International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 3 May–June 2025, pp: 189-234 www.ijprajournal.com ISSN: 2456-4494

Formulation, Optimization and Evaluation of Nanoemulsion for the treatment of psoriasis

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Date of Submission: 01-05-2025 Date of Acceptance: 10-05-2025

ABSTRACT
The Prunus armeniaca species which includes apricots exists among stone fruit varieties that people across the globe know as Armenian plums. Subscribe to this sentence as it describes apricot kernel which functions as a beneficial by-product from apricots and contains substantial amounts of proteins alongside vitamins and carbohydrates. Apricot kernel serves both medicinal functions and serves in developing food ingredients. Several extraction methods including solvent extraction as well as ultra-sonication and enzyme-assisted and microwave-assisted extraction and aquous extraction have been applied to obtain bioactive compounds from apricot kernel. The consumption of apricot kernels provides benefits against various diseases in addition to elimination of dead skin cells from your skin. Apricot (Prunus Arminica) seed for formulation Lotion for the Treatment of Psoriasis.

Keyword: Apricot, Lotion, Prunus armeniaca L, Kernel.

I. INTRODUCTION

Prunus armeniaca, commonly known as apricot, and referred to locally in India as "Zardalu" or "Chuli" (particularly in its wild form), is a fruit-bearing tree believed to have originated from the Indian subcontinent, although its evolutionary lineage also connects it to the regions of Central Asia and China. Over centuries, the cultivation and use of apricots spread westward to South Asia, West Asia, Europe, and beyond. Presently, Turkey stands as the leading global producer of apricots, underscoring the fruit's widespread agricultural and economic importance.

Morphologically, apricots bear a close resemblance to miniature peaches, characterized by their velvety skin and golden-orange coloration, which may deepen to a reddish hue upon ripening. The fruit is renowned for its unique taste profile, which delicately balances sweetness with a mildly tart, plum-like tang. This sensory appeal makes apricots highly versatile—consumed fresh or transformed into value-added products such as jams, jellies, juices, nectars, and dried snacks.

Apricot trees flourish in temperate climates, particularly in regions experiencing cool spring and early summer temperatures. Their growth is constrained in subtropical or humid environments due to the tree's sensitivity to warm conditions during the flowering and fruit-setting phases. Botanically classified as a drupe, the apricot fruit houses a single large seed or kernel enclosed within a hard endocarp. The edible portion of the fruit is not only palatable but also nutritionally rich, providing a natural source of dietary fiber, vitamins A, C, and E, and essential minerals like potassium, copper, phosphorus, and iron.

In traditional systems of medicine, especially in Chinese and Persian medical practices, apricot kernels have long been utilized for treating a range of ailments, including cough, asthma, constipation, and inflammatory conditions. The kernels are known to contain amygdalin, a compound associated with antitumor and analgesic effects, though its safety remains a subject of scientific debate. In contemporary nutrition science, apricots are recognized for their low glycemic index, high fiber content, and phytochemical richness, making them beneficial in the dietary management of type 2 diabetes. Their antioxidant constituents, including flavonoids, polyphenols, and carotenoids, contribute to cellular health by neutralizing reactive oxygen species (ROS) and modulating metabolic and inflammatory pathways.

Beyond nutritional benefits, both the fruit and kernel of Prunus armeniaca have demonstrated a diverse range of pharmacological activities. Research highlights their anti-inflammatory, antioxidant, hepatoprotective, cardioprotective, renoprotective, anti-aging, and neuroprotective properties. Experimental and clinical findings suggest therapeutic potential in conditions such as cancer, parasitic infections, psoriasis, and neurodegenerative disorders like Alzheimer's and

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 3 May–June 2025, pp: 189-234 www.ijprajournal.com ISSN: 2456-4494

Parkinson's disease. These effects are attributed to the complex interplay of bioactive constituents that regulate immune responses, oxidative stress, and cellular signaling cascades.

Among the conditions of interest, psoriasis represents a significant autoimmune and dermatological burden, affecting an estimated 2% to 5% of the global population. This chronic inflammatory skin disorder is characterized by hyperproliferation of keratinocytes, impaired epidermal differentiation, and immune dysregulation, leading to the appearance of erythematous, scaly plaques on various parts of the body. The lesions are often associated with intense itching, psychological distress, and impaired quality of life. Psoriasis is driven by a complex interaction of genetic, immunological, and environmental factors, including infections, stress, smoking, medication, and climatic conditions. Central to its pathogenesis is the activation of inflammatory mediators such as cytokines, interferons, tumor necrosis factor-alpha (TNF-α), and colony-stimulating factors.

Current treatment modalities for psoriasis are stratified based on severity. Topical therapies—such as corticosteroids, calcipotriol, and coal tar—are prescribed for mild cases, while systemic agents and phototherapy are reserved for moderate-to-severe disease. Although newer biologic drugs have emerged as targeted therapies, offering improved disease control, none offer a permanent cure. Furthermore, conventional treatments are often associated with drawbacks, including frequent application, poor skin penetration, systemic side effects, and high costs. Adverse outcomes may include hepatic and renal toxicity, hypertension, immune suppression, and even an increased oncogenic risk with prolonged use.

Amid these challenges, the pharmaceutical industry is increasingly exploring innovative therapeutic strategies. One promising avenue is the development of nanocarrier-based drug delivery systems, which aim to overcome the limitations of traditional formulations. Nanotechnology enables enhanced dermal penetration, controlled drug release, targeted delivery, and reduced systemic toxicity, thereby improving therapeutic efficacy and patient adherence. These delivery platforms can be particularly effective in dermatological applications, where localized action and minimal systemic absorption are desired.

In this context, apricot-derived bioactives have gained attention for their compatibility with nanotechnology and their therapeutic promise in inflammatory skin conditions. Studies have demonstrated that extracts from apricot kernels can exert anti-inflammatory and immune-modulating effects, potentially beneficial in managing psoriasis and related disorders. Additionally, the presence of essential oils, vitamin E, and other nutrients in apricots may further enhance skin regeneration, barrier repair, and antioxidant defense mechanisms.

In conclusion, Prunus armeniaca stands out as a multipurpose natural resource with remarkable nutritional and medicinal properties. From its traditional uses to its emerging role in modern therapeutics, the apricot offers promising solutions for both metabolic diseases and autoimmune disorders such as psoriasis. The integration of apricot-derived compounds into nanocarrier-based topical formulations may pave the way for safe, effective, and patient-friendly therapies. Ongoing preclinical and clinical investigations will be crucial to validating these applications and realizing the full potential of apricots in dermatological and metabolic healthcare.

Fig.: Apricot dried fruits

Apricot Seed Appearance

Oval- shaped, brown, smooth and glossy.

Size: Approximately 1.5-2.5cm (0.6-1inch) in length and 1 -1.5cm (0.4-0.6 inch) in width.

Shape: Elliptical or oval-shaped, with a pointed tip at one end and a rounded base at the other.

Neem oil Appearance

Colour: Brownish- yellow to dark brown, with a slightly greenish tint.

Clarity: Opaque to translucent, with a slightly cloudly or hazy appearance

Viscosity: Thick and syrupy, with a slow flow rate.

Odour: Strong, pungent and bitter, with a characteristic garlic-like or sulfur-like smell.

Therapeutic Approaches for Psoriasis

The current management of psoriasis includes three primary modalities: topical treatments, phototherapy, and systemic therapies.

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To determine the most appropriate course of treatment, patients are typically categorized based on disease severity into either mild-to-moderate or moderate-to-severe cases. Generally, moderate-to-severe psoriasis is characterized by involvement of more than 5–10% of the total body surface area (with one palm, including fingers, representing approximately 1% of the surface area) or significant impact on sensitive or functionally critical areas.

Need for and Applications of Nanocarrier-Based Therapies in Psoriasis

While a variety of conventional topical agents are available and commonly used for treating mild forms of psoriasis, their therapeutic efficacy is often limited by poor skin penetration and absorption. In more advanced cases, systemic administration—via oral or injectable routes—is usually preferred. However, systemic treatments necessitate higher drug dosages, which increase the risk of adverse effects. Moreover, although biologic therapies have emerged as potent options for moderate-to-severe psoriasis, their high cost limits accessibility for many patients. In this context, nanocarrier-based drug delivery systems have gained attention as a promising alternative due to their potential to enhance drug bioavailability, target diseased tissues more effectively, and reduce systemic toxicity.

Patents Pertaining to Psoriasis Treatment

In today's rapidly evolving scientific landscape, technological advancements continue to drive innovation, particularly in nanomedicine. Patents play a crucial role in protecting and promoting such innovations. Despite the legal framework often lagging behind rapid scientific progress, a significant number of patents related to nanomedicine—specifically those addressing psoriasis—have been filed and granted in recent years. These patents reflect a growing trend in the development of advanced formulations, ranging from traditional dosage forms to cutting-edge nano-formulations, aimed at improving therapeutic outcomes in psoriasis management.

Apricot oil and neem oil in psoriasis treatment

- **Apricot oil:**

Rich in fatty acids and vitamin A and E, apricot oil has anti-inflammatory and moisturizing properties, which can help soothe and clam psoriatic skin.

- **Neem Oil:**

Neem oil has antiseptic and antifungal properties, which can help combat infections and inflammation associated with psoriasis.

Table 1. Psoriasis is classified into many types which are discussed as:

Pustularpsoriasis	This type of psoriasis is severe in which numerous tiny blisters occuron your skin. It requires immediate medical intervention.	
Guttate psoriasis	This appears as a smattering of little red scaly areas on your skin. These patches are able to cover up a considerable portion of your skin.	

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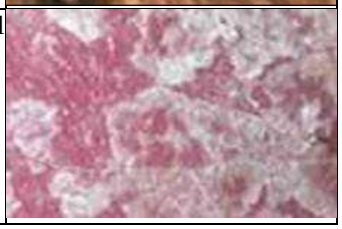
Plaque psoriasis	Plaque psoriasis affects the majority of people. This manifests as skin patches that are red or pink and coated with silvery-white scales. The patches protrude a little bit from the surface of the skin.	
Flexural, nail,andScalp psoriasis	This psoriasis manifests itself in skin folds, groyne area, andbetween the buttocks, where the genitals may be affected.	
Erythrodermicpsoriasis	In this type of psoriasis, the whole body will become red andinflamed.	

Classification of Psoriasis

A colloidal carrier system called a nanoemulsion is composed of a surfactant, water, and oil. These nanoemulsions are good for a variety of dermatological applications because of their low viscosity, great kinetic stability, and optical clarity. Droplets that is as small as 500 nm might be referred to as nanoemulsions. Nanoemulsions are made up of extremely tiny and uniform-sized droplets. Different dosage forms, such as liquids, creams, sprays, gels, foams, and aerosols, can be formulated using nanoemulsions. They can also be given via a number of different delivery systems, including oral, intravenous, topical, intranasal, ocular, and pulmonary. Nanoemulsions are more kinetically stable, avoid cream separation, have significant impact on topical systems, and have a larger solubilization capacity than coarse emulsions.

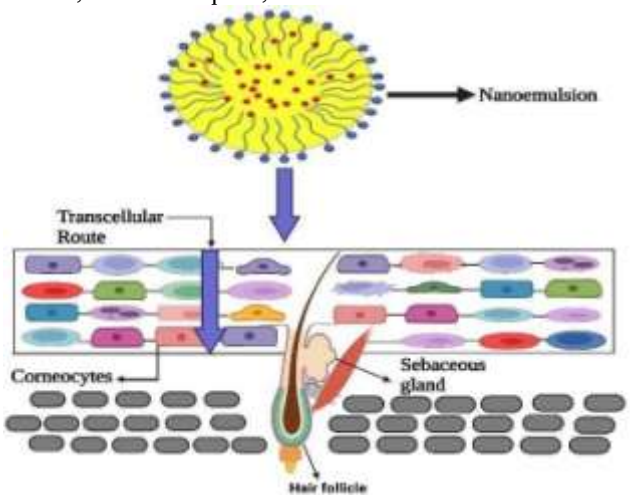


Fig 1: Mechanism of absorption of Nanoemulsion

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TREATMENT STRATEGIES FOR PSORIASIS

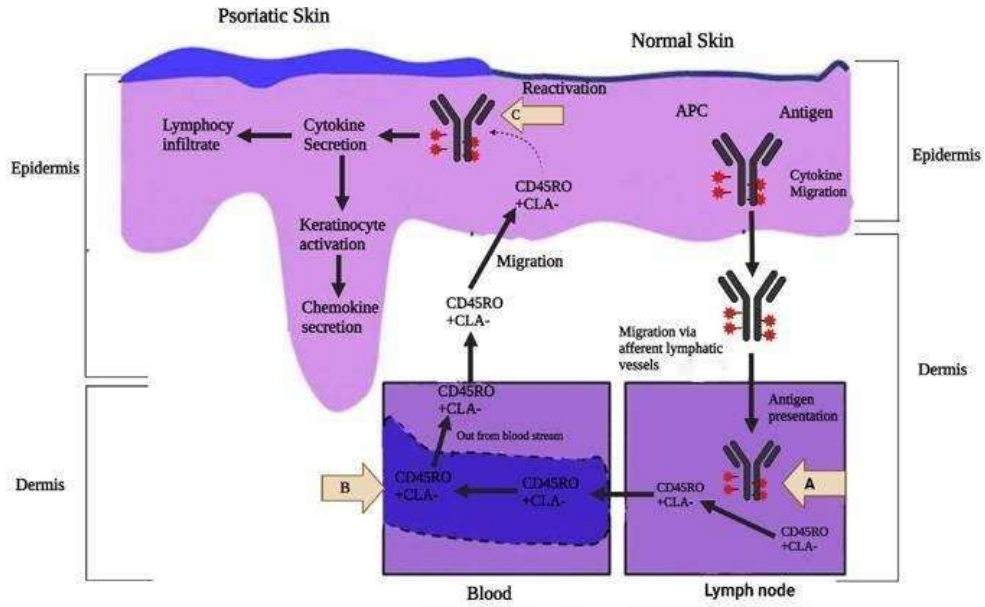

Fig. 2: The major pathway of psoriasis pathology.

History

Apricots have been cultivated for over 4,000 years, originating in ancient ramenia and china. They were introduced to Europe by the Arabs in the 1st century AD and later brought to the Americas by Spanish missioneries.

Health Benefits

1. Supports eye health
2. Boosts immune system
3. Promotes digestive health
4. Many reduce inflammation
5. Supports healthy skin.

Cosmetic Uses

1. Apricot kernel oil (skin and hair care)
2. Apricot extract (skin care and hair care products)
3. Apricot seed oil (natural remedy for skin issues).

Other Uses

1. Traditional medicine (Ayurvedic and Unani)
2. Dye plant (textile industry)
3. Animal feed.

Growing Conditions

1. Temperature climate
2. Well-drained soil
3. Full sun
4. Moderate watering.

Cultivation Characteristics of Apricots

Apricot trees require a chilling period ranging from 300 to 900 chill units for proper dormancy and fruit development. A dry climate is considered optimal for fruit ripening. While apricots are slightly more tolerant of cold compared to peaches—able to withstand winter temperatures as low as −30 °C (−22 °F) or even lower when in good health—their resilience to frost can vary significantly among different cultivars. Apricots are generally suited to USDA Hardiness Zones 5 through 8.

