RESEARCH PAPER

Formulation and Evaluation of a Herbal Moisturizing Cream Containing Carrot Seed Oil and Tamanu Oil

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ABSTRACT

The present study focuses on the formulation and evaluation of a herbal moisturizing cream containing Carrot Seed Oil and Tamanu Oil. Moisturizers play a vital role in maintaining skin hydration, preventing dryness, and improving skin barrier function.

Herbal formulations are gaining popularity due to their safety, efficacy, and minimal side effects compared to synthetic products. Carrot seed oil is rich in antioxidants, vitamins, and photoprotective compounds, which help in skin nourishment and protection against environmental damage.

Tamanu oil possesses excellent anti-inflammatory, antimicrobial, and wound-healing properties, making it beneficial for skin repair and hydration. The herbal moisturizing cream was formulated using suitable excipients such as stearic acid, cetyl alcohol, glycerine, and preservatives through the emulsification method.

The prepared formulation was evaluated for various parameters such as physical appearance, pH, spreadability, viscosity, washability, and stability. The results indicated that the formulated cream showed good consistency, stability, and skin compatibility. The combination of herbal ingredients demonstrated effective moisturizing properties and potential therapeutic benefits. Hence, the developed formulation can be considered a safe and effective herbal alternative for skin care applications

How To Cite This Article: Durgalakshmi Rc, Shanmugapriya R, Naveen Kumar L, Rubika M, Manikandan M, Rupa R, Abishek V. Formulation And Evaluation Of A Herbal Moisturizing Cream Containing Carrot Seed Oil And Tamanu Oil. Int J Drug Deliv Technol. 2026;16(27s):437-454. Doi: 10.25258/ijddt.16.27s.52.

AIM

To formulate and evaluate a herbal moisturizing cream containing Carrot Seed Oil and Tamanu Oil.

OBJECTIVES

- To select suitable herbal ingredients with moisturizing and antioxidant properties.
- To develop a stable herbal cream formulation using appropriate excipients.
- To prepare the formulation using the emulsification method.
- To evaluate the prepared cream for physicochemical parameters such as pH, viscosity, spreadability, and stability.
- To assess the effectiveness of the formulation in improving skin hydration and overall skin condition.

NEED TO STUDY

In recent years, there has been a growing demand for herbal and natural skincare products due to increasing awareness about the side effects associated with synthetic chemicals. Conventional moisturizers may contain artificial preservatives, fragrances, and chemicals that can cause skin irritation, allergies, and long-term adverse effects.

Herbal ingredients such as Carrot Seed Oil and Tamanu Oil offer multiple skin benefits including hydration, antioxidant protection, anti-inflammatory activity, and wound healing properties. These natural oils not only improve skin moisture but also enhance skin repair and protect against environmental damage.

Therefore, the development of an herbal moisturizing cream using these ingredients provides a safer, effective, and economical alternative to synthetic formulations. This study aims to explore the potential of herbal components in improving skin health while minimizing

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adverse effects, thereby contributing to the advancement of cosmeceutical formulations.

INTRODUCTION

Moisturizers are among the most used topical dermatological preparations in pharmaceutical and cosmetic practice due to their proven effectiveness in preventing and managing various skin conditions. They are widely prescribed and used for maintaining skin hydration and improving skin barrier function. The terms moisturizer and emollient are often used interchangeably; however, moisturizers generally contain a combination of emollients, occlusives, and humectants, which together help increase the water-binding capacity of the stratum corneum of the skin.

Moisturizers are suitable for both normal and dry skin. Application of moisturizers increases the water content of the stratum corneum, which is the outermost layer of the skin, thereby exerting their primary moisturizing effect. In addition to hydration, moisturizers help in maintaining the normal pH of the skin and support the restoration of the lipid bilayers. This enables better cohesion between corneocytes and improves moisture retention within the intercellular spaces.

Improved skin hydration interrupts the dry skin cycle and results in smoother, softer, more flexible, and healthier-looking skin. Apart from their moisturizing action, several studies have indicated that moisturizers may exhibit additional beneficial effects such as anti-inflammatory action, antipruritic activity, antimicrobial effect, photoprotective properties, and wound-healing potential. These actions are mainly attributed to the bioactive components present in the formulation and their ability to modulate inflammatory mediators and skin barrier repair mechanisms.

Moisturizer based on skin type:

1. Normal skin:

If you're experiencing seasonal dryness in otherwise-normal skin, Dr. Clark says lotion is sufficient for most younger people. With age, however, the skin holds less moisture and needs more assistance. Dr. Kazin says that perimenopausal people and everyone 50 and older should be using a cream-based moisturizer.

2. Dry skin:

If your skin tends to be dry, and winter is making it even more so, Dr. Clark says to skip the lotion and go for something thicker and more effective. "Creams are going to add more moisture to the skin and preserve more water than lotion, and ointments even more so," he says. "So, somebody with dry skin is going to want to start with a cream or ointment and bypass lotions altogether."

3. Oily skin:

For some people, too much moisturizer can clog pores and lead to acne; in people with black or brown skin, acne can cause discoloration and hyperpigmentation. Dr. Clark recommends skipping the moisturizer or opting for a gel, which is lighter than other types of moisturizers.

4. Combination of dry and oily skin:

If you have combination skin, your skin is dry in some spots and oily in others often in what's called the "T-zone," which is the T-shaped area on your face that includes your forehead, nose, and chin. Dr. Kazin tells these patients to treat their face as though it's two faces: moisturize the dry spots and skip the oily areas. "I tell some people never put moisturizer on the center of your face," says Dr. Kazin. "It's like a huge revelation that your nose probably never needs moisturizer."

An Ideal Moisturizer Should

- Reduce and prevent further TEWL
- Restore lipid barrier, i.e., duplicating and enhancing the skin's moisturizing retention mechanisms
- Hypoallergenic, no sensitizing, fragrance free, noncomedogenic
- Absorbed immediately, providing immediate hydration
- Cosmetically acceptable
- Affordable.

HISTORY OF MOISTURIZER

❖ Even though cosmetics have most certainly existed for much longer, the first evidence of cosmetics dates from about 6000 years ago in Ancient Egypt. Aloe, myrrh, and frankincense are common among Egyptians.

❖ Ancient Egyptians believed these products, particularly frankincense, had anti-aging properties and used them as anti-wrinkle creams.

❖ Jain et al. (2009) also reported that men and women in Egypt used scented oils and ointments to clean and smooth their skin and mask body Odor as early as 10,000 BC. Egyptian hygiene and wellbeing were inextricably linked to cosmetics.

❖ For protection against the hot sun and dry winds, oils and creams were used. Egyptian customs were exported and utilized by Greeks and Roman.

❖ Crocodile excrement, white lead and chalk were commonly used by ladies to enhance the appearance of their skin. They also made face masks out of starch and eggs, which were thought to tighten the skin, reduce wrinkles, and keep the face looking youthful .

