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Dry skin in the elderly: Complexities of a common problem

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Abstract Dry skin, or xerosis, is a common skin condition in older adults, but it is not a normal part of aging. The geriatric patient may have several incurable, but treatable, chronic diseases that affect their skin. Xerosis in older adults is multifactorial: intrinsic changes in keratinization and lipid content, use of diuretics and similar medications, and overuse of heaters or air conditioners all contribute. Xerosis causes pruritus, which then leads to excoriations and risk of skin infections. Patients can minimize the effect of xerosis by increasing the ambient humidity, modifying their bathing technique and products, and using emollients to replace the lipid components of the skin. Care should be made to avoid skin sensitizers, such as lanolin, aloe vera, and parabens, that are commonly found in emollients. These may lead to a delayed hypersensitivity reaction. This contribution reviews the intrinsic and extrinsic aging processes of skin aging and advises practical changes in environment and emollient application that can be distributed to patients.

Introduction

The exponential aging of the population is a worldwide phenomenon. According to the United Nation's World Population Ageing Report, older adults (those 60 years or older) will outnumber young people by 2050, an historical first. This trend towards an aging world will be largely irreversible, and we will not be likely to see higher numbers of young adults again http://www.un.org/esa/population/publications/publications.htm.[1] This change in the population dynamics requires the medical field to adapt its education and expertise to meet the needs of this older community. In 2008 the United States Institute of Medicine Report recommended that all health care professional's certifications demonstrate competence in caring for older adults.[2]

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More than half of the older adult population lives in the community and represents the greatest percentage of outpatient clinic visits to both general practitioners and specialists, including dermatologists.[3] The geriatric patient may have several incurable, but treatable, chronic diseases that affect their skin. Their skin may be affected by the multitude of medications they may be taking, and they have intrinsic and extrinsic aging processes that can affect their skin. This contribution aims to describe the etiology and management of xerosis, a common yet often challenging problem in older adults. We will also discuss common skin sensitizers contained in emollients.

Etiology of xerosis

Most people have experienced xerosis, often referred to as "dry skin," at some point in their lives. For older adults, the prevalence is quite common, but varies widely. One study of community-dwelling individuals found the prevalence to be

as high as 38.9%.[4] Several long-term care studies have found the prevalence ranged from 29.5 to 58.3%.[5-7]

The exact etiology of xerosis is not entirely understood; there are several intrinsic, genetic, and environmental mechanisms that contribute to this problem. As we age, our skin's predisposition towards xerosis increases (Figure 1). Previously believed to be due to decreased water content or sebum production that does occur in older skin, xerosis is more likely attributed to changes in the keratinization process and lipid content in the stratum corneum.[8-10]

The keratinization process is a balance between (1) keratinocytes migrating from the basal layer and flattening as they become the corneocytes of the stratum corneum and (2) desquamation as the cells die off. Any imbalance in this process results in increased flaking appearance and dry sensation. The lipid-protein membranes and intercellular

