RESEARCH PAPER

A Topical Emulsion Cream Containing Flaxseed (Linum Usitatissimum) Oil: Optimization and Evaluation

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ABSTRACT

Since the dawn of time, creams have been valued as essential components of topical preparations in cosmetic products because of how simple it is to apply and remove them from the skin. Pharmaceutical creams are used for a variety of purposes, including skin protection against bacterial and fungal infections, healing cuts, burns, and skin wounds, as well as cleansing, beautifying, alternative appearances, moisturizing, etc. In the current study, flaxseed (linseed) oil was used to prepare and evaluate a herbal cosmetic cream. In order to give the cream emulsion a multifunctional effect on the skin, plant seed oil is frequently added. All formulations (F1 to F3) were evaluated based on a variety of factors, including pH, viscosity, and spread ability, the absence of phase separation and ease of removal, membrane diffusion, and irritation testing. According to these studies, the extracts and base cream of the formulation are more stable and safe, and they may even work in concert.

Conclusion: Herbal cream with antioxidant properties can be used as a barrier to protect the skin and delay skin ageing without causing any negative side effects.

Keywords: Flaxseed (Linseed) Oil, Anti-Aging, Herbal Cream.

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INTRODUCTION

The development of environmentally friendly cosmetic products is currently a driving force behind the skin care and cosmetics industries use of natural ingredients. Demand for novel natural products is rapidly growing in order to satisfy consumer desires for having a good appearance as well as concerns about their health and safety. Due to their availability as a renewable resource that can be extracted from a variety of plants, plant seed oils have been used extensively as raw material substitutes in [1, 2, 3]

Topical preparations that can be applied to the skin include creams. In terms of dosage forms, creamsare"viscousliquidorsemi-solidemulsionsofeithertheoil-in-waterorwater-in-oiltype," whose consistency varies depending on the amount of oil and water present [4] Creams are used for therapeutic or cosmetic functions such as cleansing, beautifying, improving appearances, protecting. These topical formulations are used to deliver drugs to specific areas of the skin or mucous membrane for localized effects [5].

Creams are regarded as pharmaceutical products because they are made using methods created by the pharmaceutical industry and are frequently used to treat a variety of skin conditions.

Ayurveda, herbal, or allopathic creams can be used by people depending on their needs for their skin conditions. The term “cream" has historically been used to refer to semisolids that are either water-in-oil (such as cold cream) or oil-in-water formulated (e.g.: Vanishing Cream) [6]

Types of Creams

There are two different kinds of creams:

1. Oil-in-water(O/W)creams
2. water-in-oil(W/O)[7]

The herb ***Linumusitatissimum*** *L.*, also referred to as flax or linseed, is a member of the Linaceae family and is indigenous to Europe, Asia, and the Mediterranean region. This seeds are cultivated for its fiber and oil richness. Flaxseed contains omega-3-fatty acids, omega-9-fatty acids, omega-6-fatty acids, saturated fat and palmic acid. Flaxseeds are used as the raw material for making oil and meal, which are rich in fat, protein, and fiber. Flaxseeds provide various benefits to skin due to high content of omega -3 fatty acids and high level of anti-oxidant properties. Flaxseeds also promote Deep hydration of skin, strengthen the skin barrier and reduce transdermal water loss and moisture retention in skin. Flaxseed act as skin tightening mask and super hydrated natural moisturizer. Flaxseed effectively supports collagen production and enhances skin elasticity due to high level of lignin content, which further helpful for reduction in wrinkles. Anti-oxidant property of flaxseed protects the skin from free radicals and UV damage, reducing hyper pigmentation. Flaxseed regulates sebum production and act as exfoliate to remove dead skin and soothing sensitive skin. [8,9]

The presence of PUFA and MUFA, which act to stimulate the production of growth factors, fibroplasias, and neo vascularization, in flaxseed oil's composition is credited with giving it pharmacological properties. Flaxseed oil is recommended for the treatment of wounds as well as being a moisturizer and dermal antioxidant in Chinese and Ayurvedic medicine. Flaxseed oil essential fatty acids work from the inside out to keep your skin hydrated and moisturized. It lessens the visibility of wrinkles and other ageing signs because skin's moisture levels are improved. [8]

Constant exposure to ultraviolet (UV) irritants damages human skin and causes the complex process of skin ageing. [10] as a result of damage to cellular DNA and proteins, skin ageing is a continuous process of deterioration. Sequential skin ageing and photo-aging are two distinct types of the ageing process. Each type has unique clinical and historical characteristics. The universal and predictable process of skin ageing in stages is characterized by physiological changes in skin function.

