Development And Characterization of Herbal Anti-Acne Cream Containing Flaxseed Extract

Pratik S. Pagar[1], Prof.Ghule.U. V[2], Dr.V.A. Kashid[3], Suvarna S. Borade[4], Fiza J. Shaikh[5], Darshan S. Pagar[6], Mayur S. Vare[7], Yash J. Gavande[8]
[1,2,3,4,5,6,7,8]*MABD Institute of Pharmaceutical Education & Research, Babhulgaon, Yeola (423401) Maharashtra*

***Abstract*—The present study focuses on the formulation and evaluation of an antiacne cream utilizing flax seed (Linum. usitatissimum) extract, known for its rich content of omega-3 fatty acids, lignans, and antioxidants. Acne vulgaris is a common dermatological condition caused primarily by inflammation, bacterial proliferation (particularly Propionibacterium acnes), and excessive sebum production. The natural Ingredient has developed into multiple industrial Applications because it now serves many functions Throughout haircare, skincare, pharmaceuticals, Health items and cosmetics. Flaxseed demonstrates Extensive commercial value through its bioactive Compounds and nutritional aspects which Establishes it as an essential all-purpose agricultural Product. The cream was prepared using suitable excipients to obtain good consistency, spreadability, and stability. It was evaluated for appearance, pH, viscosity, spreadability, homogeneity, washability, and stability under different temperature conditions. Microbial studies showed no contamination, and in-vitro testing indicated good activity against acne-causing bacteria like Propionibacterium acnes and Staphylococcus epidermidis. The results suggest that the flaxseed extract-based cream is safe, effective, and stable, providing a natural and skin-friendly alternative to chemical anti-acne products.**

***Index Terms*—Antiacne, flaxseeds, anti- inflammatory, antioxidant**

I. INTRODUCTION

Flaxseed (*Linum usitatissimum*) belongs to the family of Linaceae. Flaxseeds are a rich source of natural antioxidants, as they contain significant amounts of phenolics and flavonoids along with omega-3 fatty acids, vitamins, proteins, carbohydrates, minerals, dietary fibers, and lignans Acne vulgaris is one of the most prevalent dermatological disorders, primarily affecting adolescents and young adults worldwide. It is a chronic inflammatory condition of the pilosebaceous glands characterized by the formation of comedones, papules, pustules, nodules, and in some cases, permanent scarring [1]. The pathogenesis of acne involves multiple factors, including excessive sebum production, follicular hyperkeratinization, bacterial colonization by Cutibacterium acnes (formerly Propionibacterium

acnes), and inflammatory immune responses [2,3].Although synthetic medications such as antibiotics, retinoids, and benzoyl peroxide are effective in controlling acne, prolonged use often results in side effects such as dryness, erythema, irritation, and bacterial resistance [4]. These limitations have encouraged the exploration of herbal and natural alternatives that are safer, biocompatible, and possess fewer adverse effects. Herbal formulations are gaining popularity in cosmeceutical research due to their multifunctional bioactive components, including flavonoids, tannins, phenolics, alkaloids, and essential oils with proven anti-inflammatory, antioxidant, and antimicrobial properties [5,6].Flaxseed (Linum usitatissimum) is an ancient medicinal plant widely used for its nutritional and therapeutic value. It is rich in omega-3 fatty acids, lignans, mucilage, and phenolic compounds, which contribute to its antioxidant, emollient, anti-inflammatory, and antimicrobial activities [7,8]. These properties make flaxseed extract a valuable natural ingredient for topical formulations aimed at treating acne and improving overall skin health. Flaxseed-based creams or gels can enhance moisture retention, reduce irritation, and protect the skin barrier, offering both cosmetic and therapeutic benefits [9,10]

II. CREAM

Pharmaceutical creams are semisolid dosage forms, containing one or more drug substances dissolved or dispersed in a suitable base, intended for external application to the skin or mucous membranes. They are used for topical delivery of medications and can be either oil-in-water or water-in-oil emulsions. The Pharmaceutical creams are oil-and-water semi-solid emulsions and are therefore most frequently used.[11]

CREAM CLASSIFICATION

There are many different categories of skin creams.

1. Uses by function, such as foundation, massage and cleansing.
2. Such as cold cream, disappearing cream and so on.
3. That depends on the type and kind of emulsion.

Types of creams according to function, properties and type of emulsion:

1.Make-up cream (O/W emulsion):

a) Disappearing cream.
b) Foundation cream.

2. Cleansing cream, cleansing milk (emulsion), and cleansing lotion.

3.Winter cream (without emulsion)

(a) Cold cream or moisturizing cream.