❖ The term "cosmetic" comes from the Greek word "cosmetic," which means "adornment" or "ornament." Ointments containing cypress, cedar, and incense resins were applied at night. Lead acetate (white lead) and cinnabar were used to treat the skin (Hg).

❖ After the conquest of Carthage, figs (*Ficus carica L.*) became very common in Rome.

In order to formulate facial cream, they were combined with banana (*Musa L.*), oats (*Avena L.*), and rose water. Galen is credited with inventing the *Frigus crepito*, a precursor to the present cold cream.

❖ It is used as a skin protector, comprising almond oil, rose water and beeswax. Gels and salves were used to blanch skin in China, especially during the Shang Dynasty(1760BC). New fixings and techniques were developed and presented as skincare moved to Europe and the Middle East.

❖ The first virus cream was made with rose oil and water, with beeswax liquefied into it.
Scabs were treated with the mineral alum, and skin inflammation was treated with olive lead.

❖ Creams, also known as topical formulations, have been a staple in cosmetics since ancient civilizations. Creams are cosmetic or pharmaceutical products based on the techniques applied.

❖ Unmedicated creams are widely used in a few dermatological conditions. In ancient times, creams were simply made through the combination of two or more ingredients with water as a solvent.

❖ Albert Kligman coined the term "cosmeceuticals" (a mixture of "cosmetics" and "pharmaceuticals") in 1984 to provide an expert description of products with both cosmetic and therapeutic value.

❖ Newer approaches for cream formulation are being used as technology advances; hence, the cosmetics industry today is very different from the one described earlier.

❖ Surprisingly, there is no agreement about what constitutes a moisturizer, despite having a deep history. The word is a neologism invented by Madison Avenue advertisers to promote the simplistic notion that they moisturize the skin.

❖ The inclination to add oily materials to the skin is almost instinctive, and it can date back to the dawn of time.

❖ Natural substances, such as honey, oils or lipids, and fibre have been used in topical treatments to heal wounds since the ancient Egyptians.

❖ Moisturizers were once thought to prevent trans epidermal water loss (TEWL) by occlusion, preventing dryness, in addition to skin smoothness and elasticity maintenance.

❖ The bricks and mortar model suggests that the stratum corneum (SC), while being a dead layer, functions as an active membrane. Corneocytes are the bricks, with their tough cell membranes and keratin microfibrils, while the lipid layers between the cells are the mortar.

❖ The loss of the predominant intercellular lipids that play a vital role in regulating skin humidity by forming bilayers, such as ceramides, cholesterol, and fatty acids, results in damage to the structure of the water barrier, resulting in dry skin.

❖ When the moisture content of the skin falls below 10% and the SC loses its continuity, it is considered dry.

CLASSIFICATION
THE VARIOUS CLASS OF MOISTURIZIERS:

Class	Emollients	Humectants	Occlusives	Protein rejuvenators
Mechanism of action	Saturated and unsaturated variable length hydrocarbons which help in skin barrier function, membrane fluidity and cell signaling leading to overall improvement in skin texture and appearance. Often used in combination with emulsifiers	Mostly low molecular weight substances with water attracting properties into the stratum corneum. Used along with other components to retain the water content	Oils and waxes which form an inert layer on the skin and physically block transepidermal water loss	Small molecular weight proteins thought to help is skin rejuvenation by replenishing essential proteins
Indication	Skin dryness, roughness, papulosquamous disorders, and routine skin care	Xerosis, ichthyosis	Xerosis, atopic dermatitis, prevention of contact dermatitis	Skin rejuvenation, aging, photodamaged skin
Adverse effects	Rarely contact irritant	Irritation (urea, lactic acid)	Messy to apply, cosmetically unacceptable. Folliculitis (mineral oil), acneiform eruptions, contact dermatitis (lanolin)	Contact dermatitis
Examples	Cholesterol, squalene, fatty acids, fatty alcohols, pseudoceramides	Glycerol, propylene glycol, panthenol sorbitol, urea, alpha hydroxy acids, hyaluronic acid	Petrolatum, beeswax mineral oil, silicones, lanolin, zinc oxide	Collagen, elastin, keratin

EMOLLIENT:

❖ They are mainly lipids and oils, which hydrate and improve the skin softness, flexibility, and smoothness. The skin slips or lubricity contributes to consumer satisfaction. Intracellular lipids comprising multilamellar, which are located between SC play a major role in skin architecture.

❖ In SC, ceramides are the major lipid constituents and along with neutral lipids, they form broad laminated intercellular sheets, which act as barriers to our environment. Natural ceramides or the synthetic ones are too expensive.

❖ Hence, several pseudo-ceramides are useful as emollients. Lipophilic compounds such as cholesterol and ceramides are being used in topical skin creams. They get easily incorporated into liposomes and make the skin texture softer and smoother. Nano encapsulated Tri ceramides are also being used for increasing the hydration of the skin.

❖ Long chain saturated fatty acids, for example, stearic, linoleic, oleic, and lauric acid and fatty alcohols are essential fatty acids that are found naturally in palm oil, coconut oil, and wool fat. They influence skin physiology and pathology via their effects on skin barrier functions, eicosanoid production, membrane fluidity, and cell sig.

Classification of emollients:

Dry emollients	Fatty emollients	Astringent Emollients	Protective emollients
Decyl oleate, isopropyl palmitate, isostearyl alcohol	Castor oil, glyceryl stearate, jojoba oil, octyl stearate, propylene glycol	Cyclomethicone, dimethicone, isopropyl myristate, octyl octanoate	Diisopropyl dilinoleate, isopropyl isostearate

HUMECTANTS:

❖ They are basically hygroscopic compounds which mean they attract water from two sources, from the dermis into the epidermis and in humid conditions from the environment. Many humectants have emollient properties as well.

❖ Natural moisturizing factor made of a mixture of low molecular weight soluble hygroscopic substances such as lactic acid, pyrrolidone carboxylic acid, and amino acids is a major player for hydration of the SC.

❖ The various humectants available. Tri hydroxylated molecule glycerol is the most effective humectant. The mechanism of action. Urea has been shown to reduce TEWL in atopic and ichthyotic patients and reduce SLS-induced skin irritation.

❖ It is a humectant at a lower concentration (10%) but in higher concentrations (20–30%) it disrupts the hydrogen bonds of epidermal proteins leading to keratolysis.

❖ Alpha hydroxy acids are effective in treating xerosis. Lactic acid particularly the L-isomer stimulates ceramide synthesis leading to higher SC cera.

