

# IMPACT OF DIET ON SKIN CONDITION IN PHYSICALLY ACTIVE PEOPLE

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## Abstract

By analyzing the impact of diet and physical activity on skin condition and appearance, it was determined that physical activity is a factor of an ambiguous nature in this respect.

Physical activity can lead to dryness of the dermis layer, which consequently leads to the tired appearance of skin, devoid of color with low elasticity. On the other hand, taking into account the impact of physical activity of varying nature and intensity on the circulatory and respiratory systems, it can be concluded that physical activity undeniably affects oxygenation and blood supply to the body, which also translates into skin oxygenation and the condition and the quality of vessel capillaries in its layers. In addition, these muscle parts, which are subject to stretching and strengthening trainings, show an increased amount of capillaries, become more tense, elastic and in addition, the amount of body fat in their area, which also translates into skin appearance and condition, is further reduced.

The skin condition and appearance of a person is significantly influenced by the type of food he or she consumes. A particularly important role here is played by a diet rich in vitamins and trace elements. They protect human body against free radicals, stimulate the inhibition of the skin aging process. They affect the condition of the skin's ability to regenerate as well as eliminate skin problems, such as allergies, psoriasis or atopic dermatitis.

Vitamins A and E, which are considered the vitamins of youth, have a particularly important impact on skin appearance and condition. They reveal a strong influence on preventing the multiplication of free radicals in the body, they reduce the depth of wrinkles and furrows. They also influence skin tone, firmness, hydration and elasticity.

What we eat and how we eat is fundamental to the functioning of the whole organism. It affects the work of individual systems, influences metabolic processes as well as the silhouette, vitality and appearance of the skin. The lack of a properly balanced diet causes deficiencies, which are visible in the appearance of our body. Wrinkles appear, the skin flouts, loses its glow, color and elasticity, becomes dry.

**Key words:** physical activity, diet, skin, nutrition, vitamins

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## Skin and its appendages

The skin is the largest organ of the human body. It is a specific protective integument that protects the body from the negative influence of external factors and from water loss. This organ provides the possibility of absorption and excretion of substances, regulates the human body temperature.

In the anatomical structure of the skin, three basic layers are distinguished: epidermis, subcutaneous tissue and dermis. From the point of view of cosmetology, the most important layers of the skin, which directly affect person's appearance, are dermis and epidermis. Epidermis is the outer

layer of the skin [1]. The epidermis is a specific boundary layer between the outside world and the human body. It is made of five layers: basic, spinous, grainy, light and corneum [1]. The most visible is the stratum corneum. It also plays a dominant role in an aesthetic appearance. As a result of its specific structure, it is an almost impenetrable barrier separating human body from the environment. It is also the area where fatty substances accumulate [1]. The epidermis has the ability to regenerate, which occurs by exfoliation. Under normal conditions, 0.005 – 0.5 g cells of the stratum corneum are exfoliated. Dermis is the middle layer of the skin. It is characterized by hardness, thickness and elasticity. It is made of the following two layers:

- Papillary – this layer is responsible for skin stretching, supplying the layers of the epidermis with the necessary components, as well as for the drainage of metabolic products and foreign bodies as well as for the transmission of stimuli;
- Mesh – this layer provides the skin with strength, resistance to impact and pushing. It is also responsible for water binding in skin cells.

The building blocks of the dermis are elastin, collagen and mucopolysaccharides. This layer plays a very important role in protecting human organism against the influence of negative factors from the external environment. Due to its hard structure, it also shows excellent cushioning of external strokes, while the content of fibroblasts and mast cells makes it also involved in the wound healing process. The blood vessels located within it stimulate the epidermis and at the same time are involved in the process of removing metabolic products. In this layer of the skin there are also sebaceous glands, which provide serums to its surface and sweat glands, which in turn provide water and lactic acid. The combination of these fluids creates a protective water-lipid coat.

The anatomical area of the skin also includes skin appendages, which are as follows:

- Nails;
- Sweat glands;
- Sebaceous glands.