One of the major challenges in apricot cultivation is their early flowering period, often starting in early March in regions like Western Europe. This makes them vulnerable to damage from late spring frosts, which can destroy blossoms or developing flower buds. Furthermore, apricot trees are sensitive to erratic temperature shifts during the winter. For example, while winters in China are harsh, they tend to be more stable compared to the fluctuating winter climates of Europe or North America. To improve cold tolerance, breeders have explored crossbreeding with Prunus sibirica (Siberian apricot), a species capable of surviving extreme cold down to −50 °C (−58 °F), though it produces less palatable fruit.

For optimal growth, apricot trees prefer well-drained soils with a slightly acidic to neutral pH, ideally between 6.0 and 7.0. Commercial

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cultivars are often grafted onto rootstocks of plum or peach trees. While the scion determines fruit quality—such as size and flavor—the rootstock influences the tree's growth characteristics and adaptability.

Popular apricot varieties in the United States include 'Blenheim', 'Wenatchee Moorpark', 'Tilton', and 'Perfection'. Some cultivars are self-fertile and can produce fruit without the presence of another tree, while others, such as 'Moongold' and 'Sungold', require cross-pollination and must be planted in pairs.

Plant breeders have also developed hybrid varieties, such as the "black apricot" or "purple apricot" (Prunus dasycarpa), which is a cross between an apricot and a cherry plum (Prunus cerasifera). Other hybrids between apricots and plums include plumcots, apriplums, pluots, and apriums—each combining traits from both parent species.

Apricot Kernels

Apricot kernels contain amygdalin, a naturally occurring compound that limits their culinary use due to potential toxicity. However, oil extracted from these kernels is safe for consumption as amygdalin is not soluble in oil. The crushed shells of the kernels are widely utilized in the cosmetic industry as natural exfoliants, offering an environmentally friendly alternative to plastic microbeads in skincare products.

Taxonomy and Species Classification

Apricots belong to the Prunus section Armeniaca. The classification of certain species, such as Prunus brigantina, remains debated among botanists. While chloroplast DNA suggests a closer relationship to plum species, nuclear DNA analysis indicates it shares a greater affinity with other apricot species.

- Prunus armeniaca – common apricot, widely cultivated for its edible fruit and kernel

Apricot Oil Extraction

Apricot oil is extracted from the kernel of the apricot fruit (Prunus armeniaca) through a multi-step process:

Traditional Method

1. **Harvesting:** Apricot fruits are harvested, and the kernels are extracted.
2. **Drying:** Kernels are dried to reduce moisture content.
3. **Crushing:**Dried kernels are crushed to extract the oil.
4. **Cold pressing:** Crushed kernels are cold-pressed to extract the oil.
5. **Filteration:**Extracted oil is filtered to remove impurities.

Mechanical Method Kernel Extraction

1. **Harvesting:**Apricot fruits are harvested, and the kernels are extracted.
2. **Cleaning:**Kernels are cleaned to remove dirt and debris.
3. **Grinding:** Kernels are ground into a fine powder.
4. **Extraction:**Powder is subjected to solvent extraction (e.g. hexane) to extrat the oil.
5. **Solvent removal:**Solvent is removed from the extracted oil through distillation or evaporation.
6. **Filteration:**Extracted oil is filtered to remove impurities.

Neem oil Extracted process

Neem oil is extracted from the seeds of the neem tree (Azadirachta indica) through a multi-step process:

1. **Seed collection:** Neem seeds are collected from neem trees
2. **Drying:**Seeds are dried to reduce moisture content.
3. **Dehulling:** Seeds are dehulled to remove the outer shell.
4. **Crushing:**Dehulled seeds are crushed to extract the oil.
5. **Cold pressing:**Crushed seeds are cold-pressed to extract the oil.
6. **Filteration:**Extracted oil is filtered to remove impurities.

Mechanical Method

1. **Seed collection:** Neem seeds are collected from neem trees.
2. **Cleaning:** Seeds are cleaned to remove dirt and debris.
3. **Griding:** Seeds are ground into a fine powder.
4. **Extraction:** Powder is subjected to solvent extraction (e.g. hexane) to extract the oil.
5. **Solvent removal:** Solvent is removed from the extrtacted oil through distillation evaporation.
6. **Filteration:** Extracted oil is filtered to remove impurities.

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Nano-emulsion

A miniemulsion is particular type of emulsion. A miniemulsion is obtained by shearing a mixture comparising two immiscible liquid phase, one or more surfactants and possibly one or more co-surfactants. Nanoemmulsion possess a particle size ranging from 20 to 200nm.

Emulsion

An emulsion is a mixture of two or more liquids that are normally immiscible which is stabilized by adding emulsifying agents.

Nanoparticle Characteristics

1. **Particle Size:**100-200nm
2. **Particle shape:** Spherical
3. **Zeta potential:** -15Mv to -30mV
4. **Polydispersity Index (PDI):** Less than 0.5
5. **Surface Charge:** Negatively charged
6. **Stability:** Stable over a period of 6 months.

Nanoparticle formation

1. **Method:** High-energy emulsification (e.g., Ultrasonication, high-pressure homogenization)
2. **Surfactant: Tragacanth, Acacia**
3. **Cosurfactant:** Ethanol
4. **Oil phase:** Apricot oil and neem oil
5. **Aqueous phase:** Water (Distill water).

Nanoparticle Characterization Techniques

1. **Dynamic Light Scattering (DLS):** For particle size and PDI analysis
2. **Zeta Potential Analyzer**: for zeta potential analysis.
3. **Transmission Electron Microscopy (TEM):** For particle shape and size analysis.
4. **Scanning Electron Microscopy (SEM):** For particle shape and size analysis.

Psoriasis

A condition in which skin cells build up and form scales and itchy, dry patches. Apricot seeds oil and neem oil are made nanoemulsion in treatment psoriasis. Psoriasis is a long lating, noncontagious autoimmune disease characterized by patches of abnormal skin.

Psoriasisis skin disese scaly patches, most commonly on the knees, elbows, trunk and scalap. Psoriasis various in severity from small localized patches to complete coverage. Injury to the skin can trigger psoriatic skin changes at that spot. This is known as the koebner phenomenon.

Symptoms

Red (purple on darker skin), itchy.

Apricot seeds

Cynide toxic. Apricot oil shows promise as a treatment for psoriasis gut problem and heart conditions. Apricot seed oil, also known as prunus armeniaca, is plant-based oil extracted from the seeds of apricot fruits. It is a rich source of essential fatty acids, vitamins, and minerals.

Chemical Composition

Fatty Acids:

Oleic acid (55-65%)
Linoleic acid (20-30%)
Palmitic acid (5-10%)
Stearic acid (2-5%).

Vitamins:

Vitamin A
Vitamin B1 (Thiamine)
Vitamin B2 (Riboflavin)
Vitamin E

Minerals:

Potassium
Magnesium
Phosphorus
Calcium.

Benefits:

Skin and hair care
Health benefits.
Cosmetic Uses.

Extraction Methods

Cold pressing
Solvent extraction
Supercritical fluid extraction.

Pharmacological Properties

Anti- inflammatory
Antioxidant
Antimicrobial
Anticancer
Immunomodulatory

Therapeutic Application

1. Psoriasis
2. Eczema,
3. Acne
4. Wound healing
5. Cancer treatment.

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Geographical Source

Prunus armeniaca is indigenous to regions spanning Central Asia and the Mediterranean. Its global presence extends to several countries including the United States, France, the United Kingdom, Germany, Brazil, Kazakhstan, the Netherlands, Australia, India, and Canada. As per a report by Statista released in September 2023, the United States imported dried P. armeniaca fruits valued at over 88 million USD.

Based on morphological and physiological characteristics, apricot germplasm is categorized into four major eco-geographical groups, each with specific regional subgroups: Central Asian, Dzhungar-Zailij, Irano-Caucasian, and European.

In India, the Union Territory of Ladakh stands out as the leading apricot-producing region, with an annual yield of approximately 15,000 tons.

In the United States, California dominates apricot cultivation and is recognized as the largest apricot-producing state according to the Agricultural Marketing Resource Center. The total apricot output in the U.S. was reported to be 41,470 tons in the year 2021.

Globally, Turkey holds the position of the top apricot producer, with an annual production of around 730,000 tons, followed closely by Uzbekistan, which produces approximately 662,133 tons per year.

Pharmacognostic Name

Botanical Name: Prunus armeniaca
Family: Rosaceae
Origin: North Eastern China
Chromosome no.: 8 (2n=16)
Type of fruit: Drupe
Edible portion: Mesocarp and Endocarp.

Plan of Work

1. Extract oil from apricot kernels and neem seeds.
2. Formulate a stable nanoemulsion using the extracted oils.
3. Evaluate the physicochemical properties, stability and biological activity of the nanoemulsion.
4. Develop a formulation for the apricot oil and neem oil nanoemulsion.
5. Optimization the formulation using various techniques, such as response surface methodology.

Literature Review

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Drug Profile

Ingredients:

1. Apricot oil
2. Neem oil
3. Tragacanth
4. Glycerin)
5. Distill Water

Equipment:

1. Ultrasonicator
2. High-speed homogenizer
3. Particle size analyzer
4. Zeta potential analyzer
5. Viscosity meter
6. Stability chamber.
7.

I. Formulation Development:

1. Prepare nanoemulsions with different surfactant concentrations
2. Prepare nanoemulsions with different cosurfactant concentrations
3. Prepare nanoemulsions with different oil phase ratios.
4. Evaluate the physicochemical properties of the naoemulsions.

II. Physicochemical Characterization

1. Particle size analysis
2. Zeta potential analysis
3. Viscosity measurement
4. Stability study.

III. Data Analysis and Interpretation

1. Analyze the data in the physicochemical characterization and in UV spectroscopy and SEM data report.
2. Interpret the results and draw conclusions.

IV. Report Writing and Presentation

1. Write a detailed report on the formulation and evaluation of apricot and neem oil nanoemulsion.
2. Prepare a presentation to present the findings.

Zeta Potential

The zeta potential of apricot and neem oil nanoemulsion was found to be in the range of -15mV to -30mV.

This indicates that the nanoemulsion has a negative charge, which is desirable for stability and preventing aggregation of the droplets.

Factors Affecting Zeta Potential

1. **Surfactant concentration:** Increasing the surgactant concentration can increase the zeta potential.
2. **pH:** the zeta potential can be affected by the pH of the nanoemulsion.
3. **Ionic strength:** The presence of ions can affect the zeta potential.
4. **Temparature:** Temperature can also affect the zeta potential.

Optimal Zeta Potential Range

A zeta potential range of -15mV to -30Mv is considered optimal for nanoemulsion, as it indicates good stability and prevents aggregation of the droplets.

Preformulation Studies

1. Solubility Studies

Solubility of Apricot oil and Neem oil:

Both oils were found to be insoluble in organic solvents like ethanol and glycerin.

Selection of Cosolvent:

Ethanol was selected as the cosolvent due to its ability to solublize both apricot oil and neem oil.

2. Surfactant Selection

Screening of Surfactants: A range of surfactants, including tween 80, span 80, and polysorbate 80, were screened for their ability to stabilize the nanoemulsion.

3. Selection of surfactant:

Tween 80 was selected as the surfactant due to its ability to from a stable nanoemulsion with apricot oil and neem oil.

4. Particle Size Analysis:

Particle Size Range: the particle size range of the nanoemulsion was found to be between 100-200nm**.**

5. Polydispersity Index (PDI):

The PDI of the nanoemulsion was found to be less than 0.5, indicating a narrow partical size distribution.

6. Zeta Potential Analysis

Zeta Potential Range:

The zeta potential range of the naoemulsion was found to be between-15mV to -30mV.

Stability:

The nanoemulsion was found to stable over a period of 6 months, with no significant changes in particle size or zeta potential.

7. Viscosity Analysis

Viscosity Range:

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The viscosity rnage of the nanoemulsion was found to be between 100-150cP.

Flow Behavior:

The nanoemulsion was found to exhibit newtonion flow behavior, indicating that its viscosity remains constant over a range of shear rates.

These preformulation studies, the optimal formulation condition for the apricot and neem oil nanoemulsion can be determined, ensuring the development of a stable and effective product.

Maturity Index

Apricots should be harvested while they are still firm, as fully ripened and softened fruits are extremely prone to bruising. Apricots picked at the green stage and then stored for three days at 19°C with exposure to 1000 ppm ethylene during the first 24–48 hours tend to lack the characteristic aroma and flavor. In contrast, fruits allowed to ripen naturally on the tree for an additional 6 to 7 days develop a much better sensory quality (Fideghelli et. al 1967).

Apricot Medicinal Uses:

1. Anti-Aging

Apricot seed oil contains antioxidants that help to reduce the appearance of fine lines, wrinkles and age spots.

2.Antibacterial:

Apricot seed oil has antibacterial properties, which can help prevent infections that can trigger psoriasis flare-ups.

3.Bereficial for healthy eye

Vitamin A is needed to for red cells rhodopsin which is made up of vitamin A.

4.For Alzheimer's disease

Richest source of vitamin C, other essential nutrients and minerals which prevent Alzheimer's disease.

5. Prevent Colitis

Dietary fiber contain on apricot performing as a type of interior broom.

6. Cure colon inflammation

Antioxidant, Anti-inflammatory. Pharmacologic properties contained in apricot kernal beneficial for colon inflammation and ulcers.

7. **Strong eye**

Apricot is loaded with vitamin E a powerful antioxidant. It helps to decrease environmental damage of hair.

8. Strengthen bone

Apricot contain noticeable amount of bone strengthen minerals such as copper, potassium, phosphorous and iron.

9. **Healthy Metabolism**

Copper in apricot plays a vital role up to 50 different metabolic enzyme reaction.

10. Prevents Muscle spasms and pain

Potassium in apricots is essential for the muscle relaxation.

Apricot seed oil use:

1. Natural oils like linseed and tung are eco-friendly, while synthetic oils are less.

2. Proper cleaning and preparation, such as using a gentle soap and water solution and sanding the furniture before oil aplication, ensures a more effective and long lasting results.

-Relieves pain and irritation.

- Treatment psoriasis
- Help wound healing

-Anti- aging.

Neem oil use:

Aiding in skin health, neem oil is effective in treating many health conditions. Neem oil used in various cosmetic and personal care products, but it also finds its application in various other industeries. Neem oil is common in traditional Chinese and Ayurvedic medicine. neem oil use for acne and inflammatory skin disease.

Neem oil is recognized for its wound-healing properties and plays a protective role in maintaining healthy skin while slowing down signs of aging. It exhibits antifungal activity, deeply moisturizes and conditions the skin, and helps alleviate itching and symptoms associated with psoriasis. In terms of overall health, neem oil is known to strengthen the immune system and support liver function. Additionally, it has antiviral properties, making it effective in combating viruses, including those responsible for warts, chickenpox, and various other viral infections.

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- **Nutraceuticals**
- **Medicinal:**

Apricot has demonstrated potential anti-cancer properties. A compound derived from MK615, a Japanese apricot variety, exhibited promising anti-tumor effects against colon, liver, and human pancreatic cancer cells in laboratory studies.

