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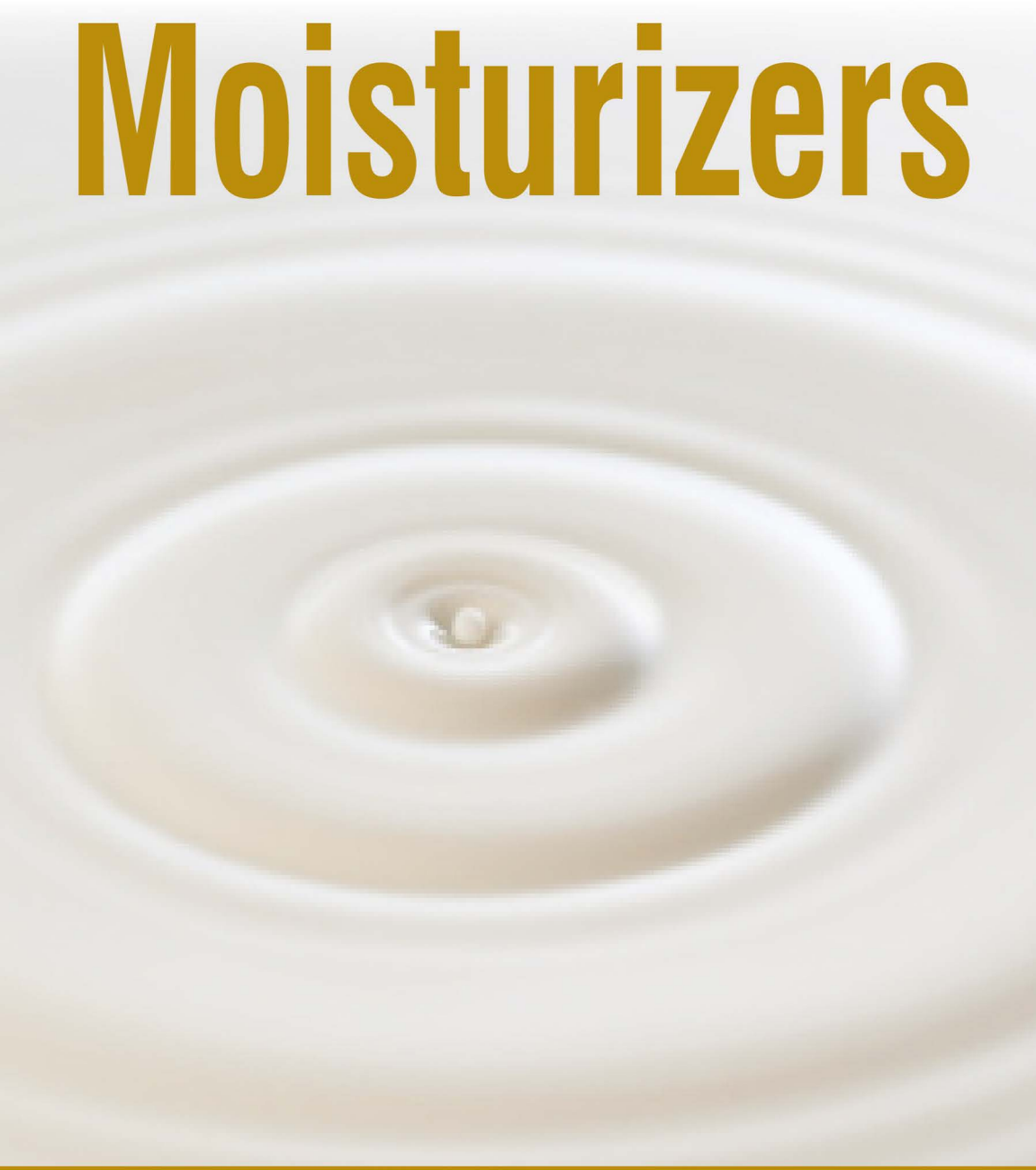
Moisturizers



Editor
Rashmi Sarkar

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CHAPTER 4

Indications of Moisturizers in Skin

Pooja Arora

INTRODUCTION

Moisturizers are required for the daily maintenance of normal skin and are the mainstay of treatment for dry skin. They are also used as adjunctive therapy for many skin diseases characterized by xerosis and impaired skin barrier. In this chapter we will discuss the indications of moisturizers on skin (Table 1).