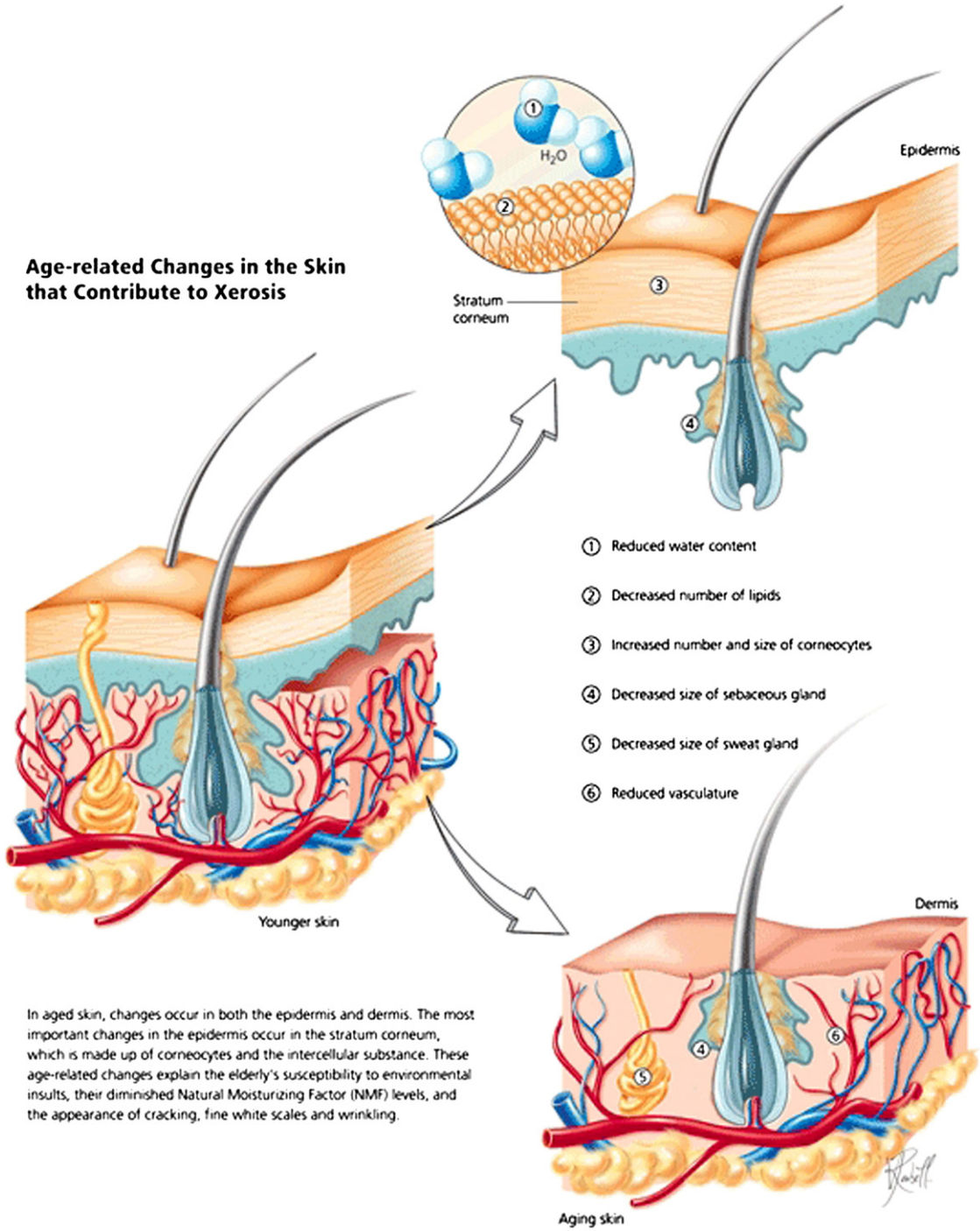

Fig. 1 Aging skin. Copyright: Geriatrics & Aging, Inc, 2006. Reproduced by permission.

Table 1 Environmental factors that contribute to xerosis

- Dry and/or cool ambient air (eg, air conditioners, winter seasonal changes, desert conditions)
- Harsh cleansers or soaps
- Hot water bathing—dries the skin
- Skin powders—drying agent on the skin

junctions of the corneocytes are destroyed, and subsequently, there is demise in the skin's barrier function.[9] Another mechanism that contributes to xerosis is genetic predisposition, including racial background (Table 1).[11]

Finding the exact cause of xerosis in older adults can be challenging. A focused history and physical examination can point the practitioners in the right direction and save time on unproductive treatments (Table 2). Medications should be reviewed, especially because polypharmacy is often prevalent in older adults. Specifically, diuretics, hypercholesterolic agents, antiandrogens, and cimetidine contribute to xerosis.[9]

The physical examination will reveal rough, dry skin to the touch. There may be scaling, and if the xerosis worsens, there may be redness and cracking (erythema craquelé), and severe cases may appear ichthyotic or fish scalelike (Figure 2).