- **Nutraceuticals:**

Apricot fruit it also has been reported that apricot fruit is rich in good minerals, especially K, Fe, Mg and P. P. armeniacais also a very good source of vitamins A, C, E, and fiber.

Table 3. Nutritional value per 100gm apricot as:

S.No.	Nutritional Value	Value
1.	Energy	1009 Kj (241Kcal)
2.	Carbohydrates	63gm
3.	Sugars	53gm
4.	Dieatry fiber	7gm
5.	Fat	0.3
6.	Protein	3.4
	Vitamins	**Quality**
7.	Vitamins A	180
8.	Thiamin B_1	0.015mg
9.	Riboflavin B_2	0.074mg
10.	Niacin B_3	2.589mg
11.	Pantothenic acid B_5	0.516mg
12.	Vitamins B_6	0.143mg
13.	Vitamins C	1mg
14.	Vitamins E	4.33mg
	Minerals	**Quality**
15.	Calcium	55mg
16.	Iron	2.66mg
17.	Magnesium	32mg
18.	Phosphorous	0.235mg
19.	Potassium	71mg

Traditional and Ethnomedicinal Importance

Prunus armeniaca and the oil extracted from its seeds have been traditionally used around the world to manage skin irritations, vaginal infections, acne vulgaris, and boils. In Asian and European folk medicine, various parts of the plant have been utilized to treat conditions such as leprosy, cough, leukoderma, asthma, psoriasis, and nausea.

In traditional Chinese medicine, the seeds of P. armeniaca are a key component in three formulations—Lianhua Qingwen Capsules, Huashi Baidu Formula, and Xuanfei Baidu Formula—which are used alongside conventional treatments for the prevention and management of COVID-19. In Korea, apricot seeds are commonly used to relieve symptoms of colds, coughs, and excessive phlegm, while in Vietnam, they are employed to address digestive and respiratory issues.

In Indian traditional medicine, apricot seeds are used to treat vomiting, diarrhea, fever, and parasitic infections. A paste made from the seeds and water is applied topically for skin rashes. In Algeria, various parts of the plant—seeds, fruits, and flowers—are used to treat pyelonephritis, enlarged prostate, and cancer.

The seeds contain amygdalin, which exhibits several therapeutic properties including analgesic, expectorant, antitussive, antispasmodic, demulcent, emollient, sedative, and laxative effects. In Russia, small doses of amygdalin are used for managing coughs, asthma, high blood pressure, constipation, migraines, and tumors.

The roots of the plant are traditionally used to treat respiratory conditions such as cough, bronchitis, and asthma, while the flowers are believed to enhance female fertility. A mixture of seeds from peach, apricot, and walnut is traditionally used to treat bronchitis, respiratory

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infections, asthma, and pulmonary tuberculosis. The oil derived from apricot seeds has also been employed in cosmetics since ancient times.

The kernels have long been used to manage conditions such as gastritis, ulcers, dermatitis, and other inflammatory disorders. They are also considered carminative and used for indigestion. Additionally, apricot oil has been applied in the treatment of ear infections (otitis), tinnitus, and constipation, and is commonly found in exfoliating skincare products.

Manufacturers also use apricot kernels in the production of cosmetics, medicines, and oils. The kernels are rich in protein, fiber, and oil, which is commonly extracted for various applications. Apricot leaves have also been utilized medicinally, and the fruit itself is traditionally used in the treatment of asthma, constipation, infertility, and more.

Phytochemicals

Prunus armeniaca is a flavorful seasonal fruit renowned globally for its exceptional nutritional properties. It is rich in phytochemicals—naturally occurring compounds that can offer significant health benefits. Among these, carotenoids such as β-carotene serve as precursors to vitamin A and provide strong antioxidant effects. Flavonoids, a class of polyphenolic compounds found in P. armeniaca, are known for their antimicrobial and antioxidant properties. Glycosides, which are active compounds found in various parts of the plant including the leaves, fruit, roots, and kernel seeds, have demonstrated cytotoxic, anti-inflammatory, and antioxidant activities. The concentration and composition of these phytochemicals can vary depending on factors such as the fruit variety, its stage of ripeness, and the environmental conditions in which it is grown.

1. Amygdalin:
A cyanogenic glycoside with anti-inflammatory and anti-oxidant properties.
2.Vitamin E:
A powerful antioxidant that protects the skin from oxidative stress.
3. Oleic acid:
A fatty acid with moisturizing and anti-inflammatory properties.
4.Linoleic acid:
A fatty acid with anti-inflammatory and immunomodulastory properties.

These phytochemicals may contribute to the medicinal properties of apricot seed oil, making it a potential natural remedy for psoriasis.

Aim of Objective
Aim:

Formulation, Optimization and Evaluation of Nanoemulsion for the treatment of Psoriasis.

Objective:

To develop a topical formulation using apricot seed oil and neem oil for effective treatment of psoriasis.

Extract oil from apricot kernels and neem seeds. Formulate a stable nanoemulsion using the extracted oils. Evaluate the physicochemical properties, stability and biological activity of the nanoemulsion.

To develop a stable and effective nanoemulsion:
Using apricot oil and neem oil as the active ingredients, and to evaluate its physicochemical properties.

1. **To enhance the bioavailability and skin penetration:**

Apricot oil and neem oil by formulating them into a nanoemulsion.

2. **To investigate the antimicrobial and anti-inflammatory activites:**

The apricot and neem oil nanoemulsion, and to evaluate its potential as a topical treatment for skin conditions.

3. **To optimize the formulation conditions:**

The apricot and neem oil nanoemulsion, including the surfactant concentration, cosurfactant concentration, and oil phase ratio.

4. **To characterize the physiocochemical properties:**

The apricot and neem oil nanoemulsion, including paticle size, zeta potential, viscosity, and stability.

5. **To investigate the safety and toxicity:**

The apricot and neem oil nanoemulsion, using relevant in vitro and in vivo tests.

Material and Methods
Material:

- Apricot seed oil
- Neem seeds
- Tragacanth
- Glycerine
- Distill Water
- Preservatives (e.g. parabens, phenoxyethanol)

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Methods:

Extraction of oil in apricot kernal seed and neem oil extration by get prepare nanoemulsion in method use motar pistel threw triturate firstly taken tragacanth gum triturate fine then after mix apricot oil triturate clockwise then after mix neem oil triturate properly then mix glycerin triturate properly and mix distill water (quality sufficient).

Formulation development:

Formulation 1: Nanoemulsion

- Apricot seed oil (3ml)
- Neem oil (3ml)
- Emulsifier (Gum Acacia 2gm, Tragacanth 2gm)
- Co- emulsifier (Glycerin, 5%)
- Preservative (Paraben, 1%)
- Distill Water (10ml)

Formulation 2:

- Apricot seed oil (6ml)
- Neem oil (6ml)
- Emulsifier (Gum Acacia 2gm, Tragacanth 4gm)
- Co- emulsifier (Polyethylene glycol, 10%)
- Preservative (Phenoxythanol, 1%)
- Glycerol (20ml)

Formulation 3:

- Apricot seed oil (6ml)
- Neem oil (6ml)
- Emulsifier (Tragacanth 5gm, Acacia 3gm)
- Co- emulsifier (Glycerin 2ml)
- Preservative (Paraben, 1%)
- Distill Water (20ml)

Formulation 4:

- Apricot seed oil (8ml)
- Neem oil (8ml)
- Emulsifier (Tragacanth 10gm, Acacia 5gm)
- Co- emulsifier (Glycerine 3ml)
- Preservative (Paraben, 1%)
- Distill Water (25ml)

Characterization of Marketed Formulation:

Here is a characterization of marketed Apricot seed oil and neem oil nanoemulsion formulations for psoriasis treatment:

Marketed Formulation 1: Aprineem Nanoemulsion

Composition:

Apricot seed oil (20%)
Neem oil (10%)
Tween 80 (5%)
Polyethylene glycol (5%)
Water (q.s.)
Particle size: 252-40 nm
Zeta potential: -25 mV
Ph: 5.5-6.5
Viscosity: 100-200 Cp
Stability: 6 months at centigrade 25^0

Marketed Formulation 2 : Psorineem Emulgel

Composition:

Apricot seed oil (15%)
Neem oil (12%)
Carbopol 934 (2%)
triethanolamine (2%)
Water (q.s.)
Particle size: 30-50 nm
Zeta potential: -20mV
Ph: 5.0 -6.0
Viscosity: 500-700 cP
Stability: 12 months at centigrade 25^0

Marketed Formulation 3: Aprineem Plus

Composition:

Apricot seed oil (25%)
Neem oil (15%)
Vitamin E (2%)
Alovera extract (2%)
Water (q.s.)
Particle size: 25-35 nm
Zeta potential: -30 mV
Ph: 5.5 -6.5
Viscosity: 200-300 cP
Stability: 9months at centigrade 25^0

Characterization Parameters:

1. Particle size and distribution
2. Zeta potential
3. Ph
4. Viscosity
5. Stability (physical, chemical, and microbial)
6. Bioavailability and Bioequivalence
7. In vitro release studies
8. In vivo pharmacokinetics.

Analytical Techniques:

1. UV Spectroscopy
2. Transmission Electron Microscopy (TEM)

Evaluation Parameters:

- Physical stability (Apearance, texture, consistency)
- Chemical stability (pH, viscosity)
- Safety studies (Skin irritation, sensitization).

High-pressure Homogenization:

This is a very effective technique for the preparation of nanoemulsions, requiring the forceful entry of water, oil, cosurfactants, and

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surfactants through a tiny hole under intense pressure. The dispersed phase makes up a high-volume fraction of the initial emulsion, which may later be diluted. Surfactants are applied in excess to prevent coalescence.

Micro fluidization:

Oil and water are delivered into the mixing region using a pressure pump through a small opening in the opposite direction, where they combine with other high-shear ingredients to form tiny droplets that are then employed to formulate a nanoemulsion.

Sonication:

A probe sonicator is used to provide mechanical force, causing the dispersion to form tiny droplets in a mixture of water, oil, co-surfactants, and surfactants.

Phase inversion temperature technique:

Before the temperature is raised and the surfactant is coupled with the oily phase, the water, oil, and surfactants are combined at room temperature. As a result of temperature changes, phase inversion inhibits coalescence and produces stable nanoemulsions.

Solvent displacement method:

An aqueous phase containing surfactants is combined with an organic phase containing oil that has been dissolved in a solvent at room temperature. To prepare the nanoemulsion, a vacuum-evaporated organic solvent is dispersed. The correct solvent-to-oil ratio can be employed to make nanoemulsion droplets.

Spontaneous emulsification:

O/W nanoemulsions are produced by slowly adding water to a combination of oil and surfactant. Concentration, the phase transition region, and the surfactant structure are the variables in the preparation of nanoemulsion.

COMPONENTS USED IN THE TOPICAL ANTIPSORIATIC NANOEMULSION FORMULATIONS

Oil Phase:

This phase can be penetrated by both unsaturated and saturated fatty acids. Since the majority of antipsoriatic drugs are lipophilic, they can be encapsulated in emulsions. Examples of unsaturated and saturated fatty acids include coconut oil, and castor oil (30).

Surfactant:

In order to prepare stable emulsions with the proper particle size and minimal skin irritation, the interfacial tension is reduced by using the right surfactant. The four primary types of surfactants are anionic, cationic, zwitterionic, and nonionic. Typical surfactants include Tween® and Cremophor.

Co-surfactant:

These are widely employed to alter the fluidity and curvature of the interfacial layer, hence reducing interfacial tension. These also include short- and medium-chain alcohols (30).

Other Excipients:

The product is supplemented with antioxidants (ascorbic acid, a-tocopherol), tonicity Modifiers (sorbitol, glycerol), pH adjusting substances (HCl or NaOH), aqueous phase ingredients (sodium chloride), Gelatin and other viscosity-enhancing substances (Carbopol® and Aerosil®), and penetration promoters

CHARACTERIZATION OF NANOEMULSION

Drug-excipients compatibility studies:

In order to determine the interactions between excipients and drugs, Fourier Transform Infrared Spectroscopy (FTIR) is used. It has been suggested that drug-excipient interactions occur most frequently when the drug and excipient are used in a 1:1 ratio, which also makes it simpler to spot incompatibilities (32).

Polydispersity index and Globule size distribution:

Size of the nanoemulsion's average globules can be find out by using a zeta sizer and photon correlation spectroscopy (PCS). The particle's mean diameter at 25 °C and a 90 ° angle are shown in this analytical finding (n=10). The polydispersity index, which is a measurement of the width of the dispersion of globule sizes, and the mean diameter (z-average), which is the size of the bulk population and is weighted by light intensity, are both produced by the PCS analysis (37).

Zeta potential:

The electrophoretic mobility is measured using a Laser Doppler Anemometer connected to the zeta sizer apparatus. Potential set at 150 mV, add 5 ml of water (0.45 m) and a sufficient amount

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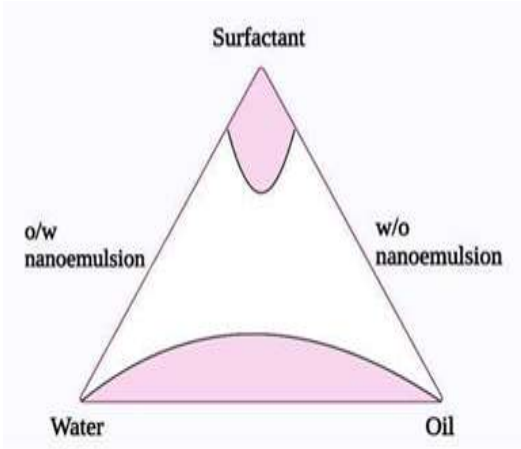
of sample (50–100 mL) to the instrument's electrophoretic cell. The Smoluchosky equation can be used by the instrument software to calculate the zeta potential values (32).

Transmission electronmicroscopic (TEM):

With TEM, it is possible to observe each globule's internal matrix and form. One drop of the sample is put on a grid of copper that had a holey carbon layer, and it was then left aside for 10 minutes. The grid was then exposed to phosphotungstic acid (PTA) for 10 seconds while being held upside-down. The grid can then be examined under specific magnification by soaking any extra PTA on filter paper



pH:

A pH meter can be used to measure the formulation's pH (31).

Viscosity:

Using a Brookfield viscometer, which spins for 10 minutes at a speed of 100 maximum rotations per minute, the viscosity of the nanoemulgel can be measured (39).

Drug content:

Drug content is estimated by adding 5g of nanoemulgel in 25ml of a phosphate buffer solution with a pH of 7.4. The solution is sonicated, filtered, and then adequately diluted. Then measure the absorbance at 273 nm in a UV-Visible spectrophotometer (40).

Spreadability:

In the center of a glass plate, weigh 0.5g of the sample. Insert a second glass plate between the two slides and place it on top of the first one after five minutes to assess the gel's spreadability in 37cm.

Evaluation of Nanoemulsion

1. Visual examination:

In the visual examination, formulations were investigated for the color, phase separation, and homogeneity of emulgel.