DRY SKIN (XEROSIS CUTIS)

Dry skin is characterized by a rough or scaly appearance of skin with an irregular feel on touch. Cracking and reddening may be associated with dry skin. There is increase in skin markings and erythematous lines can develop with time. The sites most affected are the lower legs, dorsal aspect of forearms and hands. Dry skin can lead to pruritus and eczema. People with dry skin have a genetic predisposition to it. Systemic diseases like hypothyroidism, uremia, diabetes as well as certain medications like isotretinoin can lead to dry skin. Treatment of xerosis is aimed at restoration of the epidermal barrier with liberal use of moisturizers. Application of emollients immediately after bath improves the hydration of the stratum corneum (SC). Moisturizers make the skin smooth as they fill the gaps between the desquamated corneocytes. They also reduce the friction on the skin. Studies have shown that moisturizers reduce the soap-induced xerosis.[1]

Table 1: Indications of moisturizers on skin

Indications	
Dry skin (xerosis)	Genetic, associated with systemic diseases (hypothyroidism, uremia, diabetes, chronic illness), medications (isotretinoin, lithium)
Eczema	Asteatotic eczema, atopic dermatitis, hand eczema
Disorders of keratinization	Ichthyosis, keratoderma, psoriasis
Acne	Acne treated with retinoids, rosacea
Aging	Chronic pruritus in elderly, atrophic vaginitis, photoaged skin
Miscellaneous	Scars and striae

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Alpha or beta hydroxy acids are special moisturizing agents that promote corneocyte desquamation, and hence decrease roughness. These are also helpful in the treatment of photoaged skin.

ECZEMA

Moisturizers are the mainstay of treatment of asteatotic eczema. They are also used for the treatment and prevention of hand eczema. Patients with hand eczema should apply emollients (humectants and lipids) liberally to hands after work. It should be noted that urea in moisturizers can increase skin permeability to irritants and should be avoided.[2] White petrolatum is a purified derivative of mineral oil and consists of long chained aliphatic hydrocarbons. Studies have shown that white petrolatum protects the skin from water-soluble skin irritants. It also hastens barrier recovery. Hence, it serves both as an effective moisturizer as well as a barrier cream and is the topical emollient of choice in hand eczema.

Moisturizers can also decrease the inflammation in damaged and irritated skin. Loden and colleagues studied the effects of topically applied lipids on surfactant irritated skin and found that moisturizers containing canola oil can reduce irritation induced by sodium lauryl sulfate (SLS) as they supply the damaged barrier with adequate lipids.[3]

ATOPIC DERMATITIS

Moisturizers provide numerous benefits in patients with atopic dermatitis (AD). They increase the hydration of the SC by occluding the skin surface which reduces the water loss. The addition of humectants in moisturizers amplifies their hydrating power by attracting and holding water. Humectants widely used are glycerin, lactic acid, urea and pyrrolidone carboxylic acid (PCA). Studies have shown that humectants help to maintain the bilayer lipids of skin in a liquid crystalline state at low humidity.

Moisturizers also improve the abnormal barrier function of skin in patients with atopic eczema. They relieve the pruritus, hence reducing scratching. They increase the SC elasticity by improving the skin hydration. Hence, the risk of cracking and barrier disruption is reduced. Lipids such as petrolatum are absorbed into the outer layer of delipidized SC.

"Physiologic" lipids can even modify endogenous epidermal lipids and the rate of barrier recovery. Moisturizers can also have anti-inflammatory effects. The essential fatty acids (EFAs), which are an important component of the epidermal phospholipids, are incorporated in ceramics and play role in barrier function. EFA influences eicosanoid production, membrane fluidity and cell signaling. Few ingredients of moisturizers have antimicrobial properties. One such component is propylene glycol that has antifungal properties and inhibits growth of *Trichophyton*, *Malassezia* and *Candida*.[4]

Use of moisturizers in patients with AD not only increases the hydration of the skin but also lessens symptoms and signs of AD. Randomized controlled trials (RCTs) have shown that use of moisturizers decreases the amount of anti-inflammatory agents (especially corticosteroids) required for control of diseases.[5] American Academy of Dermatology (AAD) guidelines recommend moisturizers

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as the main primary treatment for mild disease, and as a part of the treatment regimen for moderate and severe disease.[6] They are also an important part of the maintenance treatment and help to prevent flares of AD. The optimal amount or frequency of application of moisturizers has not been defined due to lack of studies. However, it is recommended that moisturizers be applied frequently (at least twice a day) and in liberal amount to reduce xerosis.