As we age, our skin becomes drier, paler, and wrinkled because keratinocytes are unable to create a functional stratum corneum and the rate at which they create neutral lipids slows down. On the other hand, excessive sun exposure leads to photo ageing. It is characterized by dry, pale, shallow skin that exhibits fine lines and deep furrows brought on by the disorganization of the epidermal and dermal layers brought on by elastosis and dermatitis. Plants and herbs have already shown to be effective tools in complementary medicine [11, 12]

MATERIALS AND METHODS

Collection Of Materials:

The flaxseed seeds were bought at a nearby market. Other chemicals were obtained from the lab, including liquid paraffin, borax, bees wax, etc.

Extraction method

To create a uniform powder, the dried flaxseeds were crushed. Using a pressure cooker, the powder was steam-cooked. To extract the edible oil, the steamed powder was then mechanically pressedusingacoldpress.Theobtainedoilwasfilteredandkeptatroomtemperatureinanamber colored bottle with an airtight lid for later use. [13]

Fig no.1: Extraction of Flaxseed oil

Excipients with their role –

SR. NO.	INGREDIENTS	ROLE

Sr. No	Ingredients	Formulation F1H	Formulation F2H	Formulation F3H
1	Flaxseed oil	3ml	4ml	5ml
2	Beeswax	4.8gm	6.4gm	8gm
3	Liquid paraffin	15ml	20ml	25ml
4	Borax	0.24gm	0.32gm	0.40gm
5	Methylparaben	0.054gm	0.072gm	0.090gm
6	Rose oil	Q.S	Q.S	Q.S

1	Flaxseed oil	Anti-aging, moisturizer, anti-wrinkle
2	Beeswax	Emulsifying agent , stabilizer
3	Liquid paraffin	Lubricating agent
4	Methyl paraben	Preservative
5	Borax	Alkylating agent
6	Rose oil	Perfume
7	Distilled water	Solvent

FORMULATION OF CREAM

1. In a borosilicate glass beaker, heat liquid paraffin and beeswax to 75°C and keep the temperature there throughout the heating process (Oil phase).
2. Borax and methylparaben should be dissolved in distilled water andheated in a separate beaker to 75°C to produce a clear solution (Phase of water).
3. After that, gradually add the heated oily phase to the aqueous phase.
4. Next, add a specific quantity of flaxseed oil and stir vigorously until a smooth cream forms.
5. Finally, as a fragrance, add a few drops of rose oil.
6. Place this cream on the slab, adjust the consistency with a few drops of distilled water, if necessary, and mix it in a geometric pattern.
7. To give the cream smooth texture and properly combine all the ingredients.
8. This technique for making cream is known as the slab technique or the spontaneous method. [14]

FORMULATION TABLE

Fig no 2: Flaxseed oil Cream

EVALUATION OF CREAM

1. **Physical evaluation**

   In this test, the cream color, odor, texture, and state were assessed in Table no.1[14]

2. **Washability**

   After applying a small amount of cream, the hand

was washed under running water. Table no 2 [14]