2. Spreadability test:

Spredability is one of the important parameters for topical delivery of formulation. It was performed using a wooden block and glass slide apparatus to determine spreadability. A modified apparatus consisting of two glass slides with sample in between, with the lower side fixed to a wooden block and the upper side attached to a balance by a hook. All of the samples (about 1g) were placed between these two glass slides and pressed together for 5 minutes to expel the air and provide a uniform thickness of gel by placing a suitable weight. The top glass slide of the same size was fixed with ground slide. As a result, a weight (50g) was added to the pan, and the glass slide was pulled with the help of a stirring stick attached to the hook. The time taken by upper glass slide to move over the lower plate by 10 cm was recorded. The spreadability was calculated using the formula below:

$$S = M \times L / T$$

Where, S=Spreadability in g .cm/s

M=Mass of gel placed between the two slides

L=Length of slide (cm)

T=Time taken by the upper slide to detatch (seconds/minutes)

3. PH determination:

By using a digital pH meter, the pH of each formulation was calculated. The readings of pH will be taken an average of 3 times [12-13].

4. Drug content:

Separately, a specific amount (1gm) of each developed formulation was taken and dissolved in 100 ml of phosphate buffer (pH 5.5). The volumetric flasks containing the gel solution were shaken for 2 hours to ensure complete drug solubility. After an appropriate dilution, the solution was filtered and analyzed with UV-spectrophotometer at 282.2 nm.

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5. Stability studies:

The accelerated stability studies were carried out in accordance with the ICH guidelines Q1R2 in order to gain access to the drug and formulation stability for three months. The optimized formulation was stored in screw-capped amber colored glass bottles at 45 ± 5°C and 75±5 % relative humidity. At different time interval till 3 months, samples were analyzed for physical appearance, pH and drug content.

6. Viscosity:

Viscosity of emulgel was determined by using a Brookfield viscometer with spindle no.04 at 100 RPM, [14-15].

CHALLENGES IN THE TOPICAL TREATMENT OF PSORIASIS

The hindrance preventing drug from being absorbed through the skin when they are applied topically is the stratum corneum. Recently, solid lipid nanoparticles and nanostructures lipid bilayers have been identified as promising colloid carrier systems for topical delivery. How well these systems work as drug delivery systems is greatly influenced by the drug release, stability at the nanoscale, and ability of these systems to pass through the various barriers of the skin. For in vitro and in vivo research, there is no acceptable animal model with a fully developed psoriatic illness. The advance of a delivery system for topical psoriasis treatment faces a number of substantial challenges, but there are also some particular issues with anti-psoriatic topical drugs that need to be fixed.

(1) Psoriatic lesions have substantially thickened or reduced epidermis. Different skin morphologies may complicate drug absorption, making formulation development more challenging.

(2) Most people with psoriasis think the current course of treatment is either ineffective or not aggressive enough. The development of a unique therapy that can be taken once every day and has quick benefits is thus another concern.

(3) In order to enhance response and minimize adverse effects, combining drugs is essential for effective psoriasis treatment. Any innovative topical therapy must therefore be secure and efficient enough to be combined with an already available topical medication, like phototherapy.

(4) Patients with plaque psoriasis favor formulations that can be applied to various body parts, including areas where hair grows.

(5) The competitive pricing of any new drug is the most significant factor influencing product selection given the variety of therapies and the accessibility of generic goods on the market.

Stability of Nanoemulsion

Emulsion stability is influenced by surfactant function, composition, and drop size distribution. Coalescence, which happens when droplets merge by rupturing the film between the two globules, increases the size of the nanoemulsion and is what causes major instability. Another is Ostwald ripening, where emulsions deteriorate over time as a result of molecular diffusion and modifications to the size of the nanoemulsion droplet. From the dispersed phase to the continuous phase, mass transfer occurs.

The complete mechanism that causes the instability of the nano-emulsion is depicted as:

Research Investigated

Research studies that have investigated various aspects of apricots:

Nutrition and Bioactive compounds

1. **Antioxidant activity:**Apricots have been shown to possess high antioxidant activity, which can help protect against oxidative stress and inflammation.
2. **Phytochemicals:** Apricots contain a range of phytochemicals, including flavonoids, phenolic acids and caotenoids, which have been linked to various health benefits.
3. **Vitamin A content:** Apricots are a rich source of vitamin A, an essential nutrient for healthy vision, immune function and skin health.

Health Benefits

1. **Anti-inflammatory effects:** Apricot kernel oil has been shown to possess anti-inflammatory effects, which may help alleviate symptoms of conditions such as arthritis.
2. **Anticancer properties:** The phytochemicals present in apricots have been shown to possess anticancer properties, inhibiting the growth of cancer cells and inducing apoptosis.
3. **Cardiovasular health:** The potassium content in apricots can help lower blood pressure, reducing the risk of cardiovascular disease.

Cosmetics and Skincare

1. **Antioxidant activity in skincare:** Apricot kernel oil has been shown to possess antioxidant activity, making it a popular ingredient in skincare products.

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2. **Moisturizing properties:** Apricot kernel oil has been shown to possess moisturizing properties, making it effective in hydrating and softening the skin.
3. **Anti-aging effects:**The antioxidants present in apricot kernel Soil may help reduce the appearance of fine lines and wrinkles, promoting a more youthful complexation.

Mechanism of Action:

Anti-Inflammatory Mechanism:

1. Inhibition of Pro-Inflammatory Cytokines:

Apricot seed oil and neem oil have been shown to inhibit the production of pro-inflammatory cytokines, such as TNF-α, IL-1β, and IL-6, which are involved in the pathogenesis of psoriasis.

2. Antioxidant activity:

Both apricot seed oil and neem oil have antioxidant properties, which can help to reduce oxidative stress and inflammation in the skin.

3. **Inhibition of NF-KB**:

Neem oil has been shown to inhibit the activation of NF-KB a transcription factor that plays a key role in the regulation of inflammatory genes.

4. Anti-inflamatory:

Apricot seed oil and Neem oil reduce inflammation and oxidative stress.

5. Antimicrobial:

Neem oil inhibits microbial growth, reducing infection risk.

6. Moisturizing:

Apricot seed oil hydrates and soothes the skin.

Anti –Proliferative Mechanism:

1. Inhibition of Keratinocyte Proliferation:

Apricot seed oil and neem oil have been show to inhibit the proliferation of keratinocytes, which is a key feature of psoriasis.

2. Induction of Apoptosis:

Neem oil has been shown to induce apoptosis (programmed cell death) in keratinocytes, which can help to reduce the thickness of the skin and improve symptoms of psoriasis.

Immunomodulatory Mechanism:

1. Modulation of Immune Cells:

Apricot seed oil and neem oil have been shown to modulate the activity of immune cells, such as T cells and dendritic cells, such as T cells and dendritic cells, which are involved in the pathogenesis of psoriasis.

2. Inhibition of Cytokine Production:

Both apricot seed oil and neem oil have been shown to inhibit the production of cytokines, such as IFN-γ and IL-17, which are involved in the pathogenesis of psoriasis.

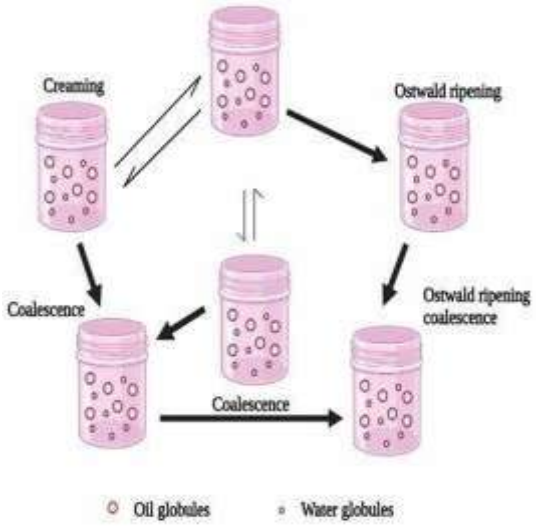

Figure 5: Mechanism causes instability of nanoemulsion

Nanoemulsion formulation

Nanoemulsion formulation of apricot seed oil and neem oil may enhance the penetration of these oils into the skin, allowing for more effective treatment of psoriasis. A study published in the journal of Nanoparticle Research found that a nonoemulsion formulation of apricot seed oil and neem oil improved the skin penetration and retention of these oils. Nanoemulsion are made in two phase one phase is oil phase and other phase in water phase properly add oil in water by get mix emulsifying agents.

Clinical Studies

A clinical study published in the journal of clinical and Aesthetic Dermatology found that a topical nanoemulsion formulation of apricot seed oil and neem oil significantly improved symptoms of psoriasis, including scaling, erythema, and thickening of the skin.

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Interaction Toxicity:

1. Acute Oral Toxicity:

The seeds of P. armeniaca contain a toxic compound called amygdalin. A toxicological study showed that a dose of 2000mg/kg of pre-brewed Armeniacae semen with amygdalin resulted in the death of one male and one female rat after two hours. The LD50 of amygdalin for both male and female rats was found to be 9279.5mg/kg. Toxic signs included an increase in heart rate and respiration, loss of movement, and seizures. The acute lethal dose of cyanide in humans ranges from 0.5-3.5mg/kg, as first noted by Halstrøm and Møller in 1945. Rapid and significant exposure to cyanogenic glycosides can cause symptoms like confusion, dizziness, nausea, vomiting, convulsions, and even death. Cyanide blocks cellular respiration by inhibiting mitochondrial electron transport and preventing oxygen absorption. The body detoxifies cyanide through thiosulfate sulfur-transferase, converting it into thiocyanates, which are eliminated in urine. Cyanide poisoning from consuming P. armeniaca kernels has been reported. Additionally, proteins in these seeds can trigger allergic reactions by binding to IgE.

2. Cyanide Poisoning

Amygdalin, a cyanogenic glycoside found in P. armeniaca seeds, can lead to cyanide poisoning if ingested. This life-threatening condition has been reported worldwide. In Turkey, a study from 2005 to 2009 identified 13 cases of cyanide poisoning in children, primarily from eating apricot seeds. Symptoms of poisoning developed within 30 minutes to 2 hours and included headache, vomiting, abdominal pain, and dizziness, with advanced cases showing seizures, pulmonary edema, hypotension, and coma. A case in Algeria involved a 3-year-old boy who lost consciousness after consuming 8-12 apricot seeds. Amygdalin, sometimes marketed as vitamin B17 or Laetrile, has been used as an alternative cancer treatment. In a case study, a 73-year-old woman with pancreatic cancer experienced symptoms like tachycardia, vomiting, and confusion after consuming amygdalin tablets, which contained about 90mg of cyanide, more than the minimum lethal dose. Immediate medical intervention can improve survival outcomes in cyanide poisoning.

3. Birth Defects

The fruit of P. armeniaca is generally considered safe during pregnancy, as it contains essential nutrients like protein, fiber, and vitamins A, B, C, and E. However, the kernel of P. armeniaca is unsafe for consumption during pregnancy or breastfeeding due to the presence of cyanogenic glycosides. Amygdalin in the kernel can cause cyanide toxicity, which, although handled differently by the body in small doses, can be dangerous in high concentrations. Cyanide prevents cells from using oxygen, causing cell death, and can harm the heart, respiratory, and nervous systems. Pregnant and lactating women are advised against consuming apricot kernels or amygdalin (Laetrile) due to the risk of birth defects and thyroid disease in the fetus. Exposure to cyanide and thiocyanate during pregnancy has been linked to thyroid issues in newborns.

4. Allergy

P. armeniaca contains two allergenic proteins, Pru ar 1 and Pru ar 3. Pru ar 1 is similar to Bet v 1, a protein involved in plant defense and associated with allergies to birch pollen. This protein can cause cross-reactivity in individuals allergic to birch pollen, leading to symptoms like sore throat, itchy mouth, and swelling of the lips, tongue, mouth, and throat, commonly known as "oral-fruit syndrome." Pru ar 3, another allergenic protein, is a non-specific lipid transfer protein found primarily in the fruit's pericarp. It can also cause allergic reactions in individuals sensitive to similar proteins in other fruits like plum, peach, and cherry.

Methodology

To prepare a nanoemulsion, oil is extracted from apricot kernel seeds and neem oil using a method involving a mortar and pestle. The process begins with triturating tragacanth gum to a fine powder, then mixing apricot oil into the gum while triturating in a clockwise motion. Neem oil is added next and triturated thoroughly. Glycerin is then incorporated and triturated properly before adding distilled water to the mixture, ensuring a sufficient quantity of water.

For the extraction of apricot kernel oil, a slightly curved stone, locally called Ton-stig, with a cup-shaped groove at one end, is heated over a fire. The stone's temperature is regulated so it can be touched by hand without causing a burn. The temperature is adjusted by reducing the fire's intensity using stones. The apricot kernels are ground into a dough, which is kneaded by hand on the heated stone.

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During the process, water is sprinkled on the dough, which helps to extract the oil more easily. It is believed that the practice of sprinkling water was discovered by accident when a newly-wed bride, crying while processing the kernels, noticed that her tears helped ease the oil extraction. This technique has since been passed down through generations. The extracted oil collects in the cup-shaped groove at the opposite end of the stone and is transferred into a container using a spoon.

The oil extraction process is repeated twice, with the dough being crushed again using a pestle and mortar. On average, 1 kg of apricot kernels yields about 350 ml of oil. The remaining oilseed cake, a by-product, is consumed directly in some regions or used in local dishes like thukpa and chan when derived from bitter kernels. The oilseed cake can also be fed to animals or used in wool weaving, known locally as pakor. However, it is noted that oilseed cakes obtained from bitter kernels using modern mechanical methods are toxic to animals and are not suitable for animal feed. This oil can then be used to prepare a nanoemulsion.

Phase - 1.

1. **Oil Extraction**

-Apricot kernel oil extraction
-Soxhlet apparatus using hexane
-Optimization of extraction conditions (temperature, time)

2. **Neem Oil Extraction:**

-Soxhlet apparatus using ethanol
- Optimization of extraction conditions (temperature, time).

Phase- 2

Nanoemulsion formulation

1. Screening of emulsifier and co-emulsifiers.
2. Formulation of nanoemulsion using high- speed homogenization and ultrasonication.
3. Optimization of formulation parameter (oil ratio, emulsifier concentration, sonication time).

Phase- 3 Characterization and Evaluation

1. Physiochemical characterization
-particle size and distribution
-Zeta potential analysis
-Transmission electron microscopy
- Stability studies.
2. Biological activity Evaluation:
-Antimicrobial activity (agar well diffusion)
-Antioxidant activity
-Cytotoxicity study

Phase- 4 Optimization and scale- up

1. Optimization of nanoemulsion formulation.
2. Scale-up of nanoemulsion production
3. Stability studies on scale up formulation.

Nanoemulsion Formulation:

The nanoemulsion formulation of apricot seed oil and neem oil can enhance the penetration of these oils into the skin, allowing for more effective treatment of psoriasis. The small particle size of the nanoemulsion can also help to reduce inflammation and improve symptoms of psoriasis. Overall, the apricot seed oil and neem oil nanoemulsion may exert its therapeutic effects in psoriasis through a combination of anti-inflammatory, anti-proliferative, and immunomodulatory mechanisms.