4. General creams and all-purpose creams.

5.Skin protection cream [12]

Acne

Acne is an infection of the skin, caused by changes in the sebaceous glands. The most common form of acne is called acne vulgaris, which means “common acne”. The redness comes from the inflammation of the skin in response to the infection.[20] Acne vulgaris is an extremely common disorder of skin (pilocebaceous unit) that affects virtually all individuals at least once during life. The incidence of acne peaks at teenage, but substantial numbers of men & women between 20-30 years of age are also affected by the disorder [21]

Fig.1 Acne on Face

Types of acne

Fig 2: types of acne

A. Non-Inflammatory Acne

a. Open comedones (Blackheads) : Pores remain open; oxidized sebum gives a black appearance; non-painful lesion.
b. Closed comedones (Whiteheads) : Pores are closed; appear as small, white or skin-colored bumps under the skin surface.

B. Inflammatory Acne

a. Papules : Small, red, raised, inflamed bumps without pus formation; indicate early inflammation.

I. Pustules :Red, inflamed lesions with white or yellow pus-filled centers; caused by bacterial infection.

b. Nodules : Large, firm, painful lumps located deep in the dermis; often cause tissue damage.
c. Cysts: Deep, pus-filled, tender lesions that may rupture and lead to permanent scarring. [22]

III. DRUG PROFILE

Flax, also known as common flax or linseed, is a flowering plant, Linum usitatissimum, in the family Linaceae. It is cultivated as a food and fiber crop in regions of the world with temperate climates. In 2022, France produced 75% of the world’s supply of flax. Flaxseed is becoming increasingly famous as a superfood because of its beneficial role in regulating gut flora and alleviating symptoms of many human.diseases, such as cardiovascular ailments, diabetes, neural disorders, menopause, skin problems, gastrointestinal issues, and even concentrations [21,22]

Flaxseed chemical constituents and therapeutic uses

Flaxseed (Linum usitatissimum) is a valuable medicinal and nutritional plant widely recognized for its rich composition of bioactive compounds and therapeutic applications. Its major constituents include lignans, fatty acids, proteins, dietary fiber, and phenolic compounds, each contributing to its pharmacological activity [14–16].

Fig. Flaxseed (Linum usitatissimum)

The principal lignan, secoisolariciresinol diglucoside (SDG), functions as a potent antioxidant and phytoestrogen, which helps in hormone regulation and protection against oxidative damage [14,19]. Flaxseed oil contains a high proportion of α-linolenic acid (ALA)—an essential omega-3 fatty acid—along with linoleic, oleic, palmitic, and stearic acids, which maintain cardiovascular, neural, and dermal health [15,17,18]. The seed also provides approximately 20–25% protein, rich in arginine, aspartic acid, and glutamic acid, which support immune and metabolic functions [16,18]. Furthermore, its soluble and insoluble fibers, along with mucilage, enhance digestion, regulate cholesterol, and promote gastrointestinal well-being [15,17]. The presence of phenolic acids such as ferulic and p-coumaric acids, as well as cyanogenic glycosides like linamarin and lotaustralin, enhances its antioxidant and antimicrobial effects [14,19].

Therapeutically, flaxseed exhibits antioxidant, anti-inflammatory, and cardioprotective activities, attributed to the combined action of lignans and omega-3 fatty acids [15,17,19]. It also demonstrates anticancer, antidiabetic, and neuroprotective properties by modulating estrogen metabolism, improving insulin sensitivity, and supporting brain health [16,17,19]. In dermatological applications, flaxseed oil provides moisturizing, anti-acne, and wound-healing benefits due to its high ALA and lignan content, making it an effective ingredient in herbal skin formulations [14,17,18]. Additionally, its fiber and mucilage components help maintain digestive balance and promote overall gut health [15]

Extraction of flaxseed :

Flaxseed (Linum usitatissimum) is a rich source of bioactive compounds such as lignans, α-linolenic acid, proteins, and phenolics. The extraction process aims to isolate these constituents effectively using suitable solvents and methods.

1) Preparation of Plant Material

Initially, flaxseeds are cleaned, dried, and finely powdered using a grinder to enhance the surface area for solvent contact. The powdered material is then sieved (40–60 mesh) to ensure uniform particle size for efficient extraction.

