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Review Article

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A Review on Pharmaceutical Cream Formulation Effective for Skin Dryness

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Abstract

Skin dryness, also known as xerosis, is a common dermatological condition characterized by roughness, itching, flaking, irritation, and loss of skin moisture. It occurs due to inadequate hydration, environmental factors, aging, excessive use of harsh soaps, nutritional deficiencies, and various skin disorders. Pharmaceutical creams are widely used for the prevention and treatment of skin dryness because they provide moisturization, protection, nourishment, and restoration of the skin barrier. In recent years, herbal and pharmaceutical cream formulations containing natural oils, humectants, emollients, vitamins, and therapeutic agents have gained considerable importance because of their safety and efficacy. Ingredients such as aloe vera, glycerin, coconut oil, shea butter, beeswax, almond oil, vitamin E, cocoa butter, and medicinal herbal extracts are commonly incorporated into moisturizing cream formulations because of their hydrating, antioxidant, anti-inflammatory, and skin-repairing properties. This review focuses on the formulation and development of pharmaceutical creams effective against skin dryness, including the causes of dry skin, the role of pharmaceutical creams in skincare, ingredients used in cream formulations, preparation methodology, evaluation parameters, advantages, limitations, and future prospects. The review also highlights the increasing demand for safe, stable, and effective moisturizing creams that restore skin hydration and improve overall skin health. Pharmaceutical creams for skin dryness represent a promising therapeutic and cosmetic approach for maintaining soft, healthy, and moisturized skin.

Introduction

The skin is the largest organ in the human body and acts as a protective barrier against environmental pollutants, harmful microorganisms, ultraviolet radiation, harmful chemicals, and physical injuries. Healthy skin helps regulate body temperature, prevents excessive water loss, provides perception to the senses, and aids in appearance. Among the various skin issues faced by people worldwide, skin dryness or xerosis is one of the most common dermatological issues. Skin dryness is a condition that results in a rough skin surface, scaling and flaking, itching, irritation, and tightness. It is characterized by a lack of moisture content in the outer layer of the skin, which reduces skin elasticity. It affects people of all ages, although it is often associated with aging as well as environmental changes, dehydration, nutrient deficiency, over-bathing, harsh soaps, and some skin diseases, such as eczema and psoriasis [1]. Environmental elements, such as colder temperatures, lower humidity, windy weather, pollution, and prolonged exposure to sunlight, can damage the skin's protective barrier [2]. These factors enhance moisture loss and increase the risk of skin becoming dry and irritated. Modern lifestyle habits, including frequent washing and the use of chemical-based beauty products, in addition to exposure to detergents, lead to skin dehydration and barrier damage. Therefore, proper skin care and regular moisturization are vital to maintain healthy skin and prevent complications associated with dry skin conditions [3]. Pharmaceutical creams are semi-solid topical products that are extensively used for prophylactic and therapeutic treatment of skin dryness [4]. These creams have moisturizing, protective, anti-inflammatory, soothing, and therapeutic effects on the skin surface. Creams offered in pharmaceutical formulations are generally composed of oil and water phases that are suitably emulsified with emulsifying agents. Moreover, they contain humectants, emollients, preservatives, and active ingredients that help restore moisture and enhance the skin barrier [5]. Moisturizing creams for skin reduce trans epidermal water loss to the atmosphere by attracting water to the skin and softening the outer keratinized layer. Depending on their composition, pharmaceutical creams may act as occlusives, humectants, or emollients [6]. Occlusive agents, including beeswax, paraffin, and petroleum jelly, create a barrier over the skin surface that prevents trans-epidermal water loss. Humectants, such as glycerine and propylene glycol, draw water into the outermost layers of the skin. Emollients, such as natural oils and butters, add softness and smoothness to the skin by filling the gaps between skin cells. In recent years, there has been increasing interest in cream formulations of drugs containing herbal and natural ingredients because they are safe and effective and have fewer chances of causing side effects than other synthetic chemical products. Providing hydration to your skin is key if you want to maintain a healthy complexion. With so many environmental barriers bombarding the skin daily, it is essential to strengthen the skin barrier [7]. Natural ingredients, such as aloe vera, coconut oil, almond oil, shea butter, cocoa butter, honey, olive oil, vitamin E, and herbal extracts, have moisturizing, antioxidant, anti-inflammatory, and healing properties that are beneficial for dry and damaged skin. Aloe vera has a soothing effect that hydrates the skin, while coconut oil and shea butter provide nourishment and repair the skin barrier. Vitamin E is a powerful antioxidant that prevents the skin from damage and ageing prematurely. These ingredients assist in alleviating dryness and improving the texture, elasticity, and appearance of the skin. Preparation studies involve selecting appropriate materials and preparation methods for pharmaceutical creams [8]. Further stimulation studies evaluate the performance of the formulation using measures such as stability, application, process, pH, viscosity, skin compatibility, and therapeutic effect. Certain evaluation parameters of the formulation, including homogeneity, consistency, irritancy, washability, and stability testing, help determine the quality. The rising demand for safe, efficient, and eco-friendly skincare products has compelled the pharmaceutical and cosmetic industries to emphasize the development of innovative moisturizing cream formulations for dry skin. Accordingly, the aim of this review is to present various pharmaceutical cream formulations that are effective for treating skin dryness. It will include the anatomy of the skin, causes of dry skin, role of moisturizing creams, ingredients used in formulations, formulation methods, evaluation studies, advantages, limitations, and future scope of cream formulations in skincare therapy [9].

