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Xerosis: a health and cosmetic problem

THE STRUCTURE AND PHYSIOLOGY OF THE SKIN

The skin is the largest organ of the human organism and, similarly to the heart or lungs, plays a crucial role. It is the organ connecting the interior of the organism with the surrounding external world and at the same time it constitutes a protective barrier for physical, chemical and mechanical factors. It is also responsible for the maintenance of a stable level of internal fluids, takes part in the respiration process and thermoregulation. By means of blood and lymphatic vessels and nerve fibres the information from internal organs reaches the skin (4, 10). The presence of nerve fibre endings encoding temperature, pain and touch stimuli reflects the receptive function of the skin. Additionally, complex secretory processes take place in the skin and vitamin D₃ is synthesized from 7-dehydrocholesterol. The skin is also an immunological organ: it contains Langerhans' cells, keratinocytes and lymphocytes T, all making the main constituents of the Skin Associated Lymphoid Tissue (SALT) (7, 10).

The normal pH of the skin ranges approximately from 4.2 to 5.6 and its task is to prevent development of bacteria on its surface. The skin consists of three layers: epidermis, dermis and hypodermis.

The epidermis is the outermost layer of the skin. It consists of the cells of stratified squamous epithelium which strictly adhere to each other and are termed keratinocytes. The epidermis is a dynamic structure in which desquaming surface layers are replaced by the cells from deeper layers. Keratinocytes of the basal layer constantly proliferate, mature and move up to the corneal layer. It takes about 2 weeks for keratinocytes to move from the basal layer to the corneal layer. Over the next 2 weeks these cells remain in the corneal layer and then undergo keratosis, die and desquamate. The corneal layer is built of flattened cells deprived of nuclei. From the chemical point of view, the corneal layer consists of 58% of keratin proteins, 11% of lipids and 30% of Natural Moisturising Factor (NMF). Hydrophilic properties of keratin and lipids from the corneal layer play a key role in maintaining the water barrier and secure appropriate hydration of keratinocytes. The presence of NMF conditions the maintenance of the appropriate moisture of the epidermis as well as its elasticity and resistance to damage (4, 5).

In the epidermis there are also melanocytes which produce melanin – a pigment determining the colour of skin and hairs. Melanin is able to absorb ultraviolet rays which protects the organism from their harmful effects.

Below epidermis, the dermis is localized, which constitutes the inner layer. It is built of the connective fibrous tissue. In the dermis there are numerous protein fibres which render it elastic and resilient. In this structure blood and lymphatic vessels run as well as nerve fibres which constitute warmth, cold, pain and touch receptors. In the dermis numerous sebaceous glands, sweat glands and

hair follicles are localized. A layer of the fatty tissue localized beneath the dermis is called the *hypodermis* (subcutaneous tissue) and creates a natural isolator and an energy store (2, 3, 4, 5, 10).

ETIOPATHOGENESIS AND CAUSES OF XEROSIS

Xerosis is currently a common health and cosmetic problem for persons at various ages. Etiopathogenesis of xerosis is complex and follows from: inappropriate metabolism of fatty acids in the skin, diminished level of urea and ceramides in the epidermis and increased trans-epidermal water loss (TEWL). It should be noted that water is an important component of the corneal layer and when its level drops below 10% it impairs the functions of the epidermis (1, 2, 7, 10). The presence of NMF contributes to retaining water in the epidermis. The following are the main components of NMF: amino acids, pyrroglutamic acid, lactates, urea, Na, K, Mg, phosphates, chlorides, ammonia, uric acid, glycosamin and keratin. This factor also affects elasticity of the corneal layer (4). The maintenance of the appropriate moisture of the epidermis is also possible due to the presence of the fat skin cover, called also the protective film. This fat cover consists of substances secreted by sebaceous glands, lipids produced by the epidermis cells and exogenous compounds (ingredients of cosmetics and medicines). The lipids of the corneal layer also include fatty acids, triglycerides, ceramides, sterols, cholesterol, waxes and squalen. The ratios of the particular components and the thickness of the fat skin cover are varied depending on the body area, age, sex and even season of the year. The fat skin cover spreading over the surface of the epidermis exerts occlusive effects and protects the corneal layer from losing water through vaporization (2, 4). In conclusion, xerosis is a consequence of an impairment to the hydrolipid system of the corneal layer of the epidermis. Dry skin inadequately fulfils its function of a protective barrier, is less elastic, exhibits greater vulnerability to infections and irritations and is too permeable to water.

CLINICAL SYMPTOMS OF XEROSIS

Dry skin has a typical appearance, is rough, reddened, dull, desquamates, cracks, and its surface is uneven. These clinical symptoms are accompanied by pain, itching, stinging, tingling or burning sensations (3, 7, 10). In the etiopathogenesis of xerosis a crucial role is played by both exogenous and endogenous factors. Exogenous factors are mainly nutritional deficiencies (e.g. avitaminosis of vitamin A), environmental conditions (low humidity, low or high temperature, air-conditioning, prolonged impact of UV radiation) and some medicines (retinoids, steroids and tar). Skin dryness can be a result of chronic exposure to allergic or toxic substances or infectious factors. Hot baths, defatting soaps and detergents significantly increase symptoms of xerosis (4, 5, 10). Endogenous causes of xerosis are often genetically determined.