3. **Viscosity**
   Cream viscosity was measured using a Brooke field viscometer at a temperature of 25^0c and spindle number 63 at 2.5 rpm. (Table no. 3) [14]
4. **Greasiness**
   Here, a smear of cream was applied to the skin surface, and the consistency of the smear oily or grease like was assessed. (Table no. 4) [14]
5. **After sensing**
   Emolliency, slipperiness,and the quantity of residue left behind after applying a predetermined amount of cream were evaluated. [13]
6. **Dye test**
   Cream and the blood-red dye were combined. A cover slip was put over a cream drop that had been placed on a microscopic slide. Under a microscope, this was examined. The colorless globules that are dispersed throughout there ground are an indication that the formulation is of the o/w type. [13]
7. **Anxiety**
   Create a1cm square area on the left dorsal surface. After that, the cream was applied there, and the duration was recorded. Then, for a period of up to 24 hours, it is examined for irritancy, erythema, and edema, if any, and reported. In Table no. [15]
8. **pH**
   Take 50 ml of distilled water and 0.5 g of cream were combined. A digital pH meter was then used to take the reading (Table no 6) [15]
9. **Phase separation**
   Prepared cream was kept in a covered container away from light at a temperature of 25 to100^0c. After that, phase separation was monitored for 24 hours. Phase separation variations were checked or observed. (Table No. 7) [16]
10. **Spreading ability**
    The spreadability was measured by how long it took two slides placed side by side to separate from the cream that was sandwiched between them when a certain load was applied. The spreadability is improved by a shorter time required to separate two slides. Glass slides were taken in two sets, each with a standard size. The cream formulation was then placed on one slide that was cut to the proper size. Afterward, a different slide was added on top of the formulation. The cream between the two slides was then uniformly compressed to form a thin layer by the application of a weight or other load to the upper slide. Following the removal of the weight, extra formulation that had adhered to the slides was scraped off. The force of weight applied to the upper slide caused it to free falloff. The amount of time it took for the upper slide to come off was noted (Table no 8) [16]

Spreadability=m .l/t

Where,

m=Standard weight which is tied to or placed over the upper slide (30g) l = length of glass slide (7.4)

t =time taken in seconds

11.Homogeneity

Both by touch and by visual inspection, the formulation's homogeneity was assessed. [12,17]

12. Franz Glass studies on diffusion

Phosphate buffer, stock solution 6.8 –

Solution A (potassium dihydrogenphosphate) and **Solution B**. (sodium hydroxide)

sample A weighs 4.08 g.Incorporate 150 ml of distilled water. Add 100 ml of distilled water to 0.79 g of solution B. Then remove 50 ml of potassium dihydrogen phosphate and 22.4 ml of sodium hydroxide. Make up the volume up to 250 ml by mixing solution A and solution B together.

Franz diffusion-cell research was suggested for in vitro DR. Between the donor compartment and the receptor is cellulose. 15 ml of saline phosphate buffer, pH 6.8, at 330.5°C was placed in the receptor section. 1gm of cream was applied to the cellulose membrane, and at 15,30,60,90, 120, 150, 180, 240, 300, and 360 minutes, 1ml of the sample was taken from the compartment. To maintain sink condition, substituted with a similar volume of medium. All testers were diluted with medium to a maximumof10 ml, and then methoxypsoralenb levels were measured using a UV-Visible spectrophotometer (ModelNo.Cary60) at 301.0nm.utilising pH 6.8 phosphate buffer as a baseline. (Table no 9) [18]

Fig no 3: Franz Diffusion Apparatus

RESULTS AND DISCUSSION

Below are evaluation results for each of the three formulations.

1. Physical assessment

Colour,odour,texture,and state of all formulations were examined during this test

Table No1: Physical evaluation

Sr.No	Parameters	F1H	F2H	F3H
1	Color	Pale yellow	Pale yellow	Pale yellow
2	Odor	Aromatic	Aromatic	Aromatic
3	Texture	Smooth	Smooth	Smooth
4	State	Semisolid	Semisolid	Semisolid

2. Washability

A small amount of cream was applied to the hand for the washability test,and the hand was then washed with tap water. All three formulations were simple to wash.

TableNo.2: Washability Observations

Sr.No	Formulation	Washability
1	F1H	EasilyWashable
2	F2H	EasilyWashable
3	F3H	EasilyWashable

3. Viscosity

A Brooke Field viscometer was used to measure the viscosity of the cream. The findings indicated that the viscosity of all three formulations was sufficient.

TableNo3: Viscosity observation table

Sr. No	Formulation	Viscosity(Cps)
1	F1H	21020
2	F2H	11810
3	F3H	18820

4. Greasiness

Here, a smear of cream was applied to the skin's surface, and the consistency of the smear oily or grease-like was assessed. The results show that all three formulations were non-greasy.