2) Solvent Selection

a. The choice of solvent depends on the polarity of the desired compound.
b. Non-polar solvents like n-hexane are used for extracting oil components.
c. Polar solvents such as ethanol, methanol, or hydroalcoholic mixtures are preferred for isolating lignans and phenolic compounds.
d. Extraction Techniques

3) Soxhlet Extraction:

a. The powdered sample is placed in a thimble and continuously extracted using the selected solvent for 6–8 hours. The solvent is later removed under reduced pressure to obtain a concentrated extract.
b. Cold Maceration:
c. The powdered flaxseed is soaked in the solvent for 48–72 hours with occasional stirring. The mixture is then filtered, and the solvent is evaporated to yield the extract.
d. Ultrasound-Assisted Extraction:
e. Ultrasonic waves are employed to enhance solvent penetration and extraction efficiency, reducing both extraction time and solvent consumption.

4) Concentration and Storage

i. After extraction, the filtrate is concentrated using a rotary evaporator or water bath, and the resulting extract is dried under vacuum or at room temperature. The dried extract is stored in an airtight container for further formulation studies.[23]

IV. COMPOSITION:

Table No 1 [24]

Ingredients	Quantity
For oil phase	
emulsifying wax	8 %
cetyl or stearyl alcohol	3 %
flaxseed oil	5%
caprylic/capric triglyceride	3%
For aqueous phase	
purified water	72%
glycerin	4%
flaxseed extract or mucilage	5%
Preservatives	0.8-1%
pH adjusters, mild fragrance	0.2%

V. PROCEDURE

1. the oil and aqueous phases were Both heated separately to about 70–75 °C
2. then emulsified under continuous stirring to obtain a smooth, homogeneous cream base.
3. The mixture was cooled to approximately 40 °C before adding the flaxseed extract, preservatives, and fragrance.
4. The pH was adjusted to 5.5–6.0 to maintain skin compatibility, and the cream was stored in clean, airtight containers [25]

VI. EVALUATION TEST

a. PHYSICAL EVALUATION: - The physical parameters of cream like colour, odour, consistency, and state of Formulation were used to further evaluate the formulation.
b. WASHABILITY: - On the hand, a little amount of cream was applied and washing it with tap water.
c. IRRITANCY: - These tests are used to determine the quality of the material and the chemicals, as well as whether Or not they are damaging to the skin. The cream is initially applied to the hand and left on for a while so that we Can check for irritation.[26]
d. PHASE SEPARATION: - Generally, this test is checked every 24 to 30 hours. Put the cream into the container at Room temperature and protect the formulation from light for these.
e. HOMOGENEITY: - The visual appearance and test were used to evaluate uniformity.
f. GREASINESS: - This test is mostly used to determine whether cream is greasy or oily.
g. pH OF CREAM: - The pH of the cream should be in range of 5.6-5.8, to avoid irritancy to the skin.
h. VISCOSITY: - Viscosity of cream is measured by the Brookfield viscometer at room temperature.[27]

VII. FUTURE SCOPE

Further modification of the herbal cream formulation to improve its stability, texture, and shelf life is part of the study's future scope. The active phytoconstituents that provide flaxseed extract its anti-acne properties can be identified and measured using sophisticated analytical methods. Its effectiveness and safety in comparison to traditional anti-acne formulations can be confirmed by larger-scale clinical research. To create synergistic effects, the addition of additional complimentary herbal extracts could be investigated. Skin penetration and bioavailability may be enhanced by nanoformulation techniques like liposomes or nanoemulsions. Further pharmacological understanding can be obtained by investigating the cream's anti-inflammatory and antioxidant properties. Lastly, bringing this herbal composition to market will be aided by increasing production and assessing its commercial viability.

VIII. CONCLUSION

From the present study it can be concluded that the use of bioactive ingredients in cream. They provide good and healthy skin. The cream will be prepared with using extracts of Pumpkin seeds they are good source of medicinal Properties. It helps in the elimination of Acne, pimples and marks. Medicinal plant shows less side effect as compare to chemical Compounds pumpkin seeds show better anti-inflammatory or anti-bacterial effect.

REFERENCES

[1] Zaenglein AL. Acne vulgaris. N Engl J Med. 2018;379(14):1343-52.