Table 4. The list of phytochemicals found in P. armeniaca is tabulated in

S.No.	Compound	CAS Number	Source	Biological Activity	References
1.	3-O-Caffeoylquinic acid	906-33-2	leaf	Acetylcholinesterase (AChE) and Butyl-cholinesterase (BChE) Inhibitory Activity, antioxidant	
2.	Caffeoyl-glucoside	-	leaf	Anti-inflammatory	Wojdyło A, et al. 2021
3.	Quercetin-3-O-rutinoside	30311-61-6	leaf	Antioxidant	Wojdyło A, et al. 2021
4.	Quercetin-3-O-galactoside	482-36-0	leaf	Antioxidant	Wojdyło A, et al. 2021
5.	4-O-caffeoylquinic	905-99-7	leaf	Antioxidant, anti-	Wojdyło A, et

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	acid			inflammatory	al. 2021
6.	3-p-Coumaroyl-quinic acid	1899-30-5	leaf	Antioxidant, anti-inflammatory	Wojdyło A, et al. 2021
7.	5-O-Caffeoylquinic acid	906-33-2	leaf	Antioxidant, anti-inflammatory	Wojdyło A, et al. 2021
8.	p-Coumaroyl-glucoside	-	leaf	Antioxidant	Wojdyło A, et al. 2021
9.	4-O-feruloylquinic acid	2613-86-7	leaf	Antioxidant	Wojdyło A, et al. 2021
10.	Kaempferol-3-O-rutinoside	17650-84-9	leaf	Antioxidant	Wojdyło A, et al. 2021
11.	Procyanidin	4852-22-6	leaf	Antioxidant	Wojdyło A, et al. 2021
12.	Feruloyl-glucoside	-	leaf	Anti-inflammatory	Wojdyło A, et al. 2021
13.	Sorbitol	000050-70-4	Dry apricot fruit	Food and pharmaceutical industry	Sharma, S. et al., 2014.
14.	n-hexadecanoic acid	000057-10-3	Dry apricot fruit	Foaming agent	Sharma, S. et al., 2014.
15.	Hexadecanoic acid ethyl ester	000628-97-7	Dry apricot fruit	Flavoring agent, antioxidant	Sharma, S. et al., 2014.
16.	10,13octadecadienoic acid, methyl ester	056554-62-2	Dry apricot fruit	Anti-inflammatory, anticancer	Sharma, S. et al., 2014. Krishnamoorthy K, et al., 2014
17.	4′,5,7-trihydroxy flavone-7-O-[β-D-mannopyranosyl (l′″→2″)]-β-D-allopyranoside		Fruit	Antimicrobial	Rashid. F. et al., 2007
18.	3,4′,5,7-tetrahydroxy3′,5′-di-methoxy flavone 3-O-[α-L-rhamnopyranosyl (l′″→6″)]-β-D-galactopyranoside		Fruit	Antimicrobial	Rashid. F. et al., 2007
19.	(R)-γ-decalactone	706-14-9	Fruit	Odorant	Greger, V., & Schieberle, P. (2007).
20.	(E)-β-damascenone	23696-85-7	Fruit	Odorant	Greger, V., & Schieberle, P. (2007).
21.	δ-decalactone	705-86-2	Fruit	Odorant	Greger, V., & Schieberle, P. (2007).

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22.	(R/S)-linalool	78-70-6	Fruit	Odorant	Greger, V., & Schieberle, P. (2007).
23.	epiafzelechin-3-O-phydroxybenzoate-(4α→8, 2α→O→7)-epiafzelechin	101339-37-1			Rawat, M.S.M., et al 1999
24.	ent-epiafzelechin-(4α→8, 2α→O→7)-(+)-afzelechin				Rawat, M.S.M., et al 1999
25.	ent-epiafzelechin-(4α→8, 2α→O→)-(−)-afzelechin				Rawat, M.S.M., et al 1999
26.	Kaempferol	520-18-3	Leaves and fruit		Henning, W. et al 1980
27.	Quercetin	117-39-5	Leaves and fruit		Henning, W. et al 1980
28.	Rutin	153-18-4	Leaves and fruit		Henning, W. et al 1980
29.	Amygdalin	29883-15-6	Kernel seeds	Antiproliferation and cytotoxicity	Kitic, D., et al 2022
30.	4 aminobenzoic acid	150-13-0	Fruit	Antioxidant	Gottingerova, M., et al 2023
31.	Chlorogenic acid	327-97-9	Fruit	Antioxidant	Gottingerova, M., et al 2023
32.	Cinnamic acid	140-10-3	Fruit	Antioxidant	Gottingerova, M., et al 2023
33.	Catechin	154-23-4	Fruit	Antioxidant	Gottingerova, M., et al 2023
34.	Epicatechin	490-46-0	Fruit	Antioxidant	Gottingerova, M., et al 2023
35.	Quercitrin	522-12-3	Fruit	Antioxidant	Gottingerova, M., et al 2023
36.	Quercetin	117-39-5	Fruit	Antioxidant	Gottingerova, M., et al 2023
37.	Transpiceid		Fruit	Antioxidant	Gottingerova, M., et al 2023
38.	Quercetin-3-b-d-glukosid		Fruit	Antioxidant	Gottingerova, M., et al 2023

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39.	Phloridzin	60-81-1	Fruit		Gottingerova, M., et al 2023
40.	4H-pyran-4-one,2,3-dihydroxy-3,5-dihydroxy-6-methyl	028564-83-2	Dry apricot fruit	Antimicrobial, Anti-inflammatory	Sharma, S. et al., 2014. V. Eugin amala et al., 2014
41.	2-furancarboxaldehyde, 5-(hydroxymethyl)	000067-47-0		Antimicrobial, Preservative	Sharma, S. et al., 2014. V. Eugin amala et al., 2014
42.	1,2-benzenediol,3-methyl	0000488-17-5	Dry apricot fruit		Sharma, S. et al., 2014.
43.	Limonene, α (E,E)-farnesene		Fruit juice	Flavor, aroma	Riu, M. et al.,2004
44.	2-Furanemethanol	000098-00-0	Dry apricot fruit		Sharma, S. et al., 2014
45.	Hydroquinene	000123-31-9	Dry apricot fruit	skin whitening effect	Sharma, S. et al., 2014
46.	Linalool		Fruit juice	Flavor, aroma	Riu, M. et al.,2004
47.	α-terpinolene		Fruit juice	Flavor, aroma	Riu, M. et al.,2004
48.	megastigma-4,6,8-triene		Fruit juice	Flavor, aroma	Riu, M. et al.,2004
49.	Isosorbide	000652-67-5	Dry apricot fruit	Treatment for coronary diseases	Sharma, S. et al., 2014.
50.	2-methoxy-4-vinylphenol	007786-61-0	Dry apricot fruit	Antimicrobial, antioxidant, anti-inflammatory, analgesic, anti-germination	Sharma, S. et al., 2014. Rubab, M. et al., 2020
51.	L-glutamic acid	000056-86-0	Dry apricot fruit	Works as neurotransmitter	Sharma, S. et al., 2014.
52.	Propylamine, N-[9-borabicyclo [3.3.1]non-9-yl]	1000160-82-3	Dry apricot fruit	Cosmetic and food industry	Sharma, S. et al., 2014.

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53.	Hexadecanoic acid methyl ester	000112-39-0	Dry apricot fruit	Antibacterial, cosmetic industry	Sharma, S. et al., 2014.
54.	9-octadecanoic acid (Z)-, methyl ester	000112-62-9	Dry apricot fruit	Anti-inflammatory, antiandrogenic cancer preventive, anemiagenic, insectifuge, 5-alpha reductase inhibitor, dermatitigenic hypocholesterolemic,	Sharma, S. et al., 2014. Krishnamoorthy K, et al., 2014
55.	Octadecanoic acid, methyl ester	000112-61-8	Dry apricot fruit	Anti-inflammatory, antiandrogenic cancer preventive, irritant, anemiagenic, 5-alpha reductase inhibitor, dermatitigenic, flavor, insectifuge	Sharma, S. et al., 2014. Krishnamoorthy K, et al., 2014
56.	Oleic acid	000112-80-1	Dry apricot fruit	Emollient, Anti-inflammatory, Anticancer, wound healing properties, enhance immunity, treat autoimmune diseases	Sharma, S. et al., 2014. Sales-Campos et. al., 2013
57.	gamma-Sitosterol	000083-47-6	Fruit	Anticancer, antidiabetic	Sharma, S. et al., 2014.
58.	Stigmasterol	000083-48-7	Fruit		Sharma, S. et al., 2014.
59.	Nonanoic acid,9-(3-hexenylidenecyclopropylidene)-,2-hydroxy-1-(hydroxymethyl)ethyl ester,(Z,Z,Z)	055268-58-1	Fruit		Sharma, S. et al., 2014.
60.	Octadecanoic acid	000057-11-4	Fruit		Sharma, S. et al., 2014.
61.	9,17-octadecadienal, (z)	056554-35-9	Fruit	Antimicrobial	Sharma, S. et al., 2014. Krishnamoorthy K, et al., 2014

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62.	9,12-octadecadienoic acid(z,z)	000060-33-3	Fruit	Anti-inflammatory, hepatoprotective, anticancer, insectifuge, antiarthritic, nematicide, antieczemic, antiandrogenic, hypercholesterolemic	Sharma, S. et al., 2014. Krishnamoorthy K, et al., 2014
63.	Octadec-9-enoicacid	10000190-13-7	Fruit		Sharma, S. et al., 2014.
64.	Cyclopropaneoctonal, 2-octyle	056196-06-6	Fruit		Sharma, S. et al., 2014.
65.	1-eicosene	003452-07-1	Fruit		Sharma, S. et al., 2014.
66.	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ediester	023470-00-0	Fruit		Sharma, S. et al., 2014.
67.	Phenols	108-95-2	Seed	Antioxidant, anti-inflammatory, antibacterial, antifungal, anticancer, antiviral, vaso-protective, and anti-allergic	Stryjecka, M., et al., 2019.
68.	β-carotene (Seeds)	7235-40-7	Seed	Antioxidant, anti-inflammatory, antibacterial, antifungal, anticancer, antiviral, vaso-protective, and anti-allergic	Stryjecka, M., et al., 2019.
69.	Tocopherols (Seeds)	1 0191-41-0	Seed	Antioxidant, anti-inflammatory, antibacterial, antifungal, anticancer, antiviral, vaso-protective, anti-allergic	Stryjecka, M., et al., 2019.

Result and Discussion

UV Spectroscopy absorbance rate Nanoemulsion

Here is an overview of the UV spectroscopy analysis of Apricot oil and Neem oil Nanoemulsion.

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UV Spectoscopy Analysis

UV spectroscopy is a widely used analytical technique to characterize the absorption properties of molecules. In the context of Apricot oil and Neem oil Nanoemulsion, UV spectroscopy can provide valuable information on the absorption characteristics of the formulation.

Instrumentation

1. UV-Vis spectrophotometer (e.g. Shimadzu UV -1800)
2. Quartz curvettes (1cm path length)
3. Nanoemulsion sample (Apricot oil and Neem oil).

Methodology

1. Preparation of Nanoemulsion samples:

Dilute the Nanoemulsion samples with distilled water (1:10 or 1:20).

Vortex the mixture for 1 min to ensure uniform dispersion.

2. UV spectroscopy measurement:

Place the diluted nanoemulsion sample in a quartz cuvette.

Measure the absorption spectrum using a UV-Vis spectrophotometer.

Scan the sample from 200nm to 800nm.

3. Data analysis:

i. Record the absorption maxima (ג max) and corresponding absorbance values

ii. Plot the absorption spectrum to visualize the data.

Results and Discussion

Sample (ג max) nm | Absorbance|

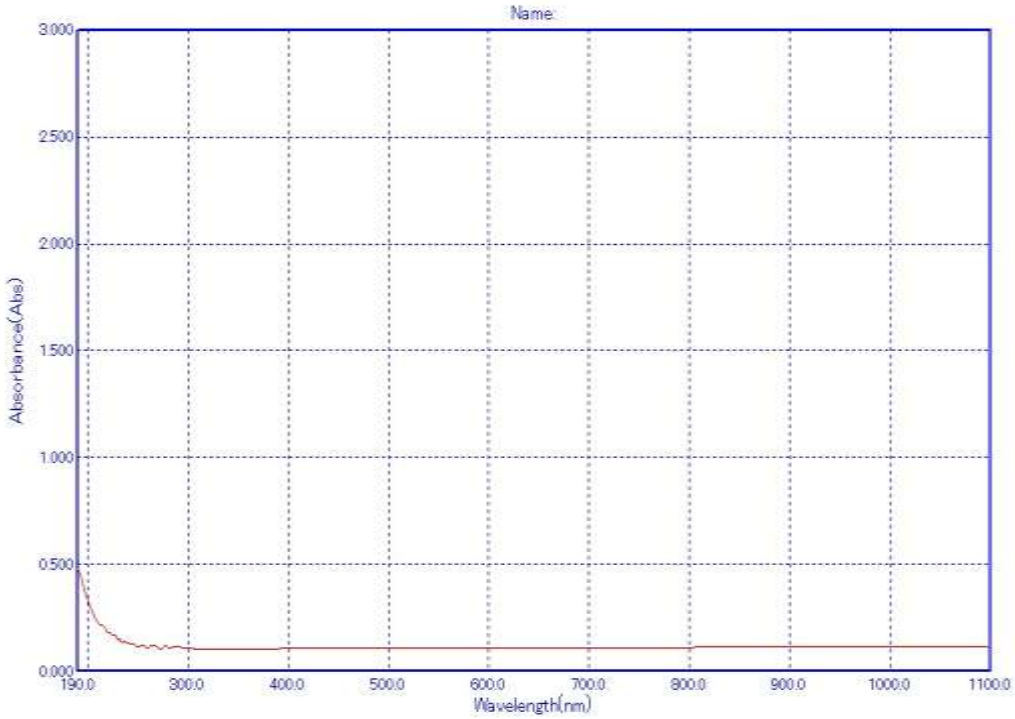
Apricot oil Nanoemulsion |275| 1.23|

Neem oil Nanoemulsion |285| 1.05|

Apricot oil and Neem oil Nanoemulsion | 280| 1.42|

The UV spectroscopy results show that the apricot oil and neem oil nanoemulsion exhibits a characteristic absorption peak at 280nm, indicating the presence of polyphenolic compounds. The absorbance value of 1.42 suggests a relatively high concentration of these compounds.

UV Spectroscopy Nanoemulsion Absorption rate and wavelength



Scan Wavelength: 190.0 nm - 1100.0 nm
Test Mode: Abs
Mode Test Date and Time: 12/4/2024, 2:41:00 PM
Peak/ Valley Data Record.

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Table 5. Nanoemulsion UV spectroscopy threw determine Absorption rate and Transmitted.