Adults should generally be using 500–600 g per week and children 250 mg per week. One set of guidelines recommends that the amount of emollient used should exceed steroid use by a ratio of 10:1. Moisturizers should be applied liberally all over the body, not just on localized areas of dry skin. They should be applied after bath or shower to help retain the hydration. Application of emollients and steroids should be separated by 30 minutes. This period should be 1 hour for tacrolimus. Patients should not insert hands or fingers into emollient pots in order to avoid microbial contamination of contents. There are hundreds of moisturizers available in market and it is difficult for the dermatologist to choose the right product. Important considerations should be the ingredient, tolerability and patient preference. The patient can be offered a number of choices and allowed to choose the one that suits them the most. Patients may require more than one emollient product depending on lifestyle, time of day, seasonal factors or disease severity. When choosing moisturizers for AD it is important to remember that they cannot cure flare of AD and should be appropriately combined with anti-inflammatory agents. Intermittent use of antiseptic bath oils can reduce the flares.

In the last few years, a newer class of topical agents has been designed for the treatment of AD. These are the prescription emollient devices (PEDs). They target the specific defects in skin barrier function seen in patients with AD. Their composition mimics the endogenous lipids and they may also contain palmitoylethanolamide, glycyrrhetinic acid and other lipids. There are very few studies regarding the use of PED, but there is evidence that they lessen the xerosis and inflammation in AD.

ICHTHYOSIS

Moisturizers form an important component of topical treatment of ichthyoses. Bathing followed by application of moisturizer improves the skin hydration. Patients with thick and dense scales may benefit with lukewarm baths and showers with short to moderate soak times.[7] Bath additives can be used to provide additional moisturization. Mineral oil can be used both as a topical moisturizer and as a bath oil. Patients should be cautious when using bath oils as they are slippery.

The choice of moisturizer depends on the patient's preference. White petrolatum jelly is one of the most widely used moisturizer and is readily available in the market. It should be used with caution around open flames as it is flammable. Newer moisturizers containing ceramides that are deficient in affected skin are available nowadays.

The potential disadvantage of the formulation should be kept in mind when prescribing moisturizers. Ointments may be superior to creams but are greasier and more occlusive. They also tend to be messier and give a shiny appearance

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to skin. They can stain the clothing and bedding. Patients using ointments during summer months may feel hotter as ointments are more occlusive. This can be avoided by refrigerating the ointment before using. During cold environments, ointments tend to become stiff and creams may be better tolerated. One disadvantage of creams is that they require preservatives to prevent bacterial overgrowth as they have relatively high water content. This can increase the risk of allergic contact dermatitis with the creams. Patients with ichthyosis need to be told about the requirement of a large amount of moisturizer and lifelong application.

Moisturizers containing humectants can be helpful in patients with ichthyosis. Alpha hydroxy acids, propylene glycol, urea, glycerin, hyaluronic acid are the ones readily available. Glycerin is a readily available humectant that can be applied directly onto the skin as well as hair-bearing areas. It is more cosmetically appealing as it is less greasy. Urea is also a component of moisturizers. It is also available as a 20% or 40% cream. The latter is especially helpful in areas with thick and dense scales. Caution should be exercised when using urea in infants and young children with ichthyosis as urea can get absorbed leading to elevated plasma blood urea nitrogen levels.[8]

PSORIASIS

Use of moisturizers offer several benefits in patients with psoriasis. Regular use of moisturizers improves comfort and reduces scaling, fissuring and itching. Emollients enhance the penetration of CS through the skin, and hence may increase the efficacy of the latter. However, the steroid-sparing effects of emollients is yet to be proven as RCTs have shown inconsistent results.[9,10]

It has been proposed that emollient monotherapy in psoriasis may improve skin hydration, barrier function as well as proliferation and differentiation markers. However, clinical trials have shown only limited evidence in this regard and need evaluation through larger trials.

Few studies have shown that some moisturizers (e.g., oil-in-water emollient) enhance the penetration of ultraviolet A (UVA) or ultraviolet B (UVB) when used before irradiation, and thus can increase the efficacy of phototherapy.[11] On the contrary, few *in vitro* studies and trials in healthy volunteers have shown a blocking effect of few emollients (e.g., white petrolatum).[12] However, practice shows that white soft petrolatum is a good moisturizer in psoriasis and can be used after topical coal tar and in conjunction with dithranol or topical steroids. It will have a good steroid-sparing effect.

Urea-containing preparations form an important component of adjuvant therapy of psoriasis. Urea offers multiple benefits. It reduces the epidermal hyperproliferation and induces cell differentiation. *In vitro* and *in vivo* studies have found that application of urea causes reduction of DNA synthesis in cells of the basal layers, and thinning of the epidermis and prolongs the generation time of postmitotic cells. Urea disperses and denatures keratin by breaking the hydrogen bonds and interfering with its quaternary structure. Urea also enhances the efficacy of other topical therapies when used concomitantly. Thus, urea is a preferred moisturizer in patients with psoriasis.