Table No 4: Greasiness observation table

Sr. No	Formulation	Greasiness
1	F1H	Non-greasy
2	F2H	Non-greasy
3	F3H	Non-greasy

5. After feel

Emolliency, slickness, and the amount of residue left after applying a specific amount of cream were discovered

6 Dye test

All formulations were of the o/w type emulsion cream, according to the dye test. All formulation for the o/w type emulsion appears to be more stable.

7. Anxiety

On the left hand dorsal surface, mark a1cm square area. Following the application of the cream, the passage of time was recorded. Then, for a period of up to 24 hours, it is examined for irritancy, erythema, and edema, if any, and reported. According to the findings, none of the three formulations F1H, F3H, and F3H exhibited irritability, erythema, or edema.

Tableno5: Irritancy study observation

Sr.no	Formulation	Irritant effect	Erythema	Edema
1	F1H	Nil	Nil	Nil
2	F2H	Nil	Nil	Nil
3	F3H	Nil	Nil	Nil

8. pH

The three formulations tested—F1H, F2H, andF3H all had pH values that were closer to skin pH, allowing for safe application to the skin.

TableNo.6: pH observation table

Sr.No	Formulation	pH
1	F1H	6
2	F2H	6.2
3	F3H	6.4

9. Phase separation

Prepared cream was stored in a covered container away from light at a temperature of 25 to 100°C.Phase separation was then monitored for 30days, 24hoursaday.The phase separation was observed to change at all. The findings show that none of the three formulations showed a separation.

TableNo7:Phase separation observation table

Sr.No	Formulation	Phase separation
1	F1H	No phase separation
2	F2H	No phase separation
3	F3H	No phase separation

10. Spreadability

The spreadability of the three formulations,F1H, F2H,and F3H,was tested, and it took less time. As a result, all formulations exhibit better spreadability.

TableNo8: Spreadability observations

Sr.No	Formulation	Time(sec)	Spreadability (g×cm/sec)
1	F1H	7	31.71
2	F2H	9	24.66
3	F3H	12	18.5

11. Homogeneity

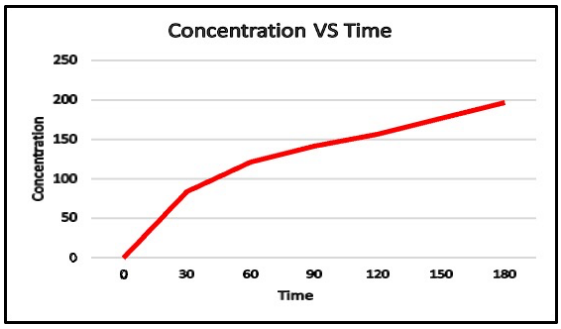
The distribution of extract in cream is consistent across all formulations. This was supported by both touch and visual appearance

12. Franz Diffusion Test,

Laboratory-scale Franz diffusion studies were conducted. Drugs are absorbed through the skin for three hours after application. The maximum wavelength of absorption in the UV-VIS spectrum is 280 nm.

Table No9: Franz diffusion study

Duration	Absorbance	Concentration(mcg/ml)
0min	0.01	0
15min	0.0261±0.0263	64
30min	0.0343±0.0345	84
45min	0.0414±0.0412	101.5
60min	0.0490±0.0492	121.5
90min	0.0575±0.0577	141.5
120min	0.0634±0.0636	156.5
150min	0.0712±0.0710	176.5
180min	0.0795±0.0797	196.5



GraphNo1-ConcenttationVSTime

1. Using a cellulose membrane and the Franz Cell model, we show permeability. Franz Cell permeation studies area highly reproducible method that are simple to use in any laboratory.

2. We discovered that the cream of flaxseed oil follows zero order kinetics by illustrating it on graphical data. In other words crème penetration rate is independent of flaxseed oil concentration.

CONCLUSION

The creation of a herbal cream was the aim of this study. One of the excellent substitutes for artificial cream is this herbal cream. The trituration method was used to prepare cream with a herbal oil base. The formulation demonstrated good activity and spreadability, suggesting that it may be an effective flaxseed oil formulation with cosmetic benefits like moisturizing, anti-aging, and anti-wrinkle properties that are more acceptable due to the perception that they are safer and less likely to cause side effects than synthetic ones. According to the findings and discussions, the cream formulation is both skin-safe and has a promising future as a cosmetic product

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