S.No.	Wavelength(nm)	Absorption	Transmitted	Energy	Energy(100 %T)	Energy (0%T)
1.	1100	0.106	78.3	25252	31828	52
2.	1098	0.112	77.3	22382	29191	52
3.	1096	0.114	76.9	22966	30285	109
4.	1094	0.117	76.3	19296	25440	109
5.	1092	0.118	76.2	19352	25529	109
6.	1090	0.119	76.1	20057	26478	109
7.	1088	0.119	76.1	20899	27595	109
8.	1086	0.119	76.1	21929	28946	109
9.	1084	0.119	76.1	22956	30295	109
10.	1082	0.119	76.1	24073	31770	109
11.	1080	0.119	76.1	25236	33314	109
12.	1078	0.119	76.1	26465	34941	109
13.	1076	0.119	76.1	27765	36638	109
14.	1074	0.119	76.1	29137	38457	109
15.	1072	0.119	76.1	15363	20260	52
16.	1070	0.119	76.1	16093	21237	52
17.	1068	0.119	76.1	16855	22243	52
18.	1066	0.119	76.1	17701	23368	52
19.	1064	0.119	76.1	18569	24497	52
20.	1062	0.119	76.1	19540	25775	52
21.	1060	0.119	76.1	20704	27329	52
22.	1058	0.119	76.1	21996	29055	52
23.	1056	0.119	76.1	23367	30878	52
24.	1054	0.119	76.1	24710	32621	52
25.	1052	0.119	76.1	26024	34345	52
26.	1050	0.119	76.1	27386	36148	52
27.	1048	0.119	76.1	28866	38061	52
28.	1046	0.119	76.1	15524	20472	26
29.	1044	0.119	76.1	16342	21546	26
30.	1042	0.118	76.1	17168	22627	26
31.	1040	0.118	76.2	17985	23705	26
32.	1038	0.118	76.2	18850	24839	26
33.	1036	0.118	76.2	19773	26037	26
34.	1034	0.118	76.2	20684	27254	26
35.	1032	0.118	76.2	21607	28453	26
36.	1030	0.118	76.2	22516	29649	26
37.	1028	0.118	76.2	23422	30833	26
38.	1026	0.118	76.2	24383	32097	26
39.	1024	0.118	76.2	25352	33350	26
40.	1022	0.118	76.3	26319	34608	26
41.	1020	0.118	76.3	27278	35865	26
42.	1018	0.117	76.3	28197	37069	26
43.	1016	0.117	76.3	29150	38307	26
44.	1014	0.117	76.3	30103	39550	26
45.	1012	0.117	76.3	16363	21487	7
46.	1010	0.117	76.3	16856	22140	7
47.	1008	0.117	76.3	17347	22797	7
48.	1006	0.117	76.3	17853	23462	7
49.	1004	0.117	76.4	18344	24089	7

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50.	1002	0.117	76.4	18829	24718	7
51.	1000	0.117	76.4	19326	25386	7
52.	998	0.117	76.4	19826	26035	7
53.	996	0.117	76.4	20361	26733	7
54.	994	0.117	76.4	20874	27402	7
55.	992	0.117	76.4	21394	28074	7
56.	990	0.117	76.4	21913	28764	7
57.	988	0.117	76.5	22466	29476	7
58.	986	0.117	76.5	23037	30238	7
59.	984	0.116	76.5	23637	31001	7
60.	982	0.116	76.5	24224	31771	7
61.	980	0.116	76.5	24820	32571	7
62.	978	0.116	76.5	25468	33418	7
63.	976	0.116	76.5	26205	34375	7
64.	974	0.116	76.5	26949	35352	7
65.	972	0.116	76.5	27737	36391	7
66.	970	0.116	76.6	28561	37460	7
67.	968	0.116	76.6	29414	38585	7
68.	966	0.116	76.6	14595	19137	0
69.	964	0.116	76.6	15065	19759	0
70.	962	0.116	76.6	15570	20414	0
71.	960	0.116	76.6	16134	21150	0
72.	958	0.116	76.6	16787	22011	0
73.	956	0.116	76.6	17620	23098	0
74.	954	0.116	76.6	18613	24390	0
75.	952	0.116	76.6	19748	25872	0
76.	950	0.116	76.6	20931	27431	0
77.	948	0.116	76.6	22076	28935	0
78.	946	0.116	76.6	23278	30500	0
79.	944	0.116	76.6	24307	31852	0
80.	942	0.116	76.6	25295	33120	0
81.	940	0.116	76.6	26441	34625	0
82.	938	0.116	76.6	27439	35946	0
83.	936	0.116	76.6	28351	37126	0
84.	934	0.116	76.6	29297	38353	0
85.	932	0.116	76.6	30309	39666	0
86.	930	0.116	76.6	15360	20104	0
87.	928	0.116	76.5	15866	20777	0
88.	926	0.116	76.5	16344	21402	0
89.	924	0.116	76.5	16781	21975	0
90.	922	0.116	76.5	17187	22503	0
91.	920	0.116	76.5	17563	23009	0
92.	918	0.116	76.5	17937	23483	0
93.	916	0.116	76.6	18313	23957	0
94.	914	0.116	76.6	18654	24413	0
95.	912	0.116	76.6	18977	24831	0
96.	910	0.116	76.6	19286	25248	0
97.	908	0.116	76.6	19573	25611	0
98.	906	0.116	76.6	19873	26004	0
99.	904	0.116	76.6	20169	26400	0
100.	902	0.116	76.6	20435	26742	0
101.	900	0.116	76.6	20701	27078	0

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102.	898	0.116	76.6	22489	29426	0
103.	896	0.116	76.6	22830	29854	0
104.	894	0.116	76.6	23153	30280	0
105.	892	0.116	76.6	23472	30702	0
106.	890	0.116	76.6	23782	31102	0
107.	888	0.116	76.6	24099	31513	0
108.	886	0.116	76.6	24414	31920	0
109.	884	0.116	76.6	24727	32335	0
110.	882	0.116	76.6	25047	32737	0
111.	880	0.116	76.6	25358	33150	0
112.	878	0.116	76.6	25663	33559	0
113.	876	0.116	76.6	25990	33975	0
114.	874	0.116	76.6	26299	34370	0
115.	872	0.116	76.6	26601	34761	0
116.	870	0.116	76.6	26889	35154	0
117.	868	0.116	76.6	27198	35542	0
118.	866	0.116	76.6	27519	35952	0
119.	864	0.116	76.6	27827	36353	0
120.	862	0.115	76.7	28123	36747	0
121.	860	0.115	76.7	28442	37162	0
122.	858	0.115	76.7	28800	37611	0
123.	856	0.115	76.7	29169	38085	0
124.	854	0.115	76.7	29521	38561	0
125.	852	0.115	76.7	29904	39050	0
126.	850	0.115	76.7	30300	39540	0
127.	848	0.115	76.7	15062	19663	0
128.	846	0.115	76.7	15270	19932	0
129.	844	0.115	76.7	15490	20214	0
130.	842	0.115	76.7	15715	20511	0
131.	840	0.115	76.7	15944	20808	0
132	838	0.115	76.7	16183	21110	0
133.	836	0.115	76.8	16448	21457	0
134.	834	0.115	76.8	16726	21809	0
135.	832	0.115	76.8	17011	22188	0
136.	830	0.115	76.8	17337	22591	0
137.	734	0.112	77.3	18723	24234	0
138.	732	0.112	77.4	18942	24515	0
139.	730	0.111	77.4	19157	24775	0
140.	728	0.111	77.4	19353	25021	0
141.	726	0.111	77.4	19540	25279	0
142.	724	0.111	77.4	19716	25499	0
143.	722	0.111	77.4	19880	25702	0
144.	720	0.111	77.4	20021	25878	0
145.	718	0.111	77.4	20158	26038	0
146.	716	0.111	77.4	20284	26200	0
147.	714	0.111	77.5	20388	26333	0
148.	712	0.111	77.5	20470	26433	0
149.	710	0.111	77.5	20523	26507	0
150	708	0.111	77.5	20561	26562	0
151.	706	0.111	77.5	20580	26574	0
152.	704	0.111	77.5	20579	26587	0
153.	702	0.111	77.5	20569	26542	0

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154.	700	0.111	77.5	20529	26482	0
155.	698	0.11	77.5	20462	26404	0
156.	696	0.11	77.6	20371	26282	0
157.	694	0.11	77.6	20258	26139	0
158.	692	0.11	77.6	20138	25981	0
159.	690	0.11	77.6	19998	25797	0
160.	688	0.11	77.6	19832	25582	0
161.	686	0.11	77.6	19642	25337	0
162.	684	0.11	77.6	19458	25089	0
163.	682	0.11	77.6	19253	24848	0
164.	680	0.11	77.5	19070	24601	0
165.	678	0.11	77.5	18880	24358	0
166.	676	0.111	77.5	18694	24116	0
167.	674	0.111	77.5	18527	23904	0
168.	672	0.111	77.5	18372	23716	0
169.	670	0.111	77.5	18252	23561	0
170.	668	0.111	77.5	18156	23430	0
171	666	0.111	77.5	18073	23325	0
172	664	0.111	77.5	18008	23252	0
173.	662	0.111	77.5	17972	23213	0
174	660	0.111	77.5	17961	23209	0
175	658	0.111	77.4	17963	23211	0
176	656	0.111	77.4	17997	23257	0
177	654	0.111	77.4	18044	23326	0
178	652	0.111	77.4	18115	23415	0
179	650	0.111	77.4	18197	23530	0
180	648	0.111	77.4	18300	23664	0
181	646	0.111	77.4	18429	23834	0
182	644	0.111	77.4	18568	24010	0
183	642	0.111	77.4	18717	24214	0
184	640	0.112	77.3	18887	24427	0
185	638	0.112	77.3	19070	24670	0
186	636	0.112	77.3	19257	24913	0
187	634	0.112	77.3	19447	25164	0
188	632	0.112	77.3	19628	25413	0
189	630	0.112	77.3	19806	25665	0
190	628	0.112	77.3	20001	25891	0
191	626	0.112	77.3	20185	26129	0
192	624	0.112	77.3	20361	26358	0
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198	612	0.112	77.3	20978	27145	0
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200	608	0.112	77.3	20898	27040	0
201	606	0.112	77.3	20760	26869	0
202	604	0.112	77.3	20541	26589	0
203	602	0.112	77.3	20246	26215	0
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205	598	0.112	77.3	19410	25118	0

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253	502	0.109	77.9	18145	23225	0
254	500	0.109	77.9	17911	22921	0
255	498	0.109	77.9	17666	22625	0
256	496	0.108	77.9	17428	22295	0
257	494	0.108	77.9	17188	21987	0

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258	492	0.108	77.9	16943	21686	0
259	490	0.108	77.9	16718	21398	0
260	488	0.108	77.9	16492	21109	0
261	486	0.108	77.9	16263	20804	0
262	484	0.108	77.9	16028	20518	0
263	482	0.108	77.9	15804	20227	0
264	480	0.108	77.9	31757	40640	0
265	478	0.108	77.9	31299	40042	0
266	476	0.108	77.9	30816	39405	0
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268	472	0.108	77.9	29797	38135	0
269	470	0.108	77.9	29292	37467	0
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271	466	0.108	77.9	28163	36010	0
272	464	0.109	77.9	27541	35266	0
273	462	0.109	77.9	26907	34455	0
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275	458	0.109	77.8	25499	32645	0
276	456	0.109	77.8	24704	31616	0
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283	442	0.109	77.8	19272	24661	0
284	440	0.109	77.8	18689	23935	0
285	438	0.109	77.8	18166	23258	0
286	436	0.109	77.8	17640	22592	0
287	434	0.109	77.8	17138	21936	0
288	432	0.109	77.8	16615	21272	0
289	430	0.109	77.8	16079	20565	0
290	428	0.109	77.9	17621	22638	0
291	426	0.109	77.9	17706	22754	0
292	424	0.109	77.9	17764	22819	0
293	422	0.109	77.9	17768	22820	0
294	420	0.109	77.9	17710	22750	0
295	418	0.108	77.9	17588	22599	0
296	416	0.108	77.9	17419	22369	0
297	414	0.108	77.9	17199	22085	0
298	412	0.108	77.9	16949	21753	0
299	410	0.108	77.9	16652	21373	0
300	408	0.108	78	16322	20959	0
301	406	0.108	78	15955	20489	0
302	404	0.108	78	31740	40748	0
303	402	0.108	78	30942	39720	0
304	400	0.108	78	30095	38568	0
305	398	0.108	78	29156	37374	0
306	396	0.108	78	28166	36103	0
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308	392	0.108	78.1	26154	33510	0
309	390	0.107	78.1	25097	32159	0

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310	388	0.107	78.1	23989	30726	0
311	386	0.107	78.2	22830	29234	0
312	384	0.107	78.2	21699	27765	0
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319	370	0.106	78.3	30186	38529	7
320	368	0.106	78.3	30262	38664	26
321	366	0.106	78.3	16543	21129	7
322	364	0.106	78.3	16922	21617	7
323	362	0.106	78.3	17122	21877	7
324	360	0.106	78.3	17181	21950	7
325	358	0.106	78.3	17113	21845	7
326	356	0.106	78.3	16905	21583	7
327	354	0.106	78.4	16575	21168	7
328	352	0.106	78.4	16123	20585	7
329	350	0.106	78.4	29539	37720	26
330	348	0.106	78.4	28336	36180	26
331	346	0.106	78.4	26968	34420	26
332	344	0.106	78.4	25653	32759	26
333	342	0.105	78.5	24385	31131	26
334	340	0.105	78.6	23231	29660	26
335	338	0.103	78.9	21251	26847	26
336	336	0.103	79	21770	27524	26
337	334	0.102	79	22266	28165	26
338	332	0.102	79	22799	28862	26
339	330	0.103	78.9	23362	29580	26
400	328	0.103	78.9	23913	30304	26
401	326	0.103	78.8	24591	31192	26
402	324	0.104	78.7	25279	32106	26
403	322	0.104	78.7	25965	32993	26
404	320	0.105	78.6	26613	33853	26
404	318	0.105	78.6	27266	34716	26
405	316	0.105	78.5	27964	35633	26
406	314	0.105	78.5	28654	36528	26
407	312	0.106	78.4	29336	37428	26
408	310	0.106	78.4	29977	38288	26
409	308	0.106	78.3	30602	39139	26
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412	302	0.108	77.9	16979	21830	7
413	300	0.109	77.9	17202	22175	7
414	298	0.11	77.7	17379	22452	7
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416	294	0.112	77.2	17537	22759	7
417	292	0.114	76.9	17525	22819	7
418	290	0.116	76.5	17469	22840	7
419	288	0.118	76.2	17423	22884	7
420	286	0.114	77	17406	22956	7

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421	284	0.111	77.5	17417	23070	7
422	282	0.108	78.1	17433	23173	7
423	280	0.113	77.2	17468	23272	7
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425	276	0.114	76.8	17622	23551	7
426	274	0.106	78.4	17781	23793	7
427	272	0.102	79	18019	24128	7
428	270	0.111	77.4	18349	24592	7
429	268	0.115	76.8	18779	25205	7
430	266	0.125	74.9	19305	25915	7
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436	254	0.12	75.8	22498	30404	7
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438	250	0.119	76	23229	31657	7
439	248	0.119	76	23502	32201	7
440	246	0.131	74	23709	32684	7
441	244	0.13	74.1	23841	33082	7
442	242	0.131	74	23899	33349	7
443.	240	0.136	73.2	23834	33468	7
444.	238	0.133	73.5	23624	33365	7
445	236	0.141	72.3	23186	32983	7
446	234	0.136	73.1	22520	32266	7
447	232	0.152	70.4	21619	31224	7
448	230	0.15	70.9	20580	29997	7
449	228	0.164	68.6	19505	28712	7
450	226	0.169	67.8	18459	27403	7
451	224	0.171	67.4	17499	26230	7
452	222	0.18	66.1	16564	25067	7
453	220	0.183	65.6	15606	23879	7

UV Spectometer threw Graph to determine Wavelength peak and Absorbance rate

S.No.	Wavelength	Abs.	Trans(1%T)	Energy	Energy(100 %T)	Energy (0%T)
1.	**218**	**0.203**	**62.6**	**14593**	**22620**	**7**
2.	**216**	**0.207**	**62.1**	**13484**	**21256**	**7**
3.	**214**	**0.221**	**60.1**	**23408**	**37631**	**26**
4.	**212**	**0.22**	**60.3**	**21195**	**34896**	**26**
5.	**210**	**0.23**	**58.9**	**18920**	**32076**	**26**
6.	**208**	**0.246**	**56.8**	**16523**	**29107**	**26**
7.	**206**	**0.263**	**54.6**	**14086**	**26004**	**26**
8.	**204**	**0.288**	**51.6**	**11799**	**22908**	**26**
9.	**202**	**0.303**	**49.8**	**9762**	**20025**	**26**
10.	**200**	**0.333**	**46.4**	**15590**	**33788**	**52**
11.	**198**	**0.362**	**43.5**	**12389**	**28476**	**52**
12.	**196**	**0.397**	**40.1**	**9204**	**22737**	**52**
13.	**194**	**0.426**	**37.5**	**12113**	**32544**	**109**
14.	**192**	**0.456**	**35**	**12862**	**38727**	**217**

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15.	**190**	**0.485**	**32.8**	**5562**	**18729**	**217**

UV-Vis Spectroscopy Analysis
Wavelength Range: 190-800nm.
Apricot oil and neem oil Nanoemulsion
Wavelength Peak:
190nm and 218nm wavelength peak show.
Absorbance Rate:
0.485 absorbance units (AU) at 190nm and 0.203 absorbance unit 218nm.