Anatomy and Physiology of Skin

The skin is the largest and most important organ of the human body. It covers the entire external surface of the body. The skin also acts as a barrier against environmental threats. The skin accounts for nearly 15% of the total body weight and performs important physiological functions, such as protection, sensation, thermoregulation, secretion, absorption, and fluid balance. Understanding skin anatomy

is essential for formulating pharmaceutical creams for skin dryness. This is because skin creams come into direct contact with skin tissues. Furthermore, this can influence skin hydration. In addition, skin creams can influence barrier function through various mechanisms. The epidermis, dermis, and hypodermis or subcutaneous tissue are the three main layers of the skin [10]. All layers perform different functions to keep the skin hydrated and healthy. The outermost layer of the skin, which protects us from microorganisms, chemicals, ultraviolet radiation, and water loss, is called the epidermis. Keratinocytes are the main cellular components of the stratified squamous epithelium or epidermis. The epidermis contains several sub-layers: the stratum basale, stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum. The outermost stratum corneum contains dead, keratinized cells embedded in a lipid matrix. They help maintain hydration and the skin's barrier function. This sheath prevents trans epidermal water loss and dehydration of the body. The skin can lose moisture if the lipid barrier is damaged or worn away by environmental factors or aging. Melanin pigment is present in the epidermis and protects the skin from harmful ultraviolet rays [11]. Beneath the skin lies the dermis, which is a thicker layer composed of connective tissue that provides strength, elasticity, and nourishment to the skin. The dermis is composed of collagen fibers, elastin fibers, blood vessels, lymphatic vessels, nerve endings, sebaceous glands, sweat glands, and hair follicles. Collagen imparts firmness and strength, whereas elastin maintains skin flexibility and elasticity. The dermis has blood vessels that provide oxygen and nutrients to skin cells through temperature regulation. Sebaceous glands, which are found in the skin, secrete an oily substance called sebum that lubricates the skin and hair [12]. Insufficient oily skin production can cause the skin to become dry, whereas excessive production can result in oily skin and acne. Sweating enables the body to regulate its temperature and hydration levels. The innermost layer of the skin, called the hypodermis or subcutaneous tissue, is predominantly composed of adipose tissue and connective tissue. This layer plays a role in insulation, energy storage, and cushioning that shields the muscles and organs below from harm. It also helps maintain the structure of the skin and imparts thermal insulation. The skin physiologically performs several important functions that are essential for homeostasis. One primary role of epithelial tissue is to offer protection from damage. The skin barrier protects against harmful substances while preventing the loss of water from the body. An important function of the skin is thermoregulation, which occurs through sweating and blood vessel constriction or dilation. The skin has sensory receptors that help in feeling touch, pressure, pain, heat, and cold. In addition, the skin helps with immunity via special immune cells in the epidermis and dermis [13]. It is crucial for the skin to maintain adequate hydration. Lipids, sebum, and natural moisturizing factors help maintain skin water balance and softness. When protective mechanisms are disrupted by environmental factors, aging, harsh soaps, dehydration, or disease, the skin becomes dry, rough, and irritated. Pharmaceutical creams that moisturize help restore hydration while repairing the skin barrier. They also improve skin elasticity and smoothness. Thus, understanding skin anatomy and physiology will help develop pharmaceutical cream formulations to prevent and treat skin dryness [14].

Causes of Skin Dryness

Skin dryness, also known as xerosis, is a common dermatosis characterized by rough, flaky, itchy, and dehydrated skin with insufficient moisture content in the outermost layer of the skin. Healthy skin usually has sufficient water and natural oils to remain soft and elastic and to form a barrier against the environment. However, various internal and external factors may disrupt the skin's natural moisture balance and protective barrier, causing excessive moisture loss and dryness [15]. A pharmaceutical cream formulation designed to restore moisture to the skin requires users to understand the cause of skin dryness, which is one of the most common causes of skin dryness. Cold weather and low humidity, combined with strong winds, excessive sun exposure, and air pollution, damage the skin's outer protective layer and increase water loss through the skin. Cold, dry weather in winter months can deplete skin moisture, making it rough, cracked, and itchy. Continuous exposure to ultraviolet rays' damages skin cells and lipids, leading to drying and aging. Oxidative stress and disruption of the skin barrier can also result from environmental pollutants, and frequent handwashing and bathing can result in dry skin. Taking more than one bath a day in hot water removes the natural oils and lipids from the skin surface. This weakens the skin barrier, making it less effective in retaining moisture. Soaps and cleansing agents containing strong surfactants, alcohols, or synthetic substances may worsen dryness and irritation [16].