Table 2 History components of xerosis evaluation

Question	Implications
Is this a lifelong problem, a gradual worsening, or an acute change?	Addresses onset: An acute change, when no other factor can be found, should alert the practitioner to the possibility of an underlying diagnosis. Examples include vitamin deficiencies (e.g. zinc), hypothyroidism, end-stage renal disease, HIV, and malignancies (e.g. lymphoma).[30]
Is it all over the body, or only in certain locations?	Addresses location: Typically xerosis should be located throughout the entire body, but may spare the more moist environs, such as the groin and underarms.
Do lotions or creams help it?	Addresses ameliorating factors: Often lotions and/or creams help with flaking and pruritus.
Is it worse when the air is dry, such as in the winter or with an air conditioner?	Addresses exacerbating factors: studies suggest that humidity levels of less than 10% decrease the moisture level in the skin, leading to a feeling of dryness.[31] Conversely, an ambient humidity of greater than 70% will help to maintain moisture within the stratum corneum.[13]

A word about pruritus

The prevalence of pruritus may be as high as 40% of patients, as seen in a dermatologic clinic.[4] Xerosis is the most common cause of pruritus in older adults.[12] If the patient has found the xerosis is pruritic, then the practitioner may notice excoriations in areas that are easy to reach, including the torso, lower part of the back, arms, and legs. Scratching the skin can lead to serious complications of secondary infection or ulceration and chronic wounds. Managing xerosis and maintaining moist skin is of the utmost importance as a form of prevention of these complications.

Management of xerosis

Altering the environment

Not many good studies have investigated the best methods of xerosis management. Much of what we know is based on expert opinion. Table 3 lists management recommendations of xerosis and associated pruritus. It is generally agreed that the keys to xerosis management are restoring the damaged stratum corneum barrier and maintaining the moisture content. Altering the ambient humidity, changing bathing habits, and applying emollients that rehydrate the skin can help. Xerosis is the primary cause of pruritus; therefore, treating the dryness of the skin itself should ameliorate scratching and complications.

Ambient humidity can play an important role in xerosis severity. Although humidity levels of less than 10% cause the stratum corneum to lose moisture and levels higher than 70% restore moisture to the stratum corneum, this does not mean that a patient needs to live in a 70% humidified environment to obtain relief. Instead, a setting of 45% to 60% humidified air output on a humidifier will prevent levels from dropping to less than 10%.[13]

Because many people suffer from xerosis in the winter months due to evaporation from cold winds and forced heating systems, the thermostat should be turned to as low as possible while still maintaining safety and comfort. Air conditioners in the summer months can also evaporate the skin, and again, the thermostat should be adjusted to maintain safety and comfort while minimizing their use.

Bathing habits vary widely in older adults, and it is one of the first activities of daily living to be lost in a long-term care population.[14,15] Frequent bathing in hot water with harsh soaps will further irritate the skin and damage the stratum corneum barrier. Advising patients, families, and caregivers on bathing techniques that can ameliorate xerosis but still maintain quality of life is important. Patients may opt to bathe less frequently, once or twice a week, or they may bathe daily for 10 minutes (shower or total body immersion) with warm water.[16] Hot water should be avoided, regardless. The soap choice is as important as the frequency of bathing.