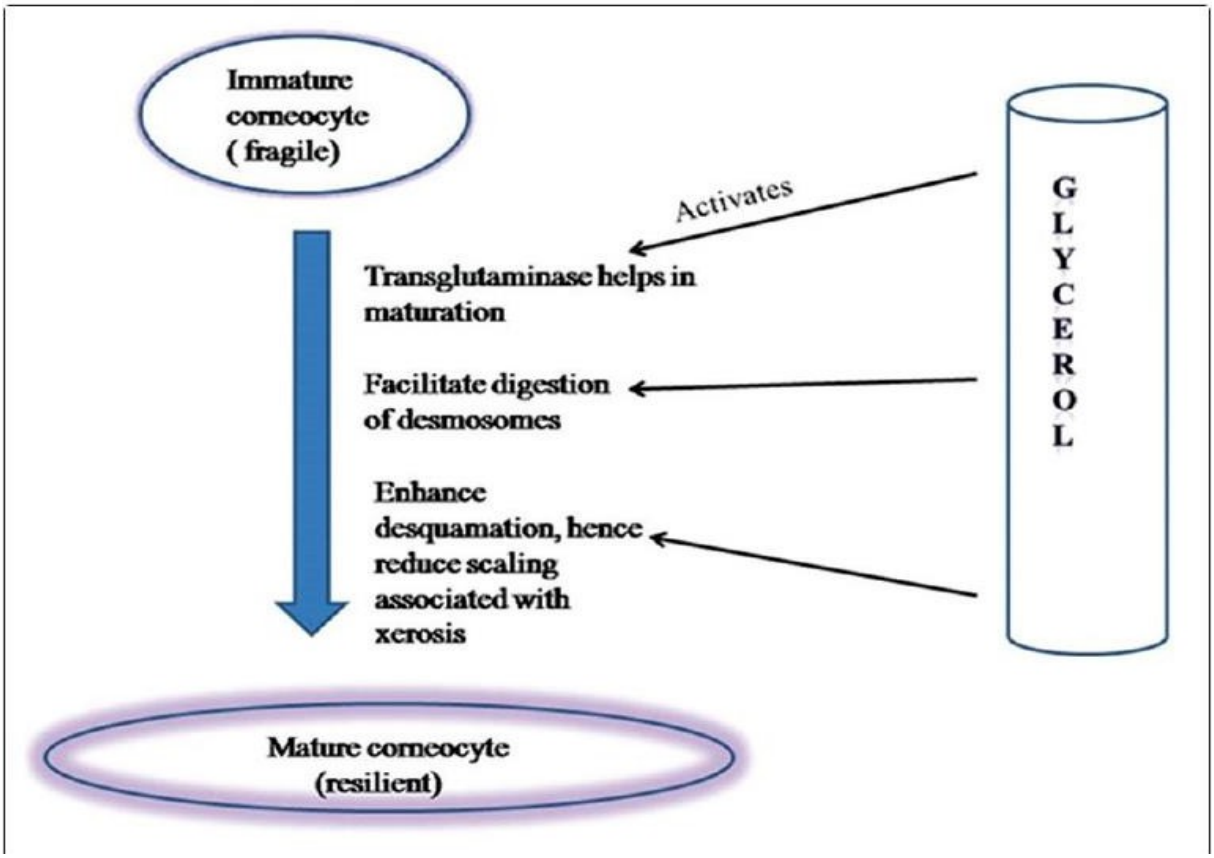
Glycerin
Alpha hydroxyl acids, for example, glycolic acid, lactic acid
Sodium pyrrolidine carboxylic acid
Propylene glycol and butylene glycol
Hyaluronic acid
Urea
Panthenol
Aluminum lactate and Sodium lactate
Gelatin
Sorbitol
Honey

The various humectants

OCCLUSIVE:

❖ They are substances that physically block TEWL in the SC. They create a hydrophobic barrier over the skin, contribute to the matrix between corneocytes and have the most pronounced effect when applied to the slightly dampened skin.

❖ They are basically oils that are thought to diffuse into the intercellular lipid domains



thus contributing to their efficacy. Mineral oils are derived from petroleum.

❖ The two most important materials are liquid paraffin (also called mineral oil and paraffinum liquidum) and petrolatum, consisting of a complex combination of hydrocarbons. Depending on the distribution of molecular weight, materials with different viscosity are obtained.

❖ During the refining process, the hydrocarbon material is hydrogenated to create oxidation resistant molecules throughout from the liquid to the solid waxes. This gives a long shelf life to these products.

❖ Among all petroleum jelly is one of the best moisturizers having a water vapor loss resistance 170 times that of olive oil but is cosmetically less acceptable due to its greasiness. Lanolin secreted by sebaceous glands of sheep, is a complex structure of esters, diesters, hydroxyesters of high molecular weight, lanolin alcohols, and lanolin acids.

❖ Unlike human sebum, it contains no triglycerides. Petrolatum in a minimum concentration of 5% reduces TEWL by more than 98% followed by lanolin, mineral oil, and silicones which only reduce TEWL by 20–30%. The limiting factors with most occlusives.

Class	Examples
Hydrocarbons	Petrolatum, paraffin, mineral oil, caprylic/capric triglyceride, squalene
Fatty acids	Lanolin acid, stearic acid
Fatty alcohols	Cetyl alcohol, stearyl alcohol, lanolin
Phospholipids	Lecithin
Polyhydric alcohols	Propylene glycol
Sterols	Cholesterol
Vegetable waxes	Carnauba, candelilla
Wax esters	Beeswax, lanolin, stearyl stearate

VARIOUS CLASS OF OCCLUSIVE:

SKIN

The skin is a multi- functional organ, the largest in the body, and its appearance generally reflects the health and efficacy of its underlying structures. It has many functions, but its fundamental role is to provide a protective interface between the external environment and an individual's tissues, providing shielding from mechanical and chemical threats, pathogens, ultraviolet radiation and even dehydration. Being in constant contact with the external environment, the skin is subject to more insults than most insults than most of our other organs, and where the first visible signs of aging occur.

The skin is composed of two main layers with quite different underlying structures- the outer most epidermis and the deeper dermis. The epidermis fulfils most of the barrier functions of the skin and is predominantly made up of cells, mostly Keratinocytes. The keratinocytes are arranged in layers throughout the epidermis; as these cells divide and proliferate away from the basal layer, which is closest to the dermis, they begin to differentiate. This process is called Keratinisation, and involves the production of specialized structural proteins, secretion of lipids, and the formation of a cellular envelope of cross-linked proteins.

During differentiation, virtually all of the sub cellular organelles disappear, including the nucleus. The cytoplasm is also removed, although there is evidence that some enzymes remain.

In contrast, the dermal skin layer provides strength and elasticity, and includes the vascular, lymphatic and neuronal Systems. It is relatively acellular and is primarily made up of complex extracellular matrix proteins, being particularly rich in collagen fibres, which make up to 75% of the dermis dry weight.