Chemical-based cosmetics can damage sensitive skin and disturb the natural pH level when used regularly. Aging is

another major factor associated with dry skin. When a person gets older, there is less activity in the sebaceous glands, and thus, less sebum is produced. Aging depletes the skin of collagen, elastin, and natural moisturizing factors, making it thinner, less elastic, and drier, resulting in wrinkles. As people age, their skin becomes very dry due to physiological changes, and not drinking enough water and dehydration also greatly contribute to dry skin. When the body does not have sufficient fluids, the skin tissues lose water, making them dull, rough, and flaky. Nutrient deficiencies, particularly of vitamins A, C, and E, essential fatty acids, and minerals, can adversely affect the skin and its barrier functions. This causes dry skin and slow healing. A lack of omega fatty acids leads to lower skin lipid content and greater water loss, and dry skin is linked to certain medical conditions and skin disorders [17]. Conditions such as eczema, psoriasis, dermatitis, diabetes mellitus, hypothyroidism, and kidney disease may alter skin physiology and moisture content. Skin disorders, such as eczema and psoriasis, are characterized by inflammatory conditions with loss of the skin barrier, scaling, itching, and severe dryness. Diabetes can impair blood circulation and reduce skin hydration, whereas hypothyroidism decreases the activity of sweat and oil glands [18]. Skin drying can also be aggravated by lifestyle factors, such as smoking, excessive alcohol consumption, stress, and poor skin care. Parcel Check Post 2022 Notification: Selection Process and Eligibility Criteria. Impaired blood circulation and damage to collagen fibers due to smoking and dehydration due to alcohol. Stress can cause changes in hormones that affect the skin barrier and moisture levels. Being exposed to air conditioning and heating units often or being frequently around chemicals at work can also dry out your skin. Drugs, such as diuretics, retinoids, antihistamines, and acne medications, may also cause dryness as a side effect. These medications may reduce oil production in the skin or alter the moisture balance. Increased susceptibility to dry skin problems may be caused by genetic predisposition and sensitive skin conditions [19]. To prevent skin from drying out, it is important to follow a good skincare routine and regularly use a pharmaceutical moisturizing cream. Creams that contain humectants, emollients, occlusive agents, vitamins, and herbal extracts replenish the moisture content of the skin, repair the barrier function of the skin, and enhance its softness and elasticity. To help formulate a specific pharmaceutical cream, it is therefore imperative to analyse the causes of skin dryness. This will help develop formulations that provide protection [20].

Role of Pharmaceutical Creams in Skin Care

Pharmaceutical creams contribute significantly to skincare by providing moisturization, protection, healing, nourishment, and therapeutic benefits directly to the skin surface. These semisolid topical formulations are widely employed in the prevention and treatment of dry skin, inflammation, infections, eczema, dermatitis, itching, burns, and premature aging. The skin is continuously exposed to environmental pollutants, ultraviolet rays, microorganisms, harsh chemicals, and climatic changes, which can wear down the natural skin barrier and disrupt hydration. Pharmaceutical creams replenish moisture, enhance skin barrier function, and promote healthy skin appearance and physiology. In contemporary skincare treatment, medicinal creams are one of the more efficacious and convenient dosage forms, as they are easy to apply, apply evenly, and offer localized action with minimal side effects. Moisturisation and hydration are the two essential roles of pharmaceutical creams for the skin. Dry skin occurs when water and natural oils from the skin's outer layer are lost. It can look rough and flaky and feel itchy and irritated [21]. Moisturizers help prevent trans epidermal water loss by forming a protective layer on the skin. Creams for pharmaceutical use are prepared using humectants, emollients, and occlusive agents that help keep the skin hydrated. Glycerine and propylene glycol are humectants that draw water into the skin, and natural oils and fatty acids are emollients that smooth the skin. Beeswax, paraffin, and petroleum jelly are occlusive agents that trap moisture and form a protective layer on the skin [22]. Pharmaceutical creams also help repair and maintain skin barrier integrity and function. A protective layer is created by the outer stratum corneum, which protects the skin from irritants, microorganisms, and water loss. Damage to this barrier, caused by exposure to soaps, pollutants, aging, or skin disorders, results in dry and sensitive skin. Creams designed for the pharmaceutical sector repair the skin barrier, restore lipids, hydrate, and stimulate recovery. Elements, such as aloe vera, shea and cocoa butter, and vitamin E, help in the regeneration of skin tissue and boost elasticity and smoothness. Pharmaceutical creams have therapeutic and protective properties. Creams that contain anti-inflammatory, antimicrobial, antifungal, or antioxidant agents are used to treat skin disorders, such as eczema, psoriasis, fungal infections, and dermatitis. Ingredients which are anti-inflammatory reduce redness, swelling, itching and irritation. Similarly anti-microbial agents prevent bacterial or fungal infections. Herbal extracts and

