promoting hair growth. Getting enough vitamin E can also support strong hair . Flaxseeds are rich in fatty acids and antioxidants that help remove toxins and Dead cells from the brain. Flaxseed gel can be used as a moisturizer on the scalp and hair, which can help stimulate growth and increase the strength of existing hair. "Flaxseed gel helps hair grow faster and longer by providing nutrients to ," explains Celeste Arnold, head stylist and owner of Celeste Arnold Hair and Makeup. "Vitamin E found in flaxseed nourishes the scalp and reduces inflammation." Flaxseed provides a unique concentration of Different phenylpropanoids. Due to the high content of secoisolariciresinol diglucoside (SDG),

ferulic acid, p-coumaric acid, glycoside And their many ways to make flaxseed (extract) effective in inhibiting bacterial and fungal growth.

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. [14]

Biological Source:-

Linseed is the dried, ripe seed of Linum usitatissimum Linn. Linseed oil is Obtained by expression of linseeds, belonging to family Linaceae.

Scientific name : Linum usitatissimum

Kingdom: Plantae

Order: Malpighiales

Family: Linaceae

Genus: Linum

Species: L. usitatissimum

Fig. 1.2 Flax Seed

Research has shown that flax is a plant that has been an important part of agriculture for hundreds of years and every part of it has been used. For example, edible seeds and flax oil can produce (this is the name of flax and, like , it is good for preserving wood and good for the body) and its bark can be used for clothing, etc. It can be used to make

Fiber for Products. The oil industry eliminated some of the demand for flax and World War II. This caused production to decline after World War II. It dropped significantly after World War II. The common plant is Linumusitatissimum [15] The flax plant Is 1.2 meters high and has soft stems. Its leaves are green, very thin, 20-40 mm long and 3 mm wide. The flowers are light blue in color, in number, 15-25 mm long, five petals. The fruit is a round capsule, dry, 5-9. Mm, 4-7 mm long, with many dark apple-like seeds.

Flax (Linum usitatissimum) is a true flowering plant that produces Small, round seeds that range in color from golden yellow to dark green. Seeds are generally used in three ways: whole seeds, ground seeds (powder or flour), or oil . Over the past decade, facsimile has received much attention for its purported benefits. The American Plant Council reported a 177% increase in flax production in 1999 alone. [16]

Most of the reported benefits of eating flaxseeds are attributed To three main components found in the flexible seeds: α-linolenic acid (ALA), lignans And fiber. [17]

Flaxseed oil

Flaxseed differs from whole flaxseed in that it does not contain Fibers and lignans. It is unique because it contains 73% polyunsaturated fatty acids (PUFA), 18% monounsaturated fatty acids (MUFA), and 9% saturated fatty acids (SFA), making it a full-fat food. Omega 3 n-3 fatty acids, which make up 55% of all fatty acids, are the first known source of ALA. In fact, the Percent ALA in flaxseed oil is 5.5 times higher than the next source, Wart and canola oil. [18]

Flaxseed and its derivatives, flaxseed oil/seed oil, are a rich source of Alpha-linolenic acid (ALA), which is the precursor of harmful omega- 3-acids such as eicosapentaenoic acid (EPA). Although omega-3 fatty acids have been implicated in the development of cardiovascular disease, evidence from human studies regarding the role of these products in cardiovascular disease or hyperlipidemia is mixed. [19]

The lignan component of flaxseed (not flaxseed oil) has an antioxidant vitamin and an estrogen receptor agonist/antagonist; these are believed to make Effective in treating breast cancer. As a source of mucus fiber, oral flaxseed (not flaxseed oil) may have laxative properties, although only one human trial has been conducted for this indication Flaxseed may reduce intestinal barrier function when taken in large doses or with insufficient water. . The effect of flaxseed On sugar levels is unclear, but a hyperglycemic effect was observed in one series. [21]

Herbal Treatment

Flaxseed

For hair

Flaxseed has a long history of use in India, and flaxseed preparations are known for their nutritional and medicinal properties. In South India, flaxseed is used as a pickle using partially ground flaxseed. LinumUsitatissimum L, Is a plant that produces licorice and belongs to the Linoceae family. Vitamin E In flaxseed oil helps treat hair loss and stimulate new growth. Lignans act as Powerful antioxidants that can help grow healthy and strong hair. Item Uses linseed oil which prevents dandruff and nourishes the scalp from within, Provides relief from dandruff.[22]

Vitamin E found in flaxseeds nourishes the scalp and reduces damage caused by . Flax seeds are rich in omega-3 acids. Flaxseed gel can also help hair grow faster and longer by providing nutrients to the hair. Vitamin E is an antioxidant that reduces the effects of free radicals on your scalp, thus promoting hair growth. A diet rich in vitamin E may also contribute to stronger hair.[13]