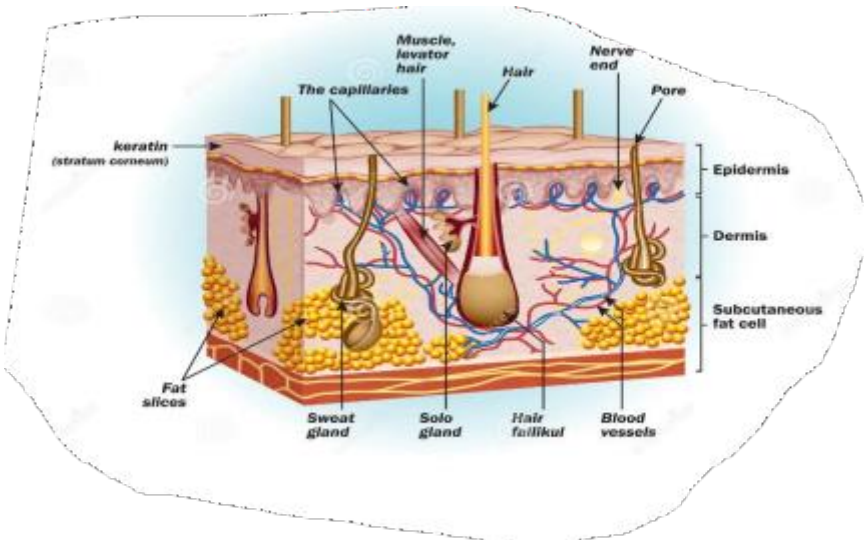


FIGURE:1 STRUCTURE OF SKIN

LAYERS OF SKIN

EPIDERMIS:

It is the outermost layer of the skin, which is approx. (150mm thick). cell from outer layer of the skin travel upward during their lifecycle and become flat dead cell of the corneum's source of energy for lower portions of epidermis is also glucose, and the end product of metabolism, lactic acid accumulates in skin.

THE LAYER OF EPIDERMIS ARE:

- ➢ Stratum germinative (growing layer)
- ➢ Malpighian layer (pigment layer)
- ➢ Stratum spinosum (pricky cell layer)
- ➢ Stratum granulosum (granular layer)
- ➢ Stratum lucidum
- ● Stratum corneum (horny layer)

DERMIS:

Non-descriptive region lying in between the epidermis and the subcutaneous fatty region. It consists mainly of the dense network of structural protein fibre i.e. collagen, reticulum and elastin, embedded in the semi gel matrix of mucopolysaccharide 'ground substance'. The elasticity of skin is due to the network or gel structure of the cells. Beneath the dermis the fibrous tissue open outs and merges with fat containing subcutaneous tissue. Protein synthesis is a key factor in dermal metabolism.

- ● **SUBCUTANEOUS TISSUE:**

This layer consists of sheet of fat rich areolar tissue; known as superficial fascia, attaching the dermis to the underlying structure. Large arteries and veins are present only in the superficial region.

- ● **SKIN APPENDAGES:**

The skin is interspersed with hair follicle and associated sebaceous gland like regions two type of sweat glands eccrine and apocrine. Collectively these are referred to asskin appendages.

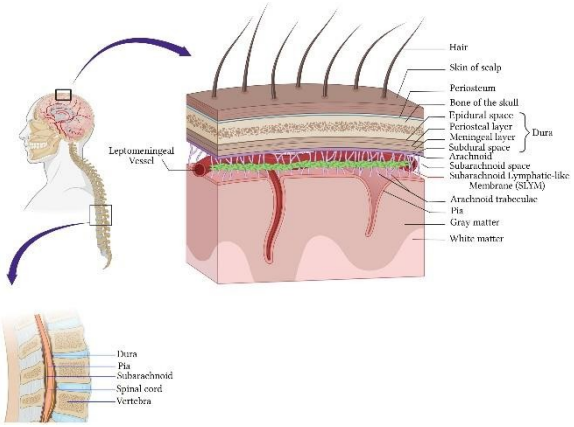


FIGURE 3: LAYER OF SKIN FUNCTION OF SKIN

UNCTION OF SKIN:

➢ Protection from external stimuli like chemical, light, heat, cold and radiation.

➢ Contamination of body fluids and tissues.

➢ Biochemical synthesis.

➢ Reception of stimuli like pressure, heat, pain etc.

➢ Metabolism and disposal of biochemical wastes.

➢ Controlling of blood pressure.

➢ Regulation of body temperature.

➢ Prevent penetration of noxious foreign material & radiation.

DAMAGE ON SKIN DUE TO UV EXPOSURE:

Types of Skin Damage	Cause	Skin Structure Affected
Sunburn	Acute and excessive UV exposure	Cell death of skin cells with associated inflammation
Photoaging / Oxidant-induced damage	Chronic UV overexposure, cigarette smoking	Damage to collagen and elastin matrix; thinning of the epidermal layer
Hyperpigmentation	Chronic UV exposure and environmental stress	Excessive pigment formation and increased melanocyte activity in the epidermis
Wrinkle formation	Natural aging, oxidative stress, smoking, medical treatments	Dermal layer changes; deterioration of collagen and elastic fibers
Skin sagging	Natural aging, oxidative stress damage, extreme weight loss	Loss of collagen and elastin fibers; thinning of skin layers; reduced muscle tone
Surface roughness	Chemical and UV exposure, physical abrasion, allergy, inflammation	Damage to stratum corneum; loss of skin moisture barrier function

CLINICAL SIGNIFICANCE OF MOISTURIZER ON SKIN

1. Maintenance of Skin Barrier Function:

❖ Skin moisture plays a key role in maintaining the integrity of the skin barrier. The stratum corneum acts as the primary protective layer, preventing excessive water loss and blocking the entry of harmful substances.

❖ Adequate hydration maintains the structural organization of corneocytes and lipids.

When moisture levels decrease, the barrier becomes compromised, allowing microorganisms, allergens, and irritants to penetrate more easily, thereby increasing the risk of infections and inflammatory responses.

2. Regulation of Trans epidermal Water Loss (TEWL):

Skin moisture is essential for regulating trans epidermal water loss (TEWL). Under normal conditions, TEWL is minimal and balanced, ensuring proper hydration. However, in dry skin conditions, TEWL increases significantly, leading to dehydration and impaired skin function. Clinically, elevated TEWL is considered a key indicator of barrier dysfunction and is widely used to assess skin health.

3. Maintenance of Skin Elasticity and Flexibility:

Adequate hydration contributes to the mechanical properties of the skin, including elasticity and flexibility. Hydrated skin remains soft, smooth, and resilient, whereas dry skin becomes rough, tight, and prone to fissures. These fissures can serve as entry points for pathogens, increasing the risk of secondary infections and compromising skin integrity. Role in Enzymatic Activity and Desquamation:

Skin moisture is crucial for enzymatic activities involved in desquamation, the natural process of shedding dead skin cells. Enzymes responsible for breaking down Corne desmosomes require sufficient hydration to function effectively. Reduced moisture levels impair enzyme activity, leading to the accumulation of dead cells, resulting in dry, scaly, and dull skin.