vitamin E, which are antioxidants included in skin care products, protect the skin from oxidative stress caused by pollutants and UV rays. This prevents the early appearance of aging and wrinkling of the skin [23]. Another crucial function of pharmaceutical creams is to nourish and condition the skin. The vitamins, proteins, and herbal extracts in these creams provide the skin with what it needs to work well. These components upgrade skin texture, smoothness, flexibility, and appearance. Pharmaceutical industry creams also contribute to comfort by alleviating tightness, scaling, and discomfort due to dry skin. Certain creams deliver cooling, soothing, and calming effects that are ideal for irritated or sensitive skin. Pharmaceutical creams can also be effective because they provide a localized and controlled delivery of medicines to the affected skin. By minimizing systemic absorption, the likelihood of side effects is decreased rather than taking oral medication. Creams that are cosmetically elegant, non-greasy, and easily washable improve compliance and convenience [24]. The growing demand for safe and effective products with minimal side effects for the skin has increased the use of herbal and natural ingredients in pharmaceutical creams, as they offer a better safety profile and are less likely to irritate the skin. Accordingly, pharmaceutical creams contribute to skin hydration, protection, healing, nourishment, therapeutic effects, and restoration of skin barrier function. Oily and fatty substances are vital for maintaining healthy, soft, smooth, and moisturized skin while treating dryness and other skin diseases [25].

Ingredients Used in Cream Formulation

Ingredients of the pharmaceutical creams for skin dryness are formulation which are incorporated in such a way that they individually and collectively provided moisturization, nourishment, protection stability and therapeutic effects to the skin. They perform specific functions, such as providing hydration, emulsifying, preserving, enhancing consistency, and conditioning the skin. The proper selection of ingredients is essential for developing effective, stable, safe, and cosmetically acceptable cream formulations. Pharmaceutical creams typically contain components of an oil phase, a water phase, an emulsifying agent, a humectant, an emollient, a preservative, an antioxidant, and an active therapeutic ingredient. Emollients are an important group of ingredients used for formulating creams. They soften and smoothen the skin by filling the spaces between skin cells. Thus, they prevent loss of moisture from the skin (i.e. trans epidermal water loss). Natural oils, such as coconut, almond, olive, sunflower, and jojoba oils, are widely used for their moisturizing, nourishing, and skin-conditioning properties. Coconut oil improves hydration and reduces inflammation, making it particularly useful for dry skin [26]. Almond oil contains vitamin E and fatty acids, which help to soften the skin. Shea and cocoa butters are often used in formulations for moisturizing creams designed to nourish the skin and prevent it from drying and cracking. Humectants are another significant class of ingredients that draw water into the skin's outer layer and retain moisture. Glycerine is perhaps the most widely employed humectant in pharmaceutical creams owing to its moisture-retaining attributes. Propylene glycol and sorbitol are used for moisture retention and prevention of skin dehydration. These components make the skin soft and supple while reducing the roughness and flaking of dry skin [27]. Occlusive agents create a barrier to prevent water loss and minimize trans-epidermal water loss. Beeswax, paraffin wax, petroleum jelly, and lanolin are often used for this purpose in waxes. Beeswax has a dual function: enhancing the consistency and stability of the cream formulation and providing protection. Lanolin is highly effective in retaining moisture and smoothing the skin. Emulsifying agents are necessary ingredients used in creams to stabilize the oil and water phases. Creams are generally emulsions, and emulsifiers help maintain their homogeneity and prevent phase separation. Cetostearyl alcohol, stearic acid, glyceryl monostearate, and polysorbates are commonly used emulsifying agents. These agents enhance the texture, stability, and shareability of creams [28]. Water-soluble ingredients are purified or distilled water, which acts as an aqueous phase ingredient and solvent base medium to dissolve other water-soluble ingredients. Water also aids in the spreadability and hydration of the foam. Moreover, moisturizing creams frequently contain herbal extracts, such as aloe vera, cucumber extract, calendula extract, chamomile extract, and green tea extract, owing to their soothing, anti-inflammatory, antioxidant, and healing properties. Aloe vera is beneficial for dry skin as it cools and hydrates the skin [29]. Antioxidants and vitamins are also useful components of pharmaceutical creams. Vitamin E is frequently used because it protects the skin from oxidative stress and free radicals while enhancing skin repair and softness. Vitamin C may also be added for its antioxidant and collagen-boosting properties. In general, preservatives prevent the growth of microorganisms, ensuring the safety and stability of personal care products.