To summarize, moisturizers can be effective in removing scales before active treatments are used. They also have anti-inflammatory and antikeratotic effects.

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ACNE

Dimethicone and glycerin are common ingredients of moisturizers used in patients of acne. Dimethicone is usually used in "oil free" moisturizers. The latter do not contain mineral or vegetable oil. Dimethicone has both occlusive and emollient properties and reduces transepidermal water loss (TEWL). It does not have a greasy feel and is noncomedogenic and hypoallergenic. Mineral oil is comedogenic and is usually not a component of moisturizers used for acne. However, cosmetic grade mineral oil may be used as it is noncomedogenic.

Dimethicone is generally combined with glycerin in acne moisturizers. Glycerin is a humectant but when used alone can increase TEWL. Therefore, it is usually combined with an occlusive agent. Ingredients like aloe vera and allantoin are added in the moisturizers for their anti-inflammatory properties. Aloe vera inhibits cyclooxygenase in the arachidonic pathway causing anti-inflammatory properties. However, it should be present at a concentration of at least 10% in order to have a moisturizing effect.[13]

Trials have shown that the adjunctive use of a moisturizer improves local tolerance of topical retinoids. Study performed by Hayashi, et al. has shown that the combined use of moisturizers with adapalene form the beginning of treatment and is useful in reducing the rate of discontinuation of treatment due to the adverse reactions to the drug.[14] Topical retinoids have been associated with adverse effects like skin discomfort, dry skin and exfoliation. Continued use of the drug reduces the frequency of these adverse reactions. However, patients might discontinue treatment once adverse effects occur.

CHRONIC PRURITUS IN ELDERLY

Moisturizers are the mainstay of treatment of pruritus in the elderly, especially in patients associated with xerosis. They improve the skin barrier function by preventing TEWL and by preventing the entry of irritants into the skin. This causes relief in pruritus. Moisturizers with low pH should be used to maintain the normal acidic pH of the skin surface. Studies have shown that serine proteases, via protease-activating receptor (PAR)-2 located on C-fiber terminals, play an important role in mediating pruritus. Low pH topical treatments reduce the activity of serine proteases (e.g., mast cell tryptase) that activate PAR-2 on skin nerve fibers.

ATROPHIC VAGINITIS

Physiologic and structural changes occur within the vulvovaginal mucosa with menopause due to the loss of estrogen. This leads to atrophic vaginitis causing vulvovaginal dryness, vulvar itching or pain, dyspareunia and abnormal vaginal discharge. Vaginal moisturizers can provide symptomatic relief for vaginal dryness in this condition. They can be used on a chronic, maintenance basis to replace normal vaginal secretions. The most widely used ingredient in such vaginal moisturizers is polycarbophil, which is a bioadhesive polymer that adheres to the vaginal walls after application and releases water and electrolytes into the epithelium, thereby making the surface moist. Polycarbophil also causes vasodilation by inducing migration of water and electrolytes into the dermal

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vasculature. This in turn leads to improved tissue hydration. It has a pH of 2.8, hence shifts the pH of the vagina to more acidic premenopausal state. Studies have shown that such vaginal moisturizers can reduce symptoms of atrophic vaginitis and are a good alternative in females with contraindication to estrogen.

SCARS AND STRIAE

Scars and striae have a malfunctional SC that has increased TEWL and reduced capacitance. Occlusion therapy is known to improve the signs and symptoms of scarring. However, apart from the pressure-related effects, direct effects of hydration on keratinocytes and fibroblasts contribute to the reduction in hypertrophic scarring. Occlusion can also cause changes in epidermal cytokines and growth factor production causing changes in fibrotic factors. Several studies have shown that moisturizers reduce the clinical signs and symptoms of scars and striae.

THERAPEUTIC MOISTURIZERS

Specific ingredients can be added to moisturizers to enhance the therapeutic potential. Such "therapeutic moisturizers" are now readily available in the market.[15] Examples of such ingredients include alpha hydroxy acids, beta hydroxy acids and vitamins. Alpha hydroxy acids (glycolic and lactic acid) provide antiaging effect whereas beta hydroxy acids (salicylic acid) are components of exfoliant moisturizers. Topical vitamin C and vitamin E provide antioxidant effects whereas panthenol is a skin conditioning agent added to moisturizers for additional benefits.

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Key Features

- A unique title providing in-depth knowledge on the use of moisturizers for ideal skin care
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