4. Indicator of Dermatological Disorders:

Variations in skin moisture levels are clinically significant indicators of various dermatological conditions. Reduced hydration is commonly observed in disorders such as Atopic dermatitis, Psoriasis, and Xerosis. Monitoring skin hydration assists in diagnosis, assessment of disease severity, and evaluation of therapeutic outcomes.

5. Protection Against Irritation and Sensitivity:

Adequately hydrated skin exhibits better resistance to external irritants. Dry skin increases sensitivity to environmental factors such as chemicals, temperature variations, and pollutants. This heightened sensitivity can lead to itching, erythema, and inflammation, which are common clinical complaints in dermatology.

6. Role in Wound Healing:

Moisture plays a vital role in the wound healing process. A moist environment promotes cell proliferation, migration, and tissue regeneration. In contrast, dry conditions delay epithelialization and increase the likelihood of scar formation. Therefore, maintaining optimal moisture is essential for effective wound management.

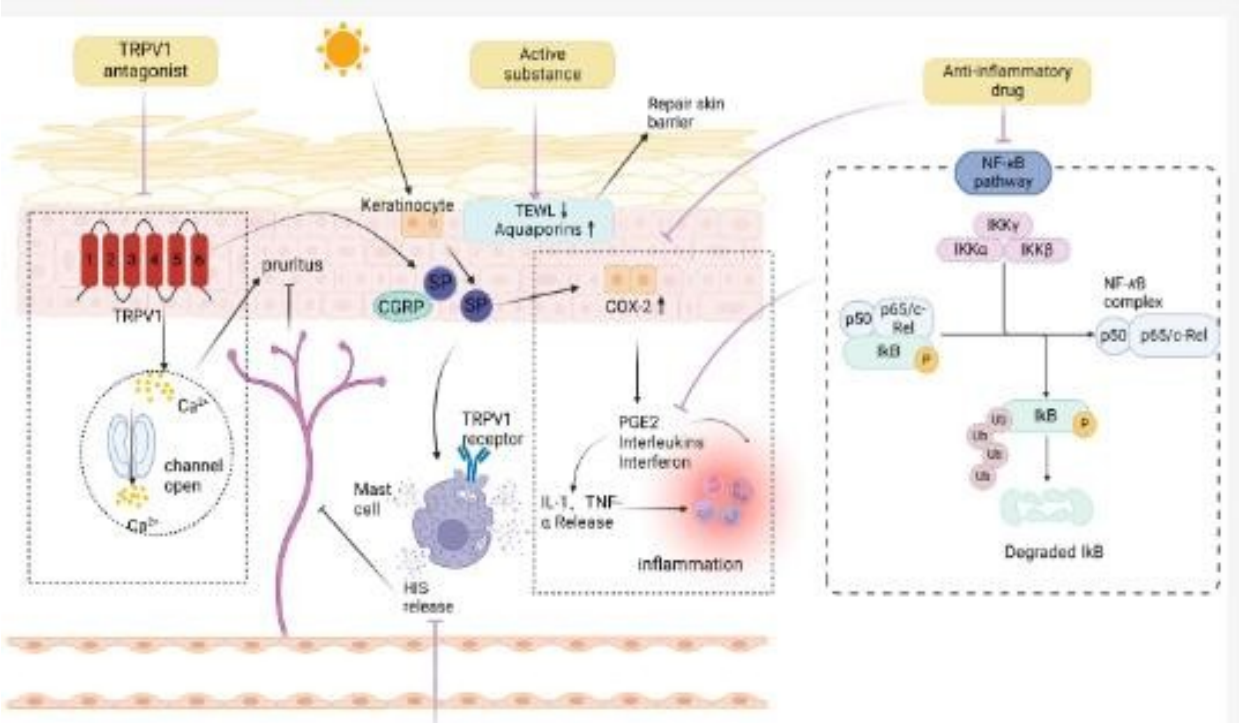
Clinical Measurement and Evaluation:

Skin moisture is measured using non-invasive instruments such as craniometers, which assess the hydration level of the stratum corneum. These measurements are widely used in clinicalandresearch settings to evaluate skin condition and monitor the effectiveness of dermatological treatments and moisturizers.

MECHANISM OF ACTION

❖ Moisturizers work by increasing the water content of the skin's outer layer (stratum corneum) through a combination of hydrating, occlusive, and emollient mechanisms.

❖ They reduce trans epidermal water loss (TEWL), restore the lipid barrier, and smooth the surface, which helps to alleviate dryness, prevent irritation, and improve skin barrier function.



LITERATURE SURVEY

Blank et.al (1952)., First described the importance of skin hydration and its relationship with the Stratum corneum. The study explained that proper moisture balance in the outermost layer of the skin is essential to maintain skin softness, elasticity, and barrier function.

Rawlings et.al (2004)., discussed the role of moisturizers in improving skin hydration by reducing Trans epidermal Water Loss (TEWL). The study highlighted that effective moisturizers contain occlusive, humectant, and emollient agents which help retain moisture and protect the skin barrier.

Lodenet.al (2003)., evaluated different moisturizing formulations and concluded that regular use of moisturizers significantly improves skin hydration and prevents dryness-related conditions such as irritation and flaking. The study emphasized the importance of lipid-based ingredients in restoring the skin barrier.

Hardinget.al (2004)., explained the function of natural moisturizing factors (NMF) present in the skin and their role in maintaining hydration. The research showed that depletion of NMF leads to dry skin, making moisturizers essential for maintaining healthy skin.

Darel'set.al (2018)., reviewed the clinical effectiveness of modern moisturizers and stated that they not only hydrate the skin but also improve skin texture, smoothness, and overall appearance. The study also highlighted advancements in dermatological formulations for better skin compatibility.

Proksch et.al (2008)., studied the impact of moisturizers on skin barrier repair and found that regular application enhances barrier recovery and protects against environmental damage. The study concluded that moisturizers play a vital role in maintaining overall skin health.

Bonte et.al (2011)., reported the beneficial effects of natural oils in skincare formulations. The study highlighted that plant-based oils rich in essential fatty acids and antioxidants enhance skin hydration and provide additional protective effects.

Payer et.al (2013)., reviewed the role of moisturizers in dermatological conditions and concluded that they are essential in managing dry skin disorders and improving skin barrier function.

Kaur et.al (2010)., evaluated herbal moisturizers and reported that plant-based oils enhance skin hydration by forming a protective barrier that reduces trans epidermal water loss (TEWL). These formulations were found to be safer and more compatible with sensitive skin.

Tarelos et.al (2018)., explained that moisturizers play a crucial role in maintaining skin barrier function. Ingredients such as emollients, humectants, and occlusives work together to improve skin hydration and prevent dryness.