Flaxseed is one of the richest sources of Phenols called lignans. Provide antibacterial activity and antifungal activity of Flax Seeds with specific phenylpropanoids. Secoisoliciresinol diglucoside (SDG) plays a role in inhibiting the growth of bacteria and plants due to the high content of ferulic acid, p- Coumaric acid, glycosides and more in flaxseed (meal). We aimed to evaluate the activity of flaxseed extract against Bacteria and drug-associated fungi: Escherichia coli, Salmonella paratyphii, Lactobacillus and Known viruses Staphylococcus aureus, Proteus vulgaris, Klebsiellapneumoniae, Saccharomyces Cerevisiae. We developed an agar diffusion method and demonstrated

bacteriostatic or bactericidal activity and fungistatic or fungicidal activity. We suggest that flaxseed extract may be a good source of antibacterial agents and other antibiotic treatment agents.[23,24]

Antioxidant effects-

Omega-3 fatty acids have been shown to suppress oxygen free radicals in neutrophils and Monocytes and activate interleukin-1, tumor necrosis factor, and Leukotriene B4 (LTB4). "Lignans may act as platinum-activated receptor Receptors and inhibit neutrophil-derived oxygen-free radicals." [26-27] Theoretically, flaxseed (but not flaxseed oil) may increase lipid peroxidation And therefore increase oxidative damage. [28] [29]

Allergy –

Known allergy or hypersensitivity to linseed oil, linseed or any member of the Linaceae plant family or Linum plant family. Hypersensitivity reactions to flaxseed Following occupational exposure have been reported anecdotally. Case reports include palmar pruritus, generalized urticaria, ocular pruritus/pruritus, nausea/vomiting, stomach/abdominal pain, vomiting, diarrhea, acute shortness of breath without bronchospasm, hydrorrhea, persistent wheezing, nasal congestion, and general malaise from eating vegetable oil (from flaxseed). Has. Or Multigrain bread).

Aim and objectives –

It is known that flaxseed is used as an antifungal and antibacterial booster and in Hair treatments. The medicinal composition of flaxseed includes 35-45% oil; of which Contain 9-10% fatty acids (palmitic and stearic acid), about 20% Fatty acids (mainly oleic acid), and 70% alpha-linolenic acid The protein content of flaxseed varies between 20-30%. Best antifungal and antibacterial drugs. Therefore, this research was planned to prepare and evaluate Hair plants.

The present study is planned with the following Objectives:-

➢ To formulate Anti-Bacterial & Anti-Fungal Hair gel and evaluation of gel.

➢ Design new formulation .

➢ Study of medicinal seeds for there Medicinal uses.

➢ Study of hair care materials.

Materials and Methods

Materials –

Herbal Drug -Flaxseed (Shivajirao Pawar College of pharmacy, Pachegaon)

Chemicals -Carbapol 934,Methyl paraben ,Sodium chloride (chemical store of shivajirao Pawar College of pharmacy, Pachegaon)

Instrument -Mechanical stirrer.,Analytical Weighing balance, Brookfield Viscometer ,Soxhlet Extraction.

Glassware -Beaker, Stirrer ,Measuring cylinder ,Slides

Methodology –

Formulation of hair gel base –

The weight of methyl paraben is dissolved in 35 ml of water at 250 250 . The mixture is then mixed using a machine operating at high speed. Appropriate amounts of Carbopol 934 and sodium chloride are slowly added to the beaker

.Add water and continue mixing. Carbopol 934 (gelling agent) was added slowly with constant stirring until a gel form was obtained . To increase the strength of carbopol, five different gels Containing different amounts of carbopol, such as 0.5 g, 1 g, 1.5 g, were prepared. G, 2 g and 2.5 g (F1 To F5). (Table 1.1)

Formulation of hair gel base Table –

Table 1.1 Formulation of hair gel base

Sr. No.	Ingredients	F1	F2	F3	F4	F5
1.	Carbopol 934 (g)	0.5	1	1.5	2	2.5
2.	Methyl parabe n (g)	0.07	0.07	0.07	0.07	0.07
3.	Sodium chloride (g)	QS	QS	QS	QS	QS
4.	Neutral blue	QS	QS	QS	QS	QS