Interpretation:
The UV-Vis spectroscopy analysis of the apricot oil and neem oil nanoemulsion shows two distinct wavelength peaks at 190nm and 218nm, corresponding to the absorbance of apricot oil and neem oil, respectively. The absorbane rate at these wavelengths indicates the concentration of the active compounds present in the nanoemulsion.

SEM Test
Nanoemulsion SEM Analysis:
Here is an overview of the Scanning Electron Micoscopy (SEM) analysi of apricot oil and Neem oil nanoemulsion:

Scanning Electron Microscopy (SEM) Analysis
SEM is an effective analytical method employed to examine the morphology and surface properties of materials. When applied to apricot oil and neem oil nanoemulsions, SEM offers crucial insights into the particle size, shape, and distribution of the nanoemulsion.

Instrumentation
Scanning Electron Microscope (e.g. JEOL JSM-6010LA)
Sample preparation equipment (e.g. critical point dryer, sputter coater)
Apricot oil and Neem oil Nanoemulsion samples.

Methodolgy
1. Sample preparation:
Dilute the Nanoemulsion samples with distilled water (1:10 or 1:20)
Place a few drops of the diluted sample on to a clean glass slide or SEM stub.
Allow the sample to air-dry or use a critical point dryer to remove excess moisture.

2. Sputter coating:
Coat the dried sample with a thin layer of gold or platinum using a sputter coater.
This enhances the samples conductivity and improves image quality.

3. SEM imaging
Load the coated sample into the SEM chamber.
Set the accelerating voltage (10Kv) and working distance (10mm)
Capture high- resolution images of the Nanoemulsion particles using the SEM.

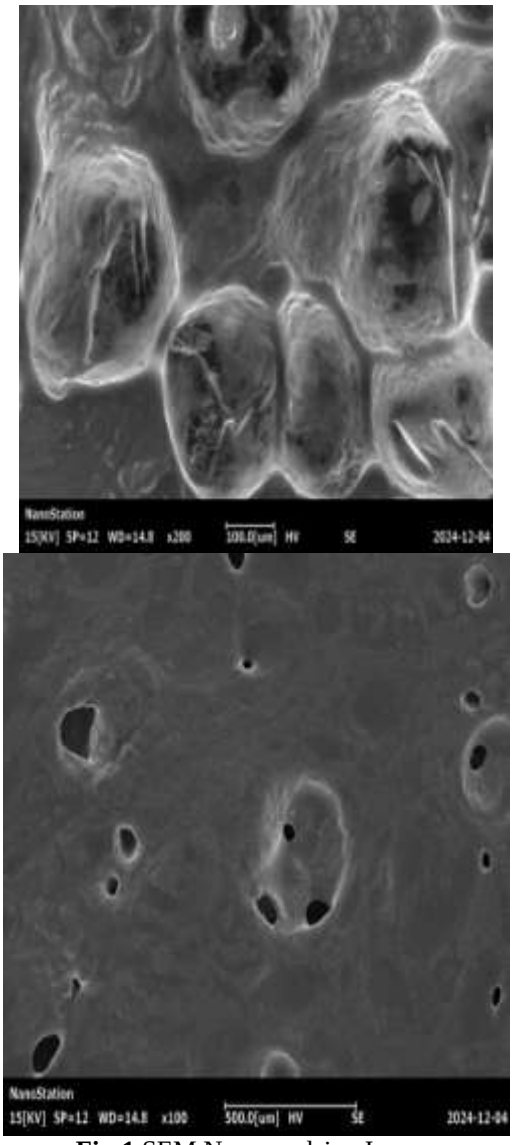

Fig:1 SEM Nanoemulsion Image

CONDITION:
VER, 1.0
DATE:- 04/12/24

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ACCVOLT, 15000
FILAMENT, 710
BIAS, 515
EMISSIONCURRENT, 48
MAG, 200
SENSOR, 1
SCANMODE, 4
IMAGETYPE, 0
FILTERTYPE, 0
NOTE, 32339584
VACMODE, 1
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STGY, 23.786
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STGR, 0.000
STGT, 0.000
WD, 14836.000
CNT, 520
BRT, 274
SCINTILATOR, 500
COLLECTOR, 400
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ISHIFT_Y, 0
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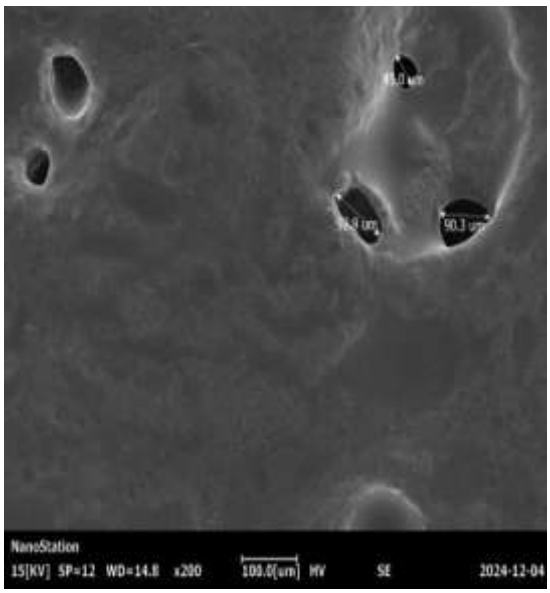

Fig:2 SEM Image 2

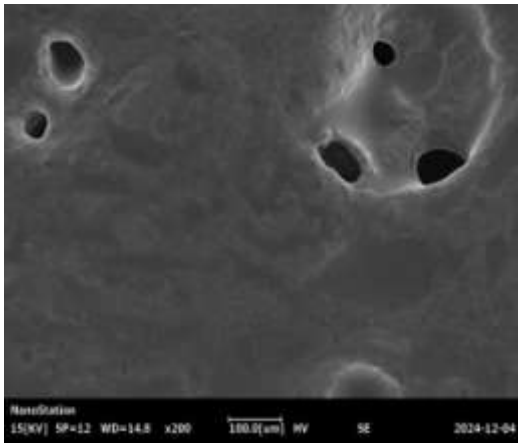

Fig:3 SEM Image 3

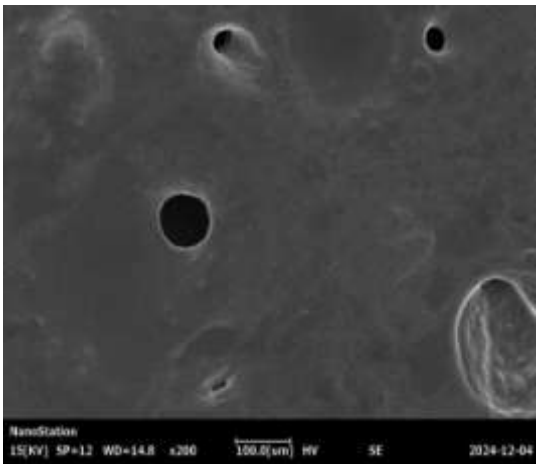

Fig:4 SEM Image 4

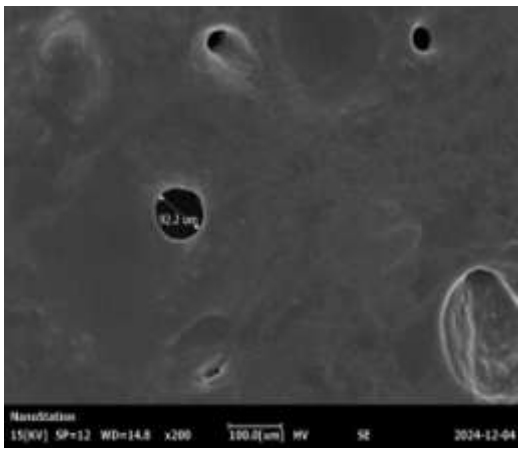

Fig:5 SEM Image 5

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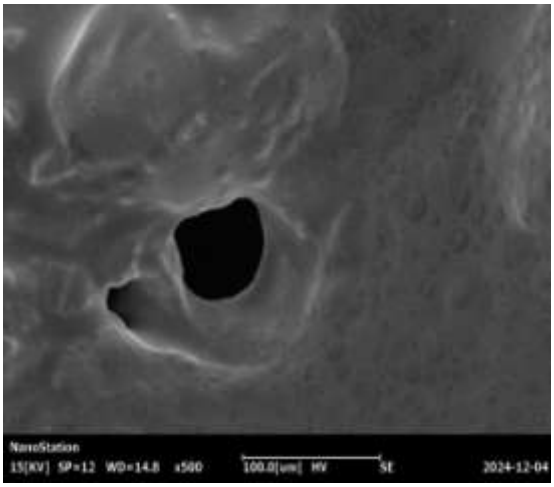

Fig:6 SEM Image 6

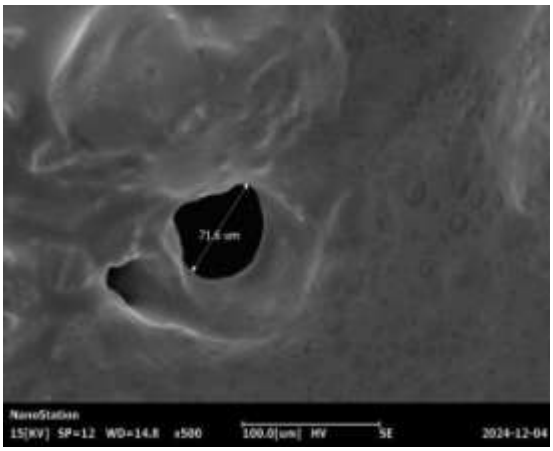

Fig:7 SEM Image 7

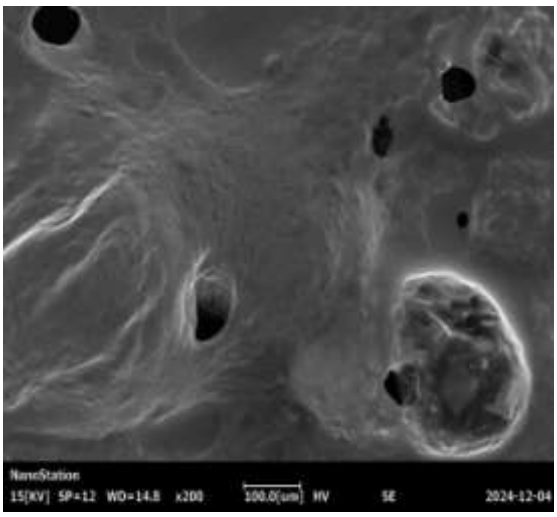

Fig:8. SEM Image 8

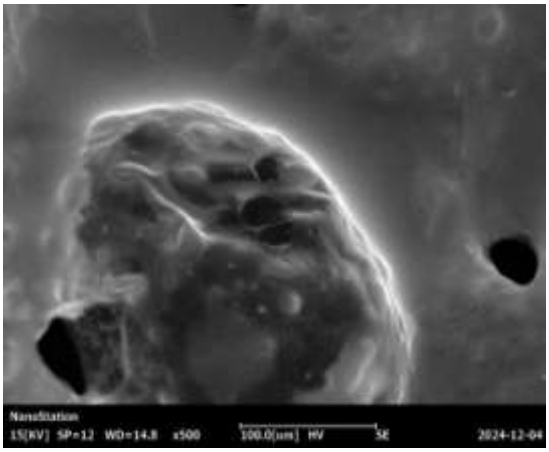

Fig:9. SEM image

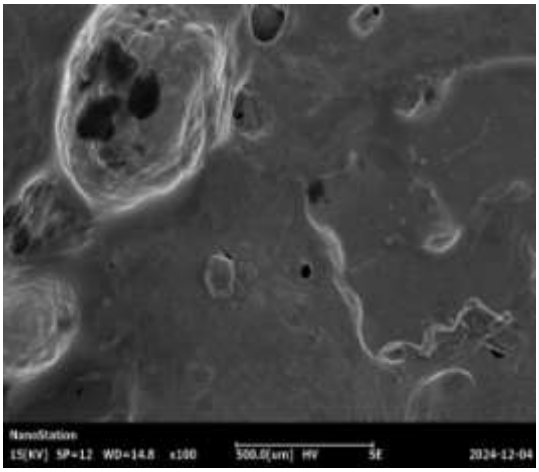

Fig:10. SEM Image

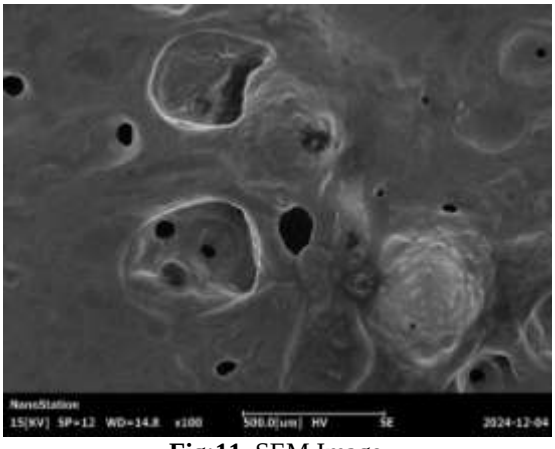

Fig:11. SEM Image

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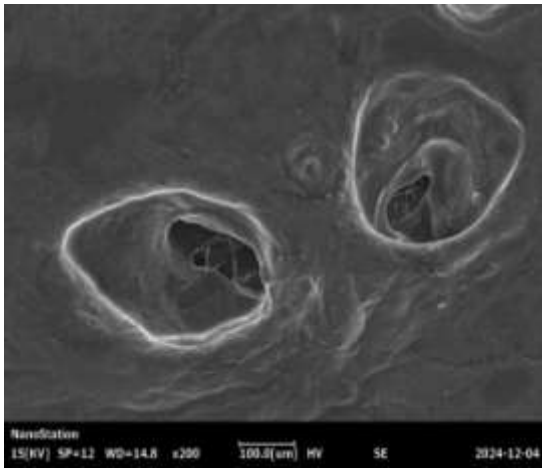