Amadeus Prabowo et.al (2021)., Investigated the anti-inflammatory, antioxidant, antimicrobial properties of tamanu oil (Calophyllum inophyllum) against Atopic dermatitis treatment. Tamanu oil is derived from the nuts of Calophyllum inophyllum. It was concluded that tamanu oil is a natural alternative treatment for Atopic dermatitis.

Sindhu Abraham et.al (2024)., Developed the Tamanu Oil Bigels as Anti-Scarring Agent to treat various skin problems. It was concluded that tamanu oil a natura and assess its anti-scarring activity.

Musnaini et.al (2013)., Effectiveness of cream formulation of carrot seed oil as Anti-AgingCarrot seed oil cream with a concentration of 9% showed the best anti-aging effectiveness by increasing water content, reducing skin hardness, shrinking pores, reducing blemishes and reducing wrinkles compared to other cream formulas.

Anayanti Ariano et.al (2022)., Develop a nanoemulgel containing vegetable oil of carrot seed oil as an effective

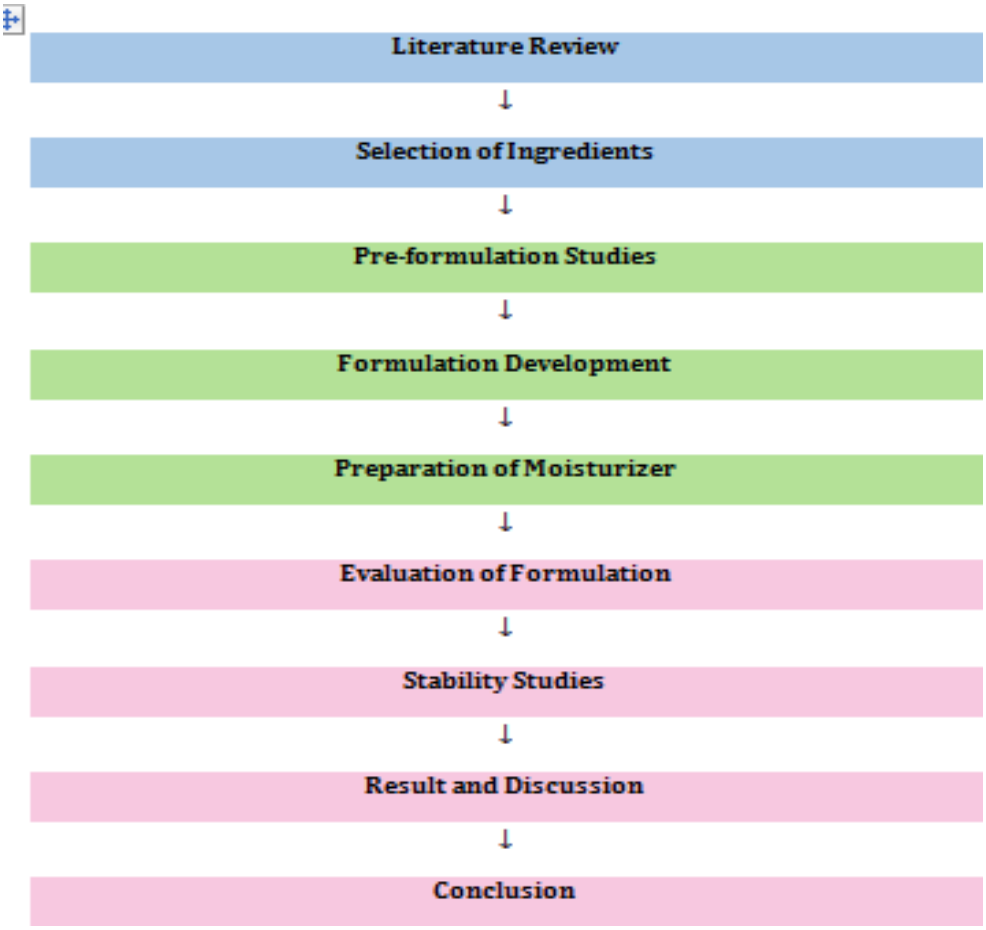
natural

sunscreen and skin anti-aging.

Mani Iyer Prasanth et.al (2019)., A Review of the Role of Green Tea (*Camellia sinensis*) in Antiphotoaging, Stress Resistance, Neuroprotection, and Autophagy. It was concluded that green tea extracts safely mitigate and reverse photoaging signs and symptoms.

Tiantian Zhao et.al (2022)., A Review of green tea shows versatile pharmacological activities, such as antioxidant, anticancer, hypoglycaemic, antibacterial, reduce oil. It was concluded that green tea also plays an important role in the prevention and treatment of microbial/viral infections, and skin inflammation.

PLAN OF WORK



PLANT PROFILE

1. TAMANU OIL:

Biological Source:
Tamanu oil is obtained from the seeds of Calophyllum inophyllum.

Family:
Clusiaceae

Synonyms:
Alexandrian laurel oil, Foraha oil

Geographical Source:
It is mainly found in tropical regions such as India, Sri Lanka, Southeast Asia, and Pacific islands.

Description:

Tamanu oil is a thick, greenish-yellow oil with a characteristic nutty aroma. It is extracted from the dried nuts of the plant through cold pressing.

Chemical Constituents:

- Fatty acids (oleic acid, linoleic acid)
- Calophyllolide
- Xanthones
- Coumarins

\Uses:

- Acts as an excellent skin moisturizer
- Promotes wound healing.
- Possesses anti-inflammatory and antimicrobial properties
- Helps in reducing scars, acne, and skin irritation.

Pharmacological Activities:

- **Anti-inflammatory activity:** Skin inflammation and redness reduce.
- **Antimicrobial activity:**Act against bacteria and fungi.
- **Wound healing activity:**Fast tissue regeneration.
- **Antioxidant activity:**Prevent free radical.

2. CARROT SEED OIL:

Biological Source:
Carrot seed oil is obtained from the dried seeds of Daucus carota.

Family:
Apiaceae

Synonyms:

Wild carrot oil, Queen Anne's lace oil

Geographical Source:
Widely distributed in Europe, Asia, and North Africa.

Description:
It is a pale yellow to amber-coloured oil with a woody and earthy aroma. It is usually obtained by steam distillation of seeds.

Chemical Constituents:

- Carotol
- Beta-carotene
- Vitamin A
- Flavonoid

Uses:

- Provides nourishment and hydration to skin
- Acts as an antioxidant
- Improves skin tone and elasticity
- Protects skin from environmental damage.

Pharmacological Activities:

- **Antioxidant activity:** Skin aging will be slow.
- **Antimicrobial activity:** Skin infections prevent.
- **Anti-aging activity:** Wrinkles and fine lines reduce.
- **Photoprotective activity:** UV damage can be protected.

3. GREEN TEA:

Biological Source:
Green tea is obtained from the leaves of Camellia sinensis.