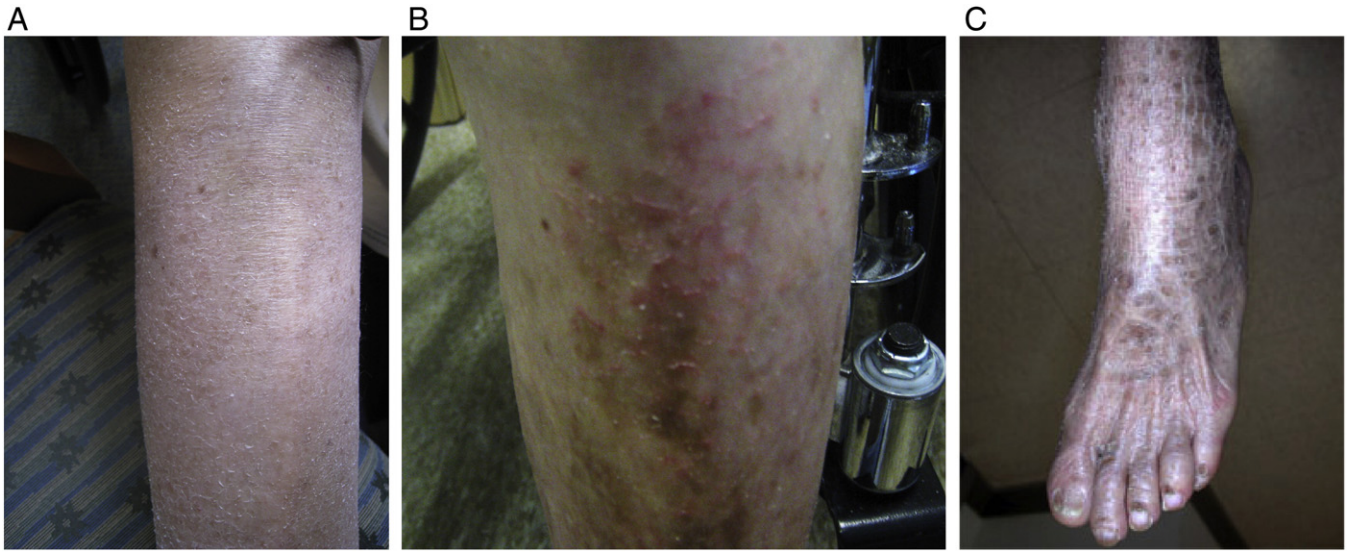

Fig. 2 A, Dry skin (Photograph courtesy of E. Foy White-Chu, MD). B, Erythema craquelé (Photograph courtesy of E. Foy White-Chu, MD). C, Ichthyosis (Photo courtesy of Ichthyosis Foundation. Reproduced with permission. http://www.scalyskin.org/content.cfm?ContentID=91&ColumnID=14.)

Soap strips away natural emollients in the skin, further drying and irritating skin. A mild moisturizing soap or soap substitute, preferably nonscented—and thus without perfumes that can irritate the skin—is ideal. Avoid recommending bath oils to older adults: there have been case reports of older adults using these oils and then slipping in tubs that resulted in significant trauma.[13] An option for patients living in long-term care is the use of the bag bath, a no rinse system that has some evidence of reducing the incidence of xerosis.[17]

Applying emollients

Water is both bound and dynamically moving within the stratum corneum. Natural moisturizing factors (NMFs) strongly bind water within the corneocyte. One study suggested that low levels of certain NMFs correlated with xerosis in an older adult.[18] The lipid-filled membrane of the corneocyte controls water loss. NMFs and the corneocytes thus maintain water homeostasis within the stratum corneum.

Emollients imitate the lipid components of the skin and thus help trap water in the stratum corneum. Emollients can be divided into creams, ointments, gels, pastes, and liquid preparations (Table 4). Each preparation type contains emulsifiers, fats and oils, humectants, antimicrobial preservatives, antioxidants, and chelating agents. Common fats and oils used in emollients include lanolin, mineral oils, waxes, fatty acids, triglycerides, and long-chain esters. This is important to keep in mind when a skin sensitization reaction develops, as described in more detail in the next section. Humectants contribute to the water-binding capacity of an emollient. Preservatives inhibit any bacteria introduced during the manufacturing process; parabens are commonly used.[19]

Selecting the right emollient can be challenging, especially because there is sparse evidence showing that one is better than another.[20] Confounders of efficacy include the patient's actual adherence to applying the emollient routinely and the