Such as parabens alternatives or phenoxyethanol. Fragrance agents and colouring agents may also be considered for cosmetic enhancement and consumer acceptability. To treat and prevent dry skin, the active ingredients used in the formulation of pharmaceutical cream is a vital factor in the performance of the final formulation. An ointment is thicker than a cream [30].

Importance of Moisturizing Creams

Moisturizing creams are essential for maintaining healthy, soft, smooth, and hydrated skin. Dry skin can cause irritation and make the skin feel tight or uncomfortable. It has become a global dermatological condition. Skin becomes dry when water or natural oils are unable to enter the skin, and the skin is prevented from drying out. Dry skin can occur at various stages of life. The skin barrier can be damaged by environmental conditions, such as cold weather, low humidity, pollution, ultraviolet radiation, and excessive washing with harsh soaps. Conditions of dry skin may be caused by dehydration, as well as aging and deficiency of nutrients, but also certain skin conditions, such as eczema and psoriasis [31]. Moisturizing creams are semisolid preparations designed to restore hydration, repair the skin barrier, and protect the skin from further loss of moisture. Using these is crucial for maintaining the healthy functioning of the skin and preventing issues arising from dry skin. Moisturizing creams are primarily important for maintaining the water balance in the skin. Moisturizers, by increasing the water content of the stratum corneum, help the skin remain hydrated. They comprise humectants, emollients, and occlusives, which work together to enhance moisture retention within the skin. Humectants are substances that attract water; glycerine is one such example of a humectant. Glycerine draws moisture to the skin. Emollients are inclusions that soften and smooth rough skin surfaces. Occlusive agents create a barrier on the skin surface to retain moisture effectively. This function is to restore skin softness, elasticity, and comfort. In addition, moisturizing creams play an important role in repairing and maintaining the skin barrier. The skin barrier shields the human body from harmful things, such as chemicals and microbes. When this barrier is damaged, it can leave the skin dry, sensitive, and susceptible to irritation and infection. Moisturizing cream replenishes lipids and regenerates damaged skin cells, thereby restoring barrier integrity and improving the general health of the skin[32]. Moisturizers are also helpful in treating different dry skin conditions. They help relieve itching, irritation, redness, inflammation, tightness, and scaling that may occur in xerosis, eczema, and dermatitis. Ingredients, such as aloe vera, shea butter, coconut oil, vitamin E, and herbal extracts, have soothing and anti-inflammatory effects that help improve comfort and healing. Moisturizing creams shield the skin from damage inflicted by ultraviolet rays, pollution, and severe weather conditions. The antioxidants found in moisturizing creams can help neutralize the impact of free radicals, which are responsible for causing oxidative stress and the early aging of the skin. They aid in diminishing wrinkles, fine lines, and loss of skin elasticity [33]. Moisturizing creams also play an important role in improving skin appearance and texture. Regular use of moisturizers keeps the skin soft, smooth, radiant, and healthy-looking. They help the skin become more flexible and less rough and flaky. Creams that moisturize the skin are beneficial for the elderly because, due to age, natural oil production decreases. All of these creams also enhance the penetration of other topical drugs' active ingredients and help maintain skin moisture levels for optimum efficacy. Moisturizers produced by pharmaceutical companies are generally easy to apply, spread uniformly, and provide a localized effect with minimal side effects. Moisturizing creams made from herbs and natural ingredients are gaining more preference because they have fewer chemicals and are safer for sensitive skin. They are also eco-friendly and biodegradable. Moisturizing creams are essential in modern skincare. They hydrate, protect, heal, nourish, and prevent dry skin conditions to keep the skin healthy and attractive [34].