Family:
Theaceae

Synonyms:
Chinese tea, Japanese tea

Geographical Source:
Primarily grown in China, India, Japan, and Sri Lanka.

Description:
Green tea consists of dried leaves that are light green in colour and have a slightly bitter taste. It is processed without fermentation to preserve its active compounds.

Chemical Constituents:
- Polyphenols (catechins such as EGCG)
- Caffeine
- Amino acids
- Vitamins

Uses:
- Powerful antioxidant
- Protects skin from UV damage
- Reduces inflammation
- Helps in anti-aging and improves skin health.

Pharmacological Activities:
- **Antioxidant activity:** Catechins (EGCG) free radicals ah neutralizes.
- **Anti-inflammatory activity:** Skin irritation reduces.
- **Anti-aging activity:** Collagen protects.
- **Photoprotective activity:** UV radiation damage reduces.

MATERIALS AND METHOD

MATERIALS:
The materials used in the formulation of the herbal moisturizing cream include both active ingredients and excipients.
The active ingredients: selected for this study were carrot seed oil, tamanu oil and green tea due to their excellent moisturizing and antioxidant properties.
Other ingredients: used in the formulation include emulsifying agents such as stearic acid and cetyl alcohol, humectants like glycerine, preservatives such as methyl paraben, and distilled water as the aqueous phase. Fragrance was added to enhance the sensory appeal of the formulation. All the chemicals and ingredients used were of analytical grade and were procured from reliable sources.

METHOD OF PREPARATION:
The herbal moisturizing cream was prepared by using the emulsification method. The formulation was carried out in the following steps:

1. Preparation of Oil Phase:
The oil phase was prepared by taking required quantities of stearic acid, cetyl alcohol, carrot seed oil, and tamanu oil in a clean beaker. The mixture was heated to a temperature of about 70°C until all the components were completely melted and mixed uniformly. Preparation of Aqueous Phase:
In another beaker, the aqueous phase was prepared by dissolving glycerine and methyl paraben in distilled water. This mixture was also heated to the same temperature (around 70°C) to ensure proper mixing.

2. Emulsification Process:
The aqueous phase was slowly added to the oil phase with continuous stirring. The mixture was stirred continuously using a mechanical stirrer until a uniform emulsion was formed.

3. Cooling and Addition of Additives:
The prepared emulsion was allowed to cool gradually. During the cooling process, fragrance and other heat-sensitive ingredients were added with continuous stirring to obtain a smooth and homogeneous cream.

4. Preparation of Final Product:
The final cream obtained was transferred into suitable containers, labelled properly, and stored at room temperature for further evaluationPR

E-FORMULATION STUDY
Objectives of Pre-formulation Study:
- To determine physical and chemical properties of active ingredients
- To check compatibility between drug and excipients
- To ensure stability of formulation
- To select suitable excipients and formulation method

Organoleptic Evaluation:
Organoleptic properties help in identifying the purity and quality of herbal ingredients.

Carrot Seed Oil
- Colour: Pale yellow to amber
- Odour: Earthy, woody smell
- Appearance: Clear liquid

Tamanu Oil
- Colour: Dark green
- Odour: Nutty, strong aroma
- Appearance: Thick viscous liquid

Physicochemical Properties:

1. Solubility Study
- Solubility determines the suitable base for formulation.
- Carrot seed oil: Soluble in alcohol and oils, insoluble in water
- Tamanu oil: Soluble in organic solvents and oils
- Conclusion: Oil phase formulation (cream) is suitable.

2. pH Determination
- pH of skin-friendly formulations: 5.5 – 7
- Oils were checked after dilution
- Both ingredients are compatible with skin ph.

3. Viscosity

❖ Tamanu oil: High viscosity

❖ Carrot seed oil: Low viscosity

❖ Helps in deciding cream consistency.

4. Specific Gravity

❖ Determines density and mixing behaviour

❖ Both oils show good miscibility in oil phase

❖ Compatibility Study

❖ Compatibility between active ingredients and excipients was checked.

Method:

❖ Physical observation

❖ No colour change / phase separation.

5. Partition Coefficient

❖ Indicates lipophilicity of oils

❖ Both oils show high oil solubility

❖ Suitable for topical skin application.

❖ Stability Study (Preliminary)

❖ Stored at different temperatures

Observed for:

❖ Colour change Odour change

6. Phase separation

❖ Result: Stable under normal conditions.

EVALUATION OF FORMULATION

Evaluation of cream is done to ensure its quality, stability, safety, and effectiveness for topical application.

1. Organoleptic / Physical Evaluation:

- **Parameters:**

Odor Appearance Texture

- **Method:**

Visually inspect the cream.

- **Ideal Result:**

Smooth, uniform No lumps or grittiness Pleasant smell Ensures consumer acceptability

2. pH Determination:

- Method:

Take 1 g cream + dissolve in 100 ml distilled water Measure using pH meterIdeal Range:
5 – 7 (skin compatible)
Prevents skin irritation

3. Spreadability:

- Importance:

Shows how easily cream spreads on skin

- Method:

Place cream between two glass slides Apply known weight
Measure time or distance spread

- Formula:

S = \frac {M \times L} {T} Where:
S = Spreadability
M = Weight tied to upper slide L = Length moved
T = Time taken
Good cream = high spreadability
Viscosity:

- Method:

Measured using Brookfield viscometer

- Importance:

Determines thickness and flow

- Ideal:

Moderate viscosity
Easy to apply + stays on skin

4. Homogeneity:

- Method:

Check visually and by touch

- Observation:

No phase separation Uniform consistency
Ensures proper mixing of ingredients

5. Stability Study:

- Method:

Store cream at different conditions: Room temperature
Elevated temperature (40°C)

- Duration:

1–3 months

- Observe: Colour change

Odor change Phase separation Texture
Stable cream = no changes

6. Skin Irritation Test:

- Method:

Apply cream on small area (patch test)

- Observe:

Redness Itching Swelling Should be non-irritant

7. Washability Test:

- Method:

Apply cream on skin Wash with water
Result:
Should wash off easily Indicates user convenience

8. Microbial Limit Test (Advanced):

- Purpose:

Check contamination

- Method:

Plate count method Ensures product safety

9. After Feel / Skin Feel Test:

- Check:

Greasiness Softness Smoothness

- Ideal cream:

Non-greasy Moisturizing

STABILITY STUDIES

Stability studies are conducted to ensure that the herbal moisturizing cream maintains its physical, chemical, microbiological, and therapeutic properties over time. These studies help determine the shelf life, storage conditions, and packaging suitability of the formulation.