[2] Kurokawa I, Danby FW, Ju Q, et al. New developments in our understanding of acne pathogenesis and treatment. Exp Dermatol. 2009;18(10):821-32.
[3] Dreno B, et al. Pathophysiology of acne. Dermatoendocrinol. 2017;9(1):e1353901.
[4] Thiboutot D, Gollnick H. New insights into the management of acne: an update from the Global Alliance. J Am Acad Dermatol. 2009;60(5):S1-50.
[5] Rathore S, Gupta S, Gupta P. A comprehensive review on formulation and evaluation of herbal anti-acne cream. J Chem Drug Res. 2023;15(4):85-92.
[6] Kumar R, et al. Herbal approach in acne management: a review. Int J Pharm Sci Rev Res. 2022;75(2):112-8.
[7] Raut SS, Nerkar S, Raut BP. The science of flaxseed in skincare: a review on its moisturizing and hydrating benefits. Int J Pharm Res Appl. 2025;10(3):1-8.
[8] Tasneem R, et al. Development of phytocosmeceutical microemulgel containing flaxseed extract and its in vitro and in vivo characterization. Pharmaceutics. 2022;14(8):1656.
[9] Ghodgaonkar S, et al. Formulation and evaluation of a herbal multipurpose cream containing orange peel powder and flaxseed gel. J Pharmacogn Phytochem. 2025;14(4):15523-8.
[10] Firnanda P, et al. The effects of flaxseed (Linum usitatissimum) on the severity level of acne vulgaris. Medico J. 2020;6(2):123-30.
[11] Moda M, Sharma N, Thakur M, Sharma I, Sharma K. A Overview on Lumpy Skin Disease: A Review. Asian Journal of Research in Pharmaceutical Sciences. 2024 Mar 2;43–50.
[12] Mueed A, Shibli S, Korma SA, Madjirebaye P, Esatbeyoglu T, Deng Z. Flaxseed Bioactive Compounds: Chemical Composition, Functional Properties, Food Applications and Health Benefits-Related Gut Microbes. Foods. 2022 Oct 21;11(20):3307.
[13] Wikipedia Contributors. Flax [Internet]. Wikipedia. Wikimedia Foundation; 2019. Available from: https://en.wikipedia.org/wiki/Flax
[14] Kajla P, Sharma A, Sood DR. Flaxseed—a potential functional food source. J Food Sci Technol. 2015;52(4):1857–71.
[15] As Imran M, Ahmad N, Anjum FM, Khan MK, Mushtaq Z, Nadeem M, et al. Flaxseed: Nutritional composition, bioactive compounds, health benefits, and food applications—A review. Food Sci Nutr. 2015;3(6):769–79.
[16] Oomah BD. Flaxseed as a functional food source. J Sci Food Agric. 2001;81(9):889–94.
[17] Goyal A, Sharma V, Upadhyay N, Gill S, Sihag M. Flax and flaxseed oil: An ancient medicine modern functional food. J Food Sci Technol. 2014;51(9):1633–53.
[18] Hall C, Tulbek MC, Xu Y. Flaxseed. In: Advances in Food and Nutrition Research. Vol. 68. Academic Press; 2013. p. 1–40.
[19] Toure A, Xueming X. Flaxseed lignans: Source, biosynthesis, metabolism, antioxidant activity, bio-active components, and health benefits. Compr Rev Food Sci Food Saf. 2010;9(3):261–9.
[20] Chambers HF, Deleo FR (2009) waves of resistance: staphylococcus aureus in the antibiotic era. Rev Microbiol, 7 (9) : 629-641.
[21] Chaudhary S (2010) anti acne activity of some Indian Antiacne herbal drugs, international journal of pharma professional" s research, 1 (1) :78-80.
[22] MSD Manual Professional Edition. Acne Vulgaris [Internet]. 2024 [cited 2025 Nov 1]. Available from: https://www.msdmanuals.com
[23] Patel J, Patel R, Raval M. Extraction, characterization and evaluation of flaxseed (Linum usitatissimum) for its antimicrobial and antioxidant potential. Int J Pharm Sci Res. 2020;11(5):2200–2208.
[24] Deshmukh N, et al. Formulation and evaluation of herbal anti-acne cream using natural ingredients. J Drug Deliv Ther. 2021;11(5):1–6.
[25] Joshi N, et al. Formulation and evaluation of herbal cream for anti-acne activity. Res J Top Cosmet Sci. 2020;11(1):10–14.
[26] Arun Kumar, Divyansh, Neha Ansari, Rahul Shukla, Gangeshwar Pratap Singh,Formulation and Evaluation of Herbal Moisturizing Cream, International Journal of Pharmacy and Pharmaceutical Research; August 2022 Vol.:25, Issue:1,pages 9-16.

[27] Choudhari NN, Dudhe AR, Tatte SP, Zile TS, Nandeshwar YK, Dhawale TP, et al. Formulation and evaluation of anti-acne face cream. World Journal of Advanced Research and Reviews [Internet]. 2023 [cited 2024 Jul 25];19(1):1181–8. Available from: https://wjarr.com/content/formulation-and-evaluation-anti-acne-face-cream