In many dermatological conditions (atopic dermatitis, psoriasis, ichthyosis) skin dryness is a prominent clinical symptom. This symptom also accompanies systemic diseases such as diabetes, hypothyroidism, chronic renal insufficiency, neoplasm, exhaustion. Skin dryness can occur in conditions accompanied by the disorders of sebum or sweat secretion (AIDS, neurological conditions, pityriasis) or it can be a result of the dehydration of the organism due to fever, diarrhoea or vomiting.

The phenomenon of xerosis is an increasing problem and affects 15–20% of population. Every fifth patient coming to the pharmacy suffers from skin dryness. The most prominent symptoms are observed on face, hands and shanks. Its symptoms particularly aggravate in autumn and winter periods.

PREVENTION AND CARE

Dry skin requires particular concern and care. The goal of the care is to regenerate the damaged lipid barrier and to renew appropriate moisture and grease of the epidermis as well as to protect from the detrimental effects of exogenous environmental factors (8, 9). Using a soap for everyday hygiene is discouraged since it has alkaline pH, drying effects and many irritating substances in its composition. The most appropriate for this aim are cleaning bars of syndet type available on the market.

Hot baths, particularly when water is hard and strongly chlorinated, can also cause excessive skin dryness and increase sensations of dryness, burning and itching. However, baths can have soothing effects for the skin under the condition that emollients in the form of cleaning emulsions are added to water. After such a bath, a lipid (fatty) layer remains on the skin which prevents the loss of the natural moisture of the epidermis (7, 9). It should be remembered that typical bath liquids have drying and irritating effects for the skin. Therefore, only delicate, hypoallergic gels or emulsions should be used for washing. These lotions should not contain any artificial flavours, fragrance factors or preservatives in their composition. The technique of drying the body after the bath is also important. Drying delicately with a soft towel through touching rather than rubbing is recommended. Immediately after the completed bath, emollients in the form of cream should be applied on the wet skin. Penetrating to the corneal layer of the epidermis, they bind water there and due to the presence of ceramides, squalen and other components they rebuild the fat cover.

Owing to their moisturizing effects, emollients efficiently prevent the skin from losing water and cracking, therefore, contributing to the patient's comfort. Additionally, they show anti-inflammatory effects, increase production of prostaglandins and stimulate the organism to release anti-inflammatory cytokines, in this way accelerating the process of the healing of wounds. Emollients relieve itching as well as normalizing the processes of the proliferation of keratinocytes.

Emollients are produced on the basis of mineral oils. Their ingredients create a protective layer similar to natural lipids on the skin, therefore, aid to rebuild the acidic fatty skin cover (2, 6, 10). They can be found in cleaning bars, emulsions, bath gels, shampoos, creams and ointments. These lotions are safe since they do not contain preservatives, artificial flavours, fragrance factors and have a neutral biological basis. In order to obtain a clinically significant improvement they should be used at least twice a day as their effects last at most 6 hours (2, 4, 10).

Emollients from *Oilatum* and *Balneum* lines are the lotions from this group most frequently recommended by dermatologists. Dermocosmetics are also used in the care for dry skin. In their composition they contain thermal water rich in silica and minerals. Owing to the thermal water, cosmetics from *Avene* line relieve the sensations of skin shrinking and burning.

An important preventive measure is to avoid too frequent exposure to sunlight. Using solarium and staying for longer periods in air-conditioned rooms are also contraindicated. Skin dryness can be relieved by intensely moisturizing rooms and keeping the temperature on a relatively stable level.

The structure of the dry skin is also affected by nutrition. A diet rich in vitamins (A, E) and mineral salts is recommended as well as maintaining appropriate hydration of the organism. Therefore, persons afflicted by xerosis should limit eating spicy food, drinking coffee, tea or alcohol and should drink every day at least two litres of still mineral water. It should also be remembered that preventing the organism from overheating or excessive sweating as well as wearing light, loose clothes made of natural fibres significantly improve the patient's comfort.

The skin is a very important organ of our organism which is, however, frequently exposed to the effects of many harmful exogenous factors. We should, therefore, care for it to keep it healthy and beautiful as long as possible.

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SUMMARY

Skin dryness (xerosis) is a common health and cosmetic problem which affects people at various ages. Dry skin has typical appearance: is dull and reddened, desquamates and cracks. These clinical symptoms are accompanied by pain, pricking and tingling sensations, and pruritus. Dry skin is vulnerable to all physical and mechanical stimuli, can be easily damaged and shows the susceptibility to eczema. Etiopathogenesis of xerosis is complex with underlying genetic and environmental factors. Preventive measures and treatment aim at rebuilding the structure of the lipid cover as well as protecting the epidermis from harmful effects of external environmental factors.

Sucha skóra – problem zdrowotny i pielęgnacyjny

Sucha skóra (*xerosis*) jest często występującym problemem zdrowotnym i kosmetycznym, który dotyczy osób w różnym wieku. Sucha skóra ma typowy wygląd, jest matowa, zaczerwieniona, łuszczy się i pęka. Wspomnianym objawom klinicznym towarzyszy bolesność, klucie, mrowienie oraz świąd. Sucha skóra jest wrażliwa na wszelkie bodźce fizyczne i mechaniczne, łatwo ulega uszkodzeniu i wykazuje skłonność do wyprysku. Etiopatogeneza suchej skóry jest złożona, a u jej podłoża znajdują się czynniki genetyczne i środowiskowe. Postępowanie profilaktyczno-pielęgnacyjne ma na celu odbudowę struktury płaszcza lipidowego (tłuszczowego) oraz ochronę naskórka przed szkodliwym działaniem czynników środowiska zewnętrznego.