A. Accelerated Stability Study:
Conditions: 40°C ± 2°C / 75% RH ± 5% Duration: 3–6 months Purpose: Predict long-term stability in short time

B. Long-Term Stability Study:
Conditions: 25°C ± 2°C / 60% RH ± 5% Duration: 6–12 months or more Purpose: Real-time shelf-life evaluation

C. Refrigerated Condition
Temperature: 4°C Used to check effect of low temperature

D. Room Temperature Study:
Temperature: 25–30°C Normal storage condition

RESULT AND DISSCUSION

A. PREFORMULATION STUDY:

1. ORGANOLEPTIC EVALUATION:

S.NO	PARAMETER	CARROTSEED OIL	TAMANU OIL	INFERENCE
1.	COLOUR	Pale yellow to amber	Dark green	Characteristic colour observed
2.	ODOUR	Earthy, woody	Strong, nutty	Acceptable natural odour
3.	APPEARANCE	Clear liquid	Viscous liquid	Suitable for formulation.

2. PHYSIOCHEMICAL PROPERTIES:

S.NO	PARAMETER	OBSERVATION	INFERENCE
1.	SOLUBILITY	Soluble in oils, insoluble in water	Suitable for oil phase formulation
2.	PH	Within 5.5-7	Skin compatible
3.	VISCOSITY	Tamanu oil - high. Carrot oil – low.	Balanced consistency
4.	SPECIFIC GRAVITY	Good miscibility	uniform mixing possible
5.	PARTITION COEFICIENT	High lipophilicity	Good skin penetration

3. COMPATIBILITY STUDY:

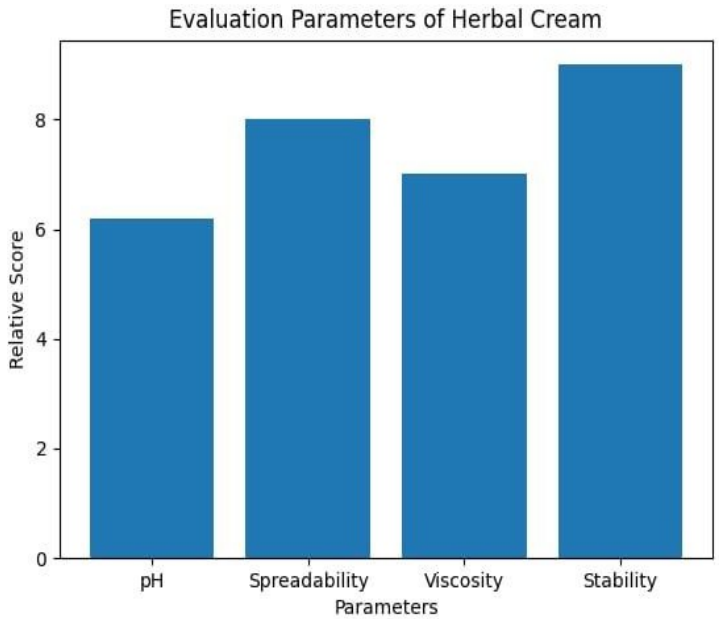
S.NO	PARAMETER	OBSERVATION	INFERENCE
1.	COLOUR CHANGE	No change	Compatible
2.	PHASESEPARATION	Absent	Stable
3.	PRECIPITATION	Absent	No incompatibility

4. PRELIMINARY STABILITY STUDY:

S.NO	CONDITION	OBSERVATION	INFERENCE
1.	ROOM TEMPERTURE	No change	Compatible
2.	ELEVATED TEMP	Absent	Stable
3.	REFRIGERATION	Absent	No compatibility

B. EVALUATION OF FORMULATION:

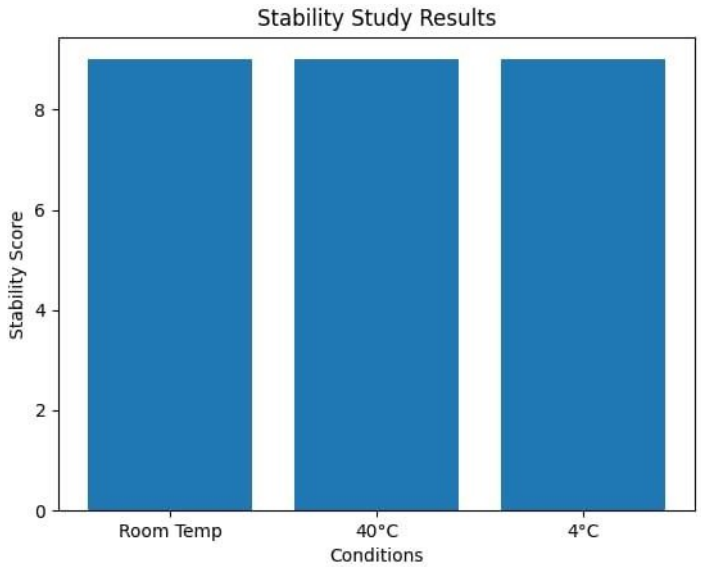
C. D. S.NO	PARAMETER	OBSERVATION	STANDARD	INFERENCE
1.	**COLOUR**	Light greenish	Acceptable	Good appearance
2.	**ODOUR**	Pleasant	Acceptable	Good sensory property
3.	**TEXTURE**	Smooth	Uniform	No grittiness
4.	**PH**	6.2	5 – 7	Skin compatible
5.	**SPREADABILITY**	Good	High	Easy application
6.	**VISCOSITY**	Moderate	Optimal	Suitable consistency
7.	**HOMEGENITY**	Uniform	No separation	Stable emulsion
8.	**WASHABILITY**	Easily washable	Non-greasy	User friendly



E. STABILITY STUDY:

S.NO	CONDITION	OBSERVATION	RESULT
1.	**Room temperature**	No change	Stable
2.	**40°C**	No phase separation	Stable

3.	**4°C**	No change	Stable



FUTURE SCOPE

- Clinical evaluation on human volunteers for efficacy.
- Incorporation of additional herbal extracts for enhanced activity.
- Long-term stability and shelf-life studies.
- Scale-up and commercial production.
- Advanced studies on anti-aging and photoprotective effects.

CONCLUSION

The present study was successfully carried out to formulate and evaluate a herbal moisturizing cream containing carrot seed oil and tamanu oil. These natural ingredients are known for their excellent moisturizing, antioxidant, and skin-healing properties.

The formulation of the cream was carried out effectively, and the prepared product showed desirable physical characteristics such as good consistency, homogeneity, and spread ability.

The evaluation parameters, including pH, viscosity, washability, and stability studies, indicated that the cream is safe and suitable for topical application.

Carrot seed oil contributed to antioxidant activity and skin nourishment, while tamanu oil enhanced hydration, wound healing, and anti-inflammatory effects. The combination of these ingredients demonstrated a significant moisturizing effect on the skin.

In conclusion, the formulated herbal cream was found to be stable, effective, and safe, making it a promising alternative to synthetic moisturizers with minimal side effects.

However, further studies such as long-term stability testing and clinical trials are recommended to support its commercial application.

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