Materials Used in Pharmaceutical Cream

The preparation of creams for skin dryness is achieved with the assistance of several materials, which collectively provide moisturizing, protective, stabilizing, nourishing, and therapeutic properties. The selection of appropriate materials is one of the most important factors essential for developing an efficient cream formulation. Each ingredient in the formulation performs a specific function that improves the quality, stability, texture, spreadability, and efficacy of the cream formulation. A pharmaceutical cream typically contains an oil phase, an aqueous phase, emulsifying agents, humectants, emollients, preservatives, antioxidants, and active ingredients. These materials are selected based on the therapeutic intention and compatibility with the skin. Emollients are the main materials in pharmaceutical cream formulations used to soften and smooth the skin by retaining water and

improving texture. Natural oils, such as coconut, almond, olive, jojoba, and sunflower oils, are often used for moisturizing and nourishing the skin or hair. Coconut oil can help reduce inflammation and improve the hydration of dry skin [35]. The vitamin E and fatty acids in almond oil make the skin soft and elastic. Shea and cocoa butters are important emollients for moisturizing creams because they nourish the skin, improve barrier function, and prevent dryness and cracking. Another important group of substances are humectants, which help attract water to the outer layers of the skin and maintain hydration. Glycerine is a humectant widely used in the industry, as it prevents moisture loss from the skin. Hydrating and softening the skin are also enhanced by the inclusion of propylene glycol and sorbitol. These ingredients help keep the skin smooth, and roughness is due to dry skin. Occlusive agents are substances that form a film or oil on the skin to slow down trans epidermal water loss. Petroleum jelly, lanolin, mineral oils, beeswax, and paraffin wax are common occlusive agents. Beeswax is used to provide protection, enhance consistency, and stabilize the cream. Lanolin aids in moisture retention and enhances smoothness. Petroleum jelly forms a protective layer on the skin, preventing moisture loss by acting as a barrier to prevent evaporation. The jelly guards the skin against external skin damaging reactions[36]. Emulsifiers are important chemicals that stabilize oil-in-water or water-in-oil emulsions in creams. Creams contain both oil and water phases, which makes emulsifiers essential to maintain uniformity and prevent the two phases from separating. Emulsifiers include stearic acid, Ceto stearyl alcohol, glyceryl monostearate, polysorbates, and emulsifying waxes. By improving the texture, spreadability, and stability of the formulation [37]. Purified or distilled water is typically used as the aqueous phase. Solvents and base media are used to incorporate water-soluble ingredients. Herbal extracts, such as aloe vera, calendula, cucumber, and chamomile, are often used in cosmetics for their soothing, antioxidant, anti-inflammatory, and healing properties. Aloe vera is good for dry skin and keeps it moist. Antioxidants and vitamins, in particular, vitamin E and vitamin, are included to neutralize oxidative stress and enhance skin repair. When combined with oil in the formulation, Vitamin E, an antioxidant, prevents the oil from going rancid while boosting the product's efficacy. To avoid microbial contamination and extend the shelf life, we added either phenoxyethanol or natural preservatives. Fragrance and colouring agents may also be included to increase the cosmetic appeal and consumer acceptability [38].

Formulation Methodology

The method of pharmaceutical cream formulation involves the systematic selection, preparation, and mixing of suitable ingredients. It must result in a stable, safe, effective, and cosmetically acceptable topical preparation for skin dryness. Pharmaceutical creams are typically thick emulsions that contain oil and water phases, with emulsifying agents acting as stabilizers. To achieve smoothness, viscosity, spreadability, stability, moisturization, and therapy, a proper formulation methodology is necessary. Ensure Development of Multi-Microbial Tablets [39]. Ensuring the development of multi-microbial tablets requires the careful selection of ingredients and controlled preparation conditions. Evaluation studies must confirm the equality and efficacy of the active ingredients in the final products. To begin the formulation process, all ingredients, such as oils, waxes, emulsifiers, humectants, preservatives, antioxidants, and herb extracts, are carefully selected and weighed accurately. The different components of the formulation are mostly divided into oil or aqueous phases. The materials in the oil phase generally comprise beeswax, stearic acid, Ceto stearyl alcohol, paraffin wax, sheabutter, coco butter, and natural oils, such as coconut oil or almond oil. These ingredients deliver moisturizing, protective, stabilizing, and soothing effects. The aqueous phase is mainly purified or distilled water along with any water-soluble ingredient (glycerine, propylene glycol, herbal extracts, and preservatives) [40]. The components of the oil phase are transferred to a clean beaker. The beaker containing the oil phase is then placed in a water bath. Heat is applied gently to the beaker in the water bath. To allow the melting of all waxes and oily materials, the heat should be continuous. To prevent degradation, sensitive ingredients are normally heated at controlled temperatures of 70–75 °C. In a separate container, the ingredients for the aqueous phase are also heated to the same temperature. It is necessary to maintain equal temperatures of both phases for proper emulsification of the cream [41]. Once both phases have reached the desired temperature, the aqueous phase is slowly added to the oil phase with constant stirring [42]. The emulsion is destabilized (but not completely broken) by grinding the dispersion of emulsifying agents into the fat. Emulsifying agents prevent the separation of oil and water, thus stabilizing the mixture. Mixing should be performed