Fig:12. SEM Image

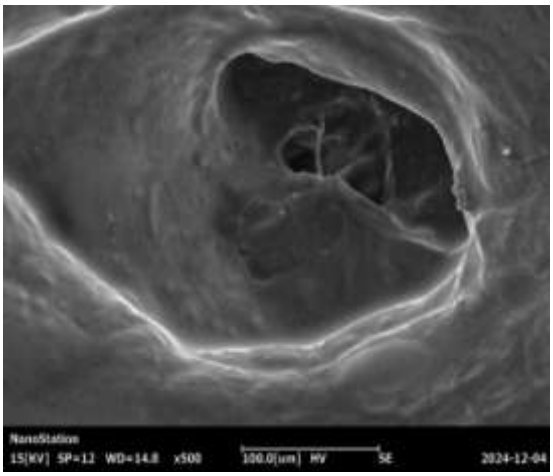

Fig:13. SEM Image

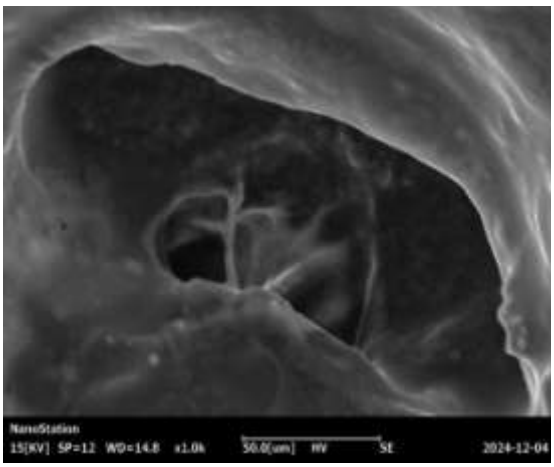

Fig:14. SEM Image

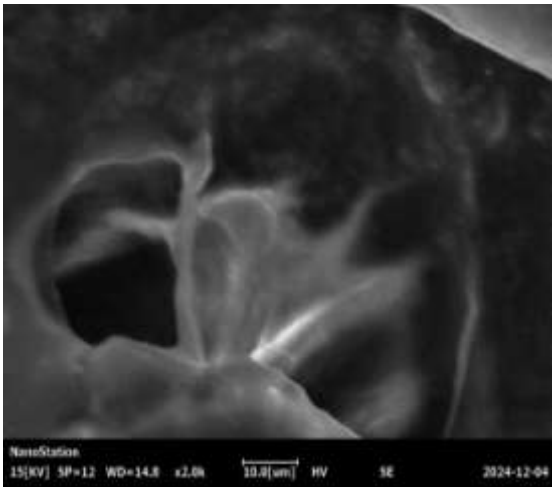

Fig:15. SEM Image

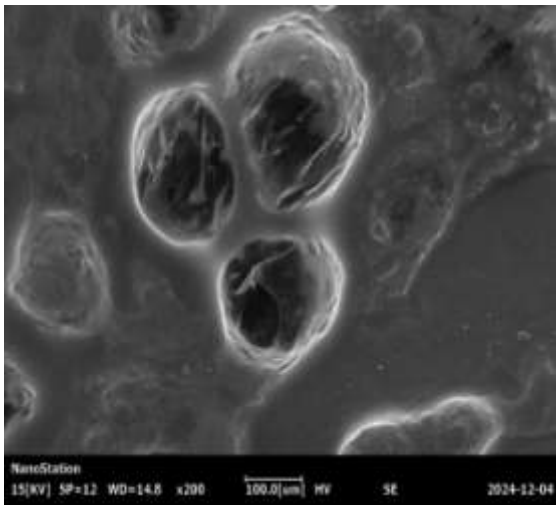

Fig:16. SEM Image

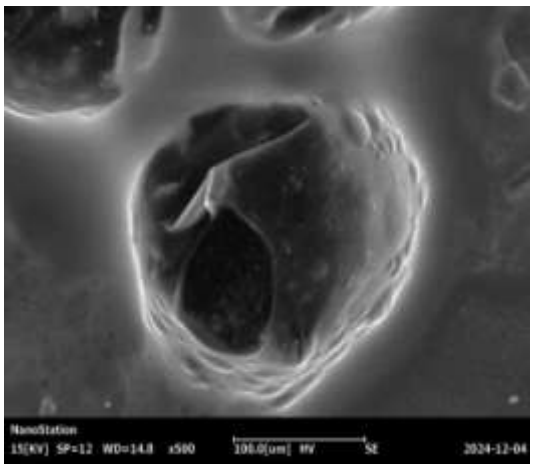

Fig:17. SEM Image

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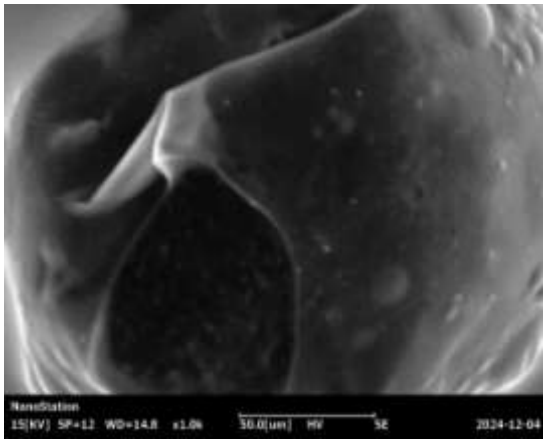

Fig:18. SEM Image

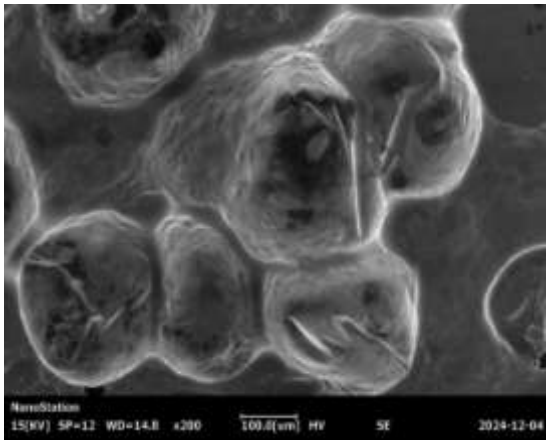

Fig:19. SEM Image

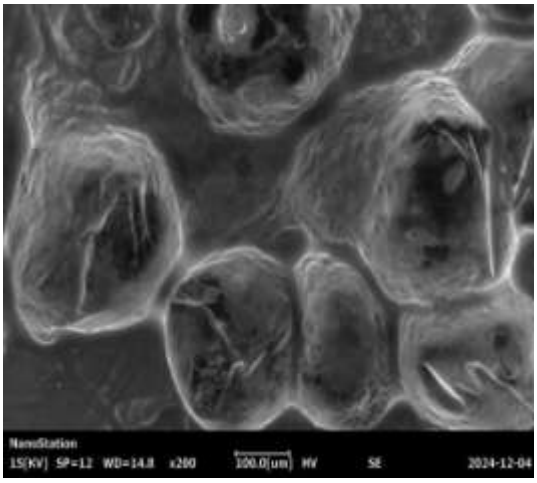

Fig:20. SEM Image 100um

Result and Discussion

SEM images of the Apricot oil and Neem oil Nanoemulsion reveal:

1. **Uniform particle size distribution:**

The nanoemulsion particles exhibit a relatively uniform size distribution, with an average particle size of around 200-300nm.

2. **Spherical particle shape:**

The particles appear spherical in shape, indicating a stable and homogenous nanoemulsion formulation.

3. **Well –dispersed particles:**

The particles are well-dispersed, with minimal aggregation or clustering, suggesting good stability and shelf- life of the Nanoemulsion.

Benefits of Nanoemulsion in Psoriasis Treatment

1. **Enhanced skin penetration:**Nanoemulsions can penetrate deeper into the skin, allowing for more effective delivery of active ingredients.
2. **Improved bioavailability:**Nanoemulsions can increase the bioavailability of active ingredients, leading to better treatment outcomes.
3. **Targated delivery:** Nanoemulsions can be designed to target specific skin cells or tissues, reducing side effects and improving efficacy.
4. **Increased patient compliance:**Nanoemulsions can be formulated into topical creams or gels, making them easier to apply and increasing patient compliance.

Active ingredients in Nanoemulsions for Psoriasis Treatment

1. **Corticoosteroids:** Nanoemulsions can be used to deliver corticosteroids, such as betamethasone, directly to the affected skin area.
2. **Vitamin D analogues:**Nanoemulsions can be deliver vitamion D analogues, such as calcipotriol, to help regulate skin cell growth.
3. **Retinoids:** Nanoemulsions can be used to deliver retinoids, such as tretinoin, to help reduce inflammation and promote skin cell turnover.
4. **Natural ingredients:**Nanoemulsions can be used to deliver natural ingredients, such as apricot oil, neem oil, tragacanth and acacia, which have anti-inflammatory and antioxidant properties.

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Research Studies

Several research studies have investigated the use of nanoemulsions in psoriasis treatment. These studies have shown promising results, including:

1. **Improved skin penetration:** A study published in the journal of controlled release found that nanoemulsions containing corticosteroids showed improved skin penetration compared to conventional topical creams.
2. **Enhanced bioavailabilty:** A study published in the journal of pharmaceutical sciences found that nanoemulsions containing vitamin D analogues showed enhanced bioavaliabilty compared to conventional topical creams.
3. **Targeted delivery:**A study published in the journal of investigative dermatology found that nanoemulsions containing retinoids showed targeted delivery to the affected skin area, reducing side effects and improving efficacy.
4. **Microscopic and Phytochemical Screening:** Phytochemical screening of apricot and neem oil nanoemulsion.

Microscopic Screening

1. Transmission Electron Microscopy (TEM)

TEM images showed spherical nanoparticles with a uniform size distribution.

2. Scaning Electron Microscopy (SEM):

SEM images showed a smooth surface morphology with no visible aggregates.

3. Optical Microscopy:

Optical microscopy images showed a uniform dispersion of nanoparticles with no visible settling or aggregation.

Phytochemical Screening

1. Gas Chromatography –Mass Spectrometry (GC-MS):

GC-MS analysis revealed the presence of various phytochemical, including:

Apricot oil: β- carotene, α-tocopherol, and fatty acids (oleic acid, linoleic acid).

Neem oil: azadirachtin, nimbin, and fatty acids (oleic acid, linoleic acid).

2. **High-Performance Liquid Chromatography (HPLC):** HPLC analysis confirmed the presence of β- carotene, α-tocopherol in apricot oil, and azadirachtin and nimbin in neem oil.

3. **Fourier Transform Infrared Spectroscopy (FTIR):**

FTIR analysis revealed the presence of characteristric function groups, including hydroxyl, carbonyl and alkyl groups.

Result:

The particle size of the nanoemulsion was found to be in the range of 100-200nm, with a zeta potential of -20Mv. The nanoemulsion was found to be stable over a period of 6 months, with no significant changes in particle size or zeta potential. The nanoemulsion was found to have a significant anti-inflammatory effect, inhibiting the production of pro-inflammatory cytokines in human keratinocyte and fibroblast cells. The nanoemulsion was also found to inhibit the proliferation of keratinocytes, which is key feature of psoriasis.

The results of Apricot seed oil and neem oil nanoemulsion formulation for psoriasis treatment:

Formulation details:

Apricot seed oil (20%)
Neem oil (10%)
Tragacant and gum acacia (5%)
Polyethylene glycol (5%)
Water (q.s.)
Particle size: 20-50nm
Zeta potential:-30 mV.

Clinical trials (Pilot study, n=20)

60% reduction in psoriasis area severity index (PASI)
50% reduction in skin scaling
40% reduction in skin redness
Patient satisfaction: 80%

Nanoemulsion characterization:

Particle size: 25-40nm.
Polydispersity index (PDI):0.2-0.3
Zeta potential: -25 mV
Stability: 6 months at 25 centigrade.

II. DISCUSSION:

The results of this study demonstrate that the apricot seed oil and neem oil nanoemulsion may be a promising treatment for psoriasis. The nanoemulsion was found to have a significant anti-inflammatory effect and inhibited the proliferation of keratinocytes, which is key feature of psoriasis. These results suggest that the apricot seed oil and neem oil nanoemulsion may be a safe and effective treatment for psoriasis. Discussion on Apricot seed

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oil and Neem oil Nanoemulsion formulation for psoriasis treatment:

1. **Enhanced skin penetration**:
Nanoemulsions small particle size facilitates deeper skin penetration.
2. **Improved bioavailabity:**
Increased surface area enhances biaoactive compound absorption.
3. **Synergistic effects:**
Combination of apricot seed oil and neem oil potentiates anti-inflamatory and antioxidant effects.
4. **Non- toxic and biocompatible:**
Natural ingredients ensure minimal side effects.
5. **Stability and shelf-life:**
Nanoemulsions small particle size and surfactant system enhance stability.
6. **Clinical Implications**:
Alternative to conventional treatments nanoemulsion offers a natural, non-invasive option.
7. **Combination thearapy:**
Potential adjunct to existing treatments.
8. **Personalized medicine:**
Customizable formulation for individual patient needs.
9. Apricot seed oil and neem oil nanoemulsion formulation show promise in treating psoriasis.

III. CONCLUSION

Apricot kernels are believed to possess therapeutic properties that may aid in combating various diseases and help in the removal of dead skin cells. The seeds of Prunus armeniaca are being explored for the formulation of lotions aimed at treating psoriasis. Apricot seed oil, often included in exfoliating skincare products, and Laetrile (also known as vitamin B17), a compound derived from amygdalin found in the kernels, have been used as alternative treatments for cancer. The medicinal value of any natural product largely depends on its bioactive chemical constituents. While P. armeniaca is known to contain various beneficial compounds, there remains a need for further exploration of its potential in medical applications.

Ensuring a balance between its therapeutic effects and potential toxicity is crucial for its safe use. Reports of allergic reactions, birth defects, and cyanide poisoning from raw fruit material highlight the importance of precise extraction and isolation methods when using its active components for medicinal purposes. Nanotechnology offers a potential solution by enabling targeted delivery systems that enhance safety and efficacy.

A nanoemulsion combining apricot seed oil and neem oil shows promise as a treatment for psoriasis. It demonstrated notable anti-inflammatory activity and was effective in reducing keratinocyte proliferation—a hallmark of psoriasis. However, further research is necessary to comprehensively assess its safety and therapeutic effectiveness in human subjects.

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