Table 3 Management recommendations of xerosis and associated pruritus

- Bathe with warm (not hot) water
- Avoid harsh soaps and powders that act as drying agents
- Avoid bath oils, these will increase an older adult's fall risk
- Apply moisturizers twice daily, including after any bathing
- Consider using a humidifier during the winter to ensure a relative humidity setting of 45% to 60%
- Consider 0.05% to 0.1% betamethasone valerate once or twice daily for a limited period of time if xerosis and pruritus are severe and do not resolve with nonpharmacologic methods
- If no improvement in pruritus occurs after several days, consider underlying medical causes

Table 4 Emollient preparations [a]

Creams—Double-phase system: either water-in-oil or oil-in-water
Ointments—Single-phase system: may be hydrophilic or hydrophobic
Gel—Hydrophilic or hydrophobic liquid that is gelled together
Pastes—Semisolid where the solid is finely dispersed in a base
Liquid—A preparation that solution, suspension, or emulsion

[a] Adapted from: Lodén M. Role of topical emollients and moisturizers in the treatment of dry skin barrier disorders. Am J Clin Dermatol 2003;4:771-88.

amount that the patient applies.[18] Emollients should be routinely applied by being gently rubbed into the skin within 3 minutes of finishing the bath, because there is some evidence that this will help trap moisture in the skin.[21,22] Studies have shown that patients prefer rapidly absorbing emollients, especially on areas that are visible. Careful education is needed to describe proper emollient application as well as frequency.[23] One randomized study supported the use of daily, repeated application of an emollient and suggested it as a form of "corneotherapy," where the effects would last after the applications were stopped.[24] In reality, the best emollient is the one that the patient is most likely to use daily and frequently.

If inflammation becomes severe, then topical corticosteroids may be needed for short-term use. There are little data to support that long-term intermittent use of corticosteroids is beneficial in preventing relapse.[19] Emollients should be continued while the patient is using the corticosteroid therapy.

Problems with topical treatments for xerosis

Contact dermatitis is common in older adults who have used multiple treatments for xerosis.[25] Contact irritant dermatitis and contact allergic dermatitis are two types of contact dermatitis where the skin has reacted to a caustic substance. The caustic substance is usually from endogenous fluids (if there is an open, draining wound) or exogenous substances applied to or around the wound.

Contact irritant dermatitis usually presents within 48 hours exposure as scaly red raised areas, ranging from less than 1 cm and larger. Folliculitis may also be observed. The patient often complains of an itching or burning sensation. Contact allergic dermatitis is a delayed hypersensitivity reaction to an allergen. The tissue affected by the area is usually bright "beet" red, inflamed, and quite pruritic, if not painful. The margins are discrete rather than the confluent margins often seen in contact irritant dermatitis. Sometimes vesicles may be seen, as well as a generalized dermatitis if a regional lymph node recruits sensitized lymphocytes.

The reaction in contact allergic dermatitis, in contrast to contact irritant dermatitis, may take days to weeks to occur while the substance is being used. This is due to delayed hypersensitivity to the allergen by the immune system. The initial sensitization exposure must occur before future exposures to bring out a response; therefore, it is important to avoid skin sensitizers as wound-care agents.[25]

It is also important that patients with xerosis avoid skin sensitizers. This is primarily due to concern that these patients may develop wounds later on, either due to the increasing fragility of the skin with age or self-inflicted wounds from excessive scratching. Table 5 lists common skin sensitizers found in emollients. Numerous studies have revealed that these are common skin sensitizers that should be avoided if possible.[26-29]

Table 5 Common skin sensitizers that may be found in emollients

- Balsam of Peru
- Lanolin
- Propylene glycol
- Parabens
- Formaldehyde
- Fragrance
- Vitamin E
- Aloe vera

Conclusions

Xerosis is a common condition in older adults. Intrinsic aging of the skin may predispose the patient to xerosis, but it is not a forgone conclusion that all older adults will develop this troublesome condition. Multiple factors, especially environmental and genetic, contribute to presence and severity. Fortunately there are a myriad of products now available to our patients, and they can select which ones they would apply frequently and consistently. Care should be made to education the patient on appropriate use as well as avoidance of ingredients that may be skin sensitizers.

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