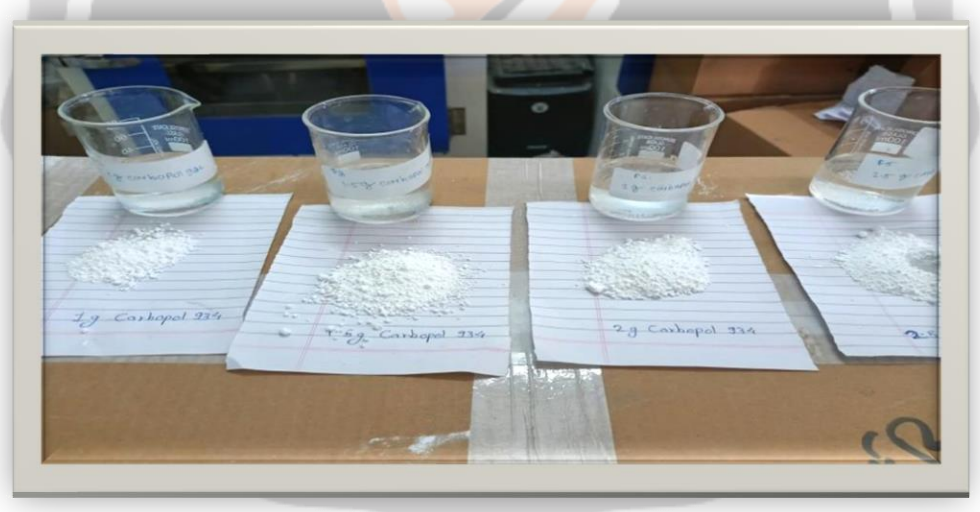

Fig. 2.1 base formulation of hair gel

Fig. 2.2 Mechanical Stirrer

Gels made with 0.5 g of carbopol 934 were found to be very small and runny after 4 to 5 hours of preparation. The gel made using 1 g carbopol 934 gel was good To some extent but flow problem was observed after 24 hours. The Gel containing 1.5 g of carbopol 934 formed such a smooth gel that the Did not flow even after 24 hours. The gel with 2 g of carbopol 934 was good to some extent for , but the problem was huge. Even though the gel contained 2.5 g of carbopol 934, it took too long to dissolve.

Among the Five formulations, gel containing 1.5g carbopol 934 (F3) was optimized.

Uses of ingredients and it's category

Table 1.2 Ingredients and it's category

Sr. No.	Ingredients	Category
1.	Flaxseed extract	Anti-Bacterial & Anti-Fungal
2.	Carbopol 934	Gelling agent
3.	Methyl paraben	Preservative
4.	Sodium Chloride	pH adjuster
5.	Neutral blue	Colorant

Extraction process –

1.All seeds used in extraction were obtained from local stores. To land It was necessary to use a mechanical planning technique. all fruits were suitable. Additionally, it is not recommended to remove mucus from Meal after removing the oil as protein is obtained. Effect of : Extraction of mucilage from whole seeds was successful.

2.Flaxseed mucilage was extracted using distilled water in the aqueous method . We weighed the seeds and placed them in distilled water. Heat this mixture and While stirring on a magnetic stirrer for at least 12 to 15 minutes. Then filter the Gel/extract through a fine muslin cloth

3. Flaxseed water is prepared by adding the seeds to boiling water with constant stirring until a thick paste is obtained. The mucus was then incubated with Using a suitable sieve and stored at room temperature until use..

Preparation of hair gel base -

Flaxseed water is prepared by adding the seeds to boiling water and continuously pulling To complete the mucilage. Mucus was then injected into Using a suitable syringe and stored at room temperature until use. Herbal conditioner is an easy-to-prepare gel based on Carbopol 934 gel. A measured amount of methylparaben and Grams of sodium chloride were added to approximately 35 ml of water in a bottle. The mixture is then pumped to At high speed using a vacuum cleaner. Add 1.5 g of carbopol 934 (optimism) and 20% flaxseed water to the beaker and continue mixing until you get a gel form. The prepared plants were stored at room temperature until.

Evaluation of Base Formulation –

1.Physical Properties:-

The physical appearance was visually checked for the Appearance, colour and the odour application of prepared base gel formulations. [35] Result are show table 4.1

• Colour:- Dark White

• Odour:- Distinctive

• Appearance:- Smooth And Homogenous

Table 4.1 Evaluation of gel base-

Sr.No.	Formulation Code	Physical Appearance	Homogeneity	Extrudablility
1.	F_1	liquefied, pale white, smooth on application	Good	Good
2.	F_2	liquefied, pale white, smooth on application	Good	Good
3.	F_3	Translucent, pale white, smooth on application	Good	Excellent
4.	F4	Translucent, pale white, smooth on application	Good	Excellent
5.	F_5	Translucent but very thick, pale white, smooth on application	Good	Excellent

2.PH determination –

The pH of all hair strands was determined at Using a pH meter.[36] One gram of gel was dissolved in 100 ml of distilled water and left at For two hours. The electrode was completely embedded in the hair gel and the pH was pH measurements of each formulation were made in triplicate, with an average of Counts. The results are shown in Table 4.2.

Table 4.2 pH determination

Sr. No.	Formulation Code	pH
1.	F_1	6.6
2.	F_2	6.8
3.	F_3	7.1
4.	F_4	7
5.	F5	7.3

Result of PH range

The pH of all bases was between 6.7 and 7.3; This means that Is suitable for gel and indicates the compatibility of the basic structure with The best result was shown for F3 respectively.