continuously to obtain a homogeneous and smooth cream. Active ingredients are delicate and are therefore added during cooling, such as herbal extracts, aloe vera gel, vitamin E, fragrance oils, and other heat-sensitive ingredients [43]. The pH of the formulation is regulated to a level that closely resembles the natural skin pH, preferably 5–7, using appropriate pH regulators, if necessary. The skin barrier will not be irritated if the pH is properly maintained. Thus, the cream is gradually cooled while being continuously stirred to prevent lump formation and to achieve the desired consistency. During preparation, hygienic conditions are maintained to minimize microorganisms along with harmful pathogens [44]. Once prepared, the cream is filled into clean and dry airtight containers suitable for storage. The selection of packaging plays a very important role in protecting a formulation from wet air, moisture, light, and bacteria, fungi, and other contaminants. To evaluate pH, viscosity, spreadability, homogeneity, stability, washability, irritancy, and moisturizing efficiency, the prepared pharmaceutical cream was subjected to various tests. Stability studies are conducted under various storage conditions to detect any changes in the texture, Odor, color, phase separation, and microbial growth over time [45]. Thus, the relevant formulation methodology is a key element in the successful development of pharmaceutical creams aimed at skin dryness, as it helps to prepare a stable, safe, effective, and cosmetically elegant moisturizer that can restore hydration and improve skin health [46].

Evaluation Parameter

Evaluation parameters are essential in the development of pharmaceutical cream formulations, as they help to determine the quality, safety, stability, effectiveness, and consumer acceptability of the final formulation. Creams of a pharmaceutical nature used for skin dryness must possess acceptable physical, chemical, and therapeutic properties to ensure suitable moisturization, spreadability, stability, and compatibility with the skin [47]. Evaluation studies are conducted to estimate the characteristics and performance of cream formulations. Properly evaluating a cream ensures that it hydrates the skin effectively to protect it from harmful irritations. One of the main evaluation parameters is organoleptic evaluation, including the color, Odor, appearance, texture, and consistency of the cream. The formulation should have a smooth texture, uniform appearance, pleasant odor, and be physically attractive without lumps or phase separation. Consumer acceptance and ease of application depend upon these traits. The cream must be sufficiently consistent so that it spreads easily on the skin without being too thick or too watery. The pH of the cream is another important parameter, as it must be compatible with that of the skin, which is generally between 5 and 7. If the pH is inappropriate, skin irritation, redness, dryness, and damage to the skin barrier can occur [48]. The pH is usually measured using a digital pH meter after preparing a diluted sample of the cream. The fluidity and thickness of the formulation are evaluated in terms of viscosity. The viscosity level should be sufficient to spread and stay on the skin. Applying a very thick cream may be difficult. In contrast, a very thin cream may not moisturize satisfactorily. Spreadability is another important evaluation parameter that measures the ease with which the cream may spread on the skin. Good spreadability facilitates easy application, uniform distribution, and better patient compliance [49]. One standard method involves placing the cream between two glass slides and measuring its spreading under applied pressure. Homogeneity testing is performed to ensure the uniform distribution of the ingredients in the formulation without lumps or aggregates. Washability assesses how effectively water removes the cream from the skin. A good cream should have sufficient retention but should be easy to wash off. Irritancy or patch testing is among the most important evaluation parameters for topical formulations. A small amount of cream is applied to the skin to check for any signs of redness, itching, swelling, burning sensation, or allergic reaction. A drug cream for dry skin must not irritate the skin and be safe for long-term use. Stability studies of the cream are conducted to assess its physical and chemical stability under different conditions, including temperature, humidity, and light exposure [50]. During stability testing, any changes in color, odor, pH, texture, phase separation, and microbial growth are noted over time. Stability studies help to estimate the shelf life and storage conditions of the formulation. In some instances, cream testing is performed to ensure that the cream is not microbiologically contaminated and will not become contaminated during storage. The efficiency of the moisturizing effect of the cream (whether it is able to hydrate the skin) can be assessed by noting an improvement in skin hydration, softness, smoothness, and decreased dryness after application. Consumer acceptability studies may also be conducted to assess user delta response towards the texture, fragrance, moisturization, and performance of the cream. Thus, evaluation parameters play a significant role in assuring the quality, safety,

stability, and therapeutic efficacy of pharmaceutical cream formulations designed for the treatment of dry skin [51].