3.Homogeneity

Once placed in the gel holder, all Developed gels were tested for homogeneity using a control. Luster is measured in terms of And the presence of lumps, flakes or lumps. [37]

Result of Homogeneity –

All base gels developed were measured for uniformity, and Controls were screened for the presence of lumps, bumps, or lumps. It was found that F1 and F2 were smaller than sugar gel, while the gel form of F3 made Uniform and smooth and did not flow even after 24 hours. The gels of F4 and F5 were μm long and therefore could not be resolved. Of the five ingredients, gel with F3 was the best.

4.Viscocity determination –

A Brookfield viscometer was used to determine viscosity. Gels are filled into a separate wide-mouth container. Viscosity is an important factor in the characterization of gels because it affects distribution, overdose, and drug release. All gels made in showed increasing freezing as the density of the gel material increased. The height of the Gel in the jar should be sufficient for it to sink. The speed of the Spindle was changed to 2.5 revolutions per minute. A look at written information. Results are as shown in Table 4.3

Table 4.3 Viscosity Determination

Sr. No.	Formulation Code	Viscosity (cps)
1.	F1	1,49,460
2.	F2	1,50,488

3.	F_3	1,51,437
4.	F_4	1,52,325
5.	F_5	1,52,890

Result of viscosity

The freezing point of all gels was found to be in the range of 1,50,232 to 1,52,876 cps. The results clearly show that as the concentration of Increased from 5% to 20%, the quality of the gel also increased with .

5.Spredability –

The flat surface on which the base application spreads on the skin is called spreading capacity. Important factors should be distributed throughout the field because of their therapeutic effects, so that their effectiveness depends on their value. The upper part of the sample (3 g) is placed between two glass plates, Wide, a 1 kg weight is placed on it and the distribution value is determined for 5 minutes. The final weight (50g) is added to the Pan and the top plate is pulled using a rope connected to the Line. The time required to raise the top plate above 10 cm is recorded.

These formulas indicate sliding time with good spreading ability.

Diffusion (S) is calculated as in equation 1.

S = M.L/t …… (equation 1)

Where

M is the weight (g) attached to the upper glass L. The length transferred to glass number is (cm) and t is the time (seconds). The results are as shown in the table 4.4

Table 4.4 :- Spreadibility

Sr. No.	Formulation code	Spread ability (gcm/sec)
1.	F_1	19.79
2.	F_2	22.6
3.	F_3	22.08
4.	F_4	22.29
5.	F_5	21

Result -The gel produced using 0.5 g of carbopol 934 was found to be too small to allow To flow within 4 to 5 hours after preparation. The gel made using 1g carbopol 934 gel Was good to some extent but after 24 hours the water problem of Appeared. The gel form containing 1.5 g of carbopol 934 had the same simple form as and remained unchanged thereafter. Gel , containing 2 g of carbopol 934 for 24 hours, was good to some extent, but the problem

was too great to solve; The gel containing 2.5 g of carbopol 934 was too large to dissolve Five-component gel contains 1.5 grams of properly prepared carbopol 934 (F3). Final values as shown in the table4.4

Result and Discussion

Flax seeds have many health benefits in general. Flaxseed gel has many benefits for 4C hair. The gel is rich in omega-3 acids, vitamins, minerals and Lignin that nourish and grow hair. Omega-3 fatty acids in flaxseed Gel are responsible for hair growth. It also shows activity such as antibacterial and antifungal properties. Visually tested looks, colors and scents are used in the gel formula.

- Colour:- light blue
- Odour:- Distinctive
- Appearance:- Smooth And Homogeneous

Result of Test :

Sr. No.	Evaluation parameter	Inferencr
1.	Colour	Light Blue
2.	Odour	Distinctive
3.	Appearance	Smooth
4.	pH	6.9
5.	Homogeneity	Homogeneous
6.	Viscosity	1,54,457
7.	Spreadability	22.07

Conclusion –

Flaxseed conditioner provides a good basis for scalp treatment and strengthens and protects the hair. Antibacterial and antifungal. There are Other fields in pharmacy. From the above results, we can conclude that the hair gel from F3 containing 1.5 grams of Carbopol 934 is suitable for primary use and shows the best results in comparison. Form F3 shows More drug release than the others. In the case of carbopol gel, drug release decreased with increasing carbopol as the concentration of polymer Increased. Viscosity is negatively related to the release of solids From the process. Gel stability study showed that the appearance of Surface, drug content, pH, rheological properties, and drug release in Gel did not change after one month of storage. Antimicrobial activity indicates that the gel formulation exhibits high efficiency Without skin irritation. Plus, the well-designed system shows no signs of irritation or burnout. Flaxseed conditioner provides a good basis for scalp treatment and prevents hair loss by strengthening the hair.

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