Advantages of Pharmaceutical Cream

Pharmaceutical creams can be helpful in the prevention and treatment of skin dryness and other skin conditions. Body creams the semisolid forms of the topical formulations, which are used widely provide moisturization, protection, nourishment and therapeutic benefits on the skin. Pharmaceutical creams are regarded as one of the most convenient and effective dosage forms in topical therapy due to their easy application, good spreadability, and localized action. Xerosis or skin dryness is a frequent condition that affects the skin, causing it to become rough, flaky, itchy, irritated and dehydrated. Pharmaceutical creams restore hydration and improve the function of the skin barrier and help skin stay healthy. As pharmaceutical creams and lotions can give a prolonged effect of moisturization and hydration[52]. Cream formulations typically contain a combination of humectants, emollients, and occlusive agents. These help in reducing trans epidermal water loss. Humectants absorb water into the outer skin layers. Emollients soften and smooth rough skin surfaces. Occlusive agents work by forming a barrier on the skin to prevent moisture loss. Pharmaceutical creams can work on a specific area of the skin. As the application of the creams is done on the affected area directly, it applies the active ingredients where they are needed most. Thus, providing faster and effective relief from dryness, irritation, inflammation, and itching When drugs are applied locally, it also minimizes the risk of systemic absorption and side effects[53]. Using pharmaceutical creams is easy for patients. They can spread the creams easily on the skin surface. They have great aesthetics, are non-greasy, and are generally comfortable to wear. Medicinal creams also help in the repair and protection of the skin barrier. When the outer protective layer of your skin gets damaged, it sometimes causes dry skin as the body loses excess water and can get more sensitive. Cream products replace important fats and enhance the integrity of the skin barrier to reduce roughness, scaling and cracking. Natural ingredients including aloe vera, coconut oil, shea butter, almond oil, and vitamin E provide added nourishment, antioxidant and healing effect which aids in skin repair and renewal. The creams containing antioxidants protect the skin against oxidative damage from pollution and UV radiation. This protects against premature skin aging, wrinkles and fine lines[54]. Pharmaceutical creams also have great benefits, as they are suitable for dry, sensitive, aging, and damaged skin. Carefully formulated creams are relatively mild and non-irritating, enabling regular and long-term use. The incorporation of such green formulations in creams is particularly popular because they do not contain harsh chemicals, and the chances of allergic reactions and skin irritations are lower. Creams in pharmaceuticals also enhance the skin's texture, elasticity, softness, and overall appearance. Thus, it improves comfort and confidence [55]. Pharmaceutical creams are flexible formulations that can contain many different active ingredients, such as anti-infective, anti-inflammatory, vitamins, herbs, and antioxidant compounds, depending on the therapeutic need. Owing to its potent moisturizing properties, it is useful not only for skin dryness but also for eczema, dermatitis, psoriasis, infections, burns, and other inflammatory skin disorders. In addition, creams are usually easy to manufacture, package, store, and transport. The comfortable texture and cooling effects increase consumer acceptability. Consequently, safe, effective, and eco-friendly skincare products have been developed in advanced pharmaceutical cream formulations using herbal and natural ingredients. Hence, pharmaceutical creams are effective in terms of moisturization, barrier repair, local action, protection, nourishment, appearance improvement, safety, and convenience. They are a great deal in today's age and for dry skin treatment[56].

Conclusion

The present review on pharmaceutical cream formulations effective for skin dryness discusses the role of moisturizing creams in maintaining healthy, soft, hydrated, and protected skin. Skin dryness or xerosis is a common skin condition that can appear due to environmental factors, aging, dehydration, excessive use of harsh soaps, nutritional deficiencies, and many other skin diseases. When the natural skin barrier is damaged, the skin loses too much moisture, resulting in roughness, itchiness, irritation, and loss of elasticity. Pharmaceutical creams are largely used for proper moistening, nourishment, protection, and direct local therapeutic actions on the affected skin. Hydrate, restore barrier function, reduce transepidermal water loss, and relieve symptoms of dry skin conditions with these creams. Pharmaceutical creams are prepared by adding emollients, humectants, occlusive agents, emulsifiers, antioxidants, preservatives, and active ingredients to a base, resulting in products that aid in skin hydration and repair upon topical application. Aloe vera, coconut oil, almond

oil, shea butter, cocoa butter, glycerin, beeswax, and vitamin E are beneficial ingredients in providing anti-oxidants, anti-inflammatories, and healing properties to dry and damaged skin. Detailed formulation development and evaluation studies, such as pH, viscosity, spreadability, stability testing, homogeneity, and irritancy studies, help establish the quality, safety, stability, and effectiveness of the final product. Creams offer a host of benefits; their healing power acts directly on the affected area, they are easy to apply, and they can improve skin quality. They also soften the skin, protect it from environmental damage, and do not cause unwanted side effects, unlike other medicines. More and more herbal and natural cream formulations are becoming popular because of their safety, biodegradability, eco-friendliness, and long-term use. Despite certain challenges, such as stability issues and a shorter shelf life, continuous research work and advanced formulation techniques can enhance the effectiveness and commercial potential of moisturizing creams. As such, pharmaceutical creams can easily be termed as an essential skincare formulation that helps prevent and treat dryness of the skin. In other words, they offer healthy, nourished, smooth, and moisturized skin.

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