### Impact of nutrition on skin

#### *Carbohydrates*

Carbohydrates are the primary source of energy for human body [3]. The total and recommended amount of carbohydrates in a diet is 50 – 65% of the total energy demand, but it cannot be less than 100 g per day, otherwise it can lead to the catabolism of body proteins [4]. Among carbohydrates, sugar is considered to be the enemy not only for the appearance of a person's skin, but also for his or her health. As a result of high levels of sugar in human blood, protein glycation occurs [5]. This affects the condition of the skin, the level of its hydration, elasticity as well as changes in the structure of collagen fibers. Collagen is crucial for beauty and thus attractive appearance of a person. It is responsible for the level of skin hydration as well as its turgor and elasticity. As a result of the protein glycation process, the collagen becomes brittle and consequently, frangible and rigid and loses its basic functions. This leads to an increase in the level of dryness and even drying of the skin, loss of elasticity and firmness and to the formation and deepening of wrinkles. According to the research, the skin of a diabetic ages up to 30% faster than the skin of a healthy person.

Therefore, in order to maintain healthy, radiant and healthy looking skin, one should eliminate from the diet, or radically limit sweet drinks, sweets, dairy pasta and bread, that is, processed carbohydrates.

Limiting simple sugars to 10% of all carbohydrates consumed (10% simple sugars, 90% combined sugars) works well on a human organism.

#### *Proteins*

Proteins are the basic building material of a human body. They are a construction element for most of its structures. For the production of keratin, which is the main component of the stratum corneum, nails and hair, a person must provide the body with a meal containing sulfur amino acids: cysteine and methionine. Their valuable source are legumes, and cereal products. By taking these ingredients as part of the diet we take care of the proper appearance and condition of skin, hair and nails. The protein sources are both plant and animal products. Protein affects the level of skin smoothness as well as its elasticity and the scale of nutrition. The deficiency of this food ingredient slows down regenerative processes of the epidermis and dermis layers, which affects the acceleration of aging processes and the appearance or deepening of wrinkles. Eggs, cheese, fish as well as meat and legumes contain the most proteins. However, it should be remembered that the daily protein requirement for a person is 1g/1kg of body weight. Bigger amount is recommended for pregnant and lactating women as well as people after a history of heart attack, patients with atherosclerosis, diabetes and those with a nephrotic syndrome.

#### *Fats*

Lipid substances affect the protective qualities of epidermis. As a result, they provide the skin with protection against excessive water evaporation and thus against dryness. A rich source of fats are vegetable oils: sunflowers, flaxseed and fish fats [6]. Aging processes and associated changes in skin smoothness are accompanied by a decrease in DHA levels in the brain. Lipids and keratinocytes, which have a very large impact on maintaining proper skin hydration levels, are very important there. Due to various exogenous and endogenous factors, there is a violation of the proper lipid composition, which results in disorders of the epidermal barrier protective functions. Exogenous factors include detergents, UV radiation and weather ingress (wind, frost, high temperatures). In turn, endogenous factors include processes of a diseaseous nature in the skin area, the appearance of inflammations and disorders of the ceramides and WKT metabolism in the epidermis area [6]. Ceramides are involved in the process of water retention in the epidermis area. Phospholipids participate in the process of epidermis keratinization, where, thanks to the lecithin activity, they provide free fatty acids. Thanks to this, they affect the maintenance of the proper pH level of the skin. Deficiencies

in the amount of linoleic acid and  $\alpha$ -linolenic acid in a human body entail the occurrence of dry skin symptoms. Glutathione metabolism disorders and LA deficiencies are the cause of many skin conditions, including excessive dryness, which will prompt the processes of its aging. Delta deficiencies – 6 desaturase and ceramides appear, among other things, with atopic dermatitis. In turn, the NNKT metabolism disorders are widely recognized as one of the causes of the psoriasis formation and development.

Dry skin is characterized by a significant decrease in water content, which at that time is about 10%. There are also abnormalities in the composition of the natural moisturizing agent (NMF). Clinical manifestations of this condition include:

- feeling of roughness and skin tension;
- exfoliation of the epidermis layer;
- the appearance of fine wrinkles and cracks on the skin;
- decrease in the degree of resistance to external factors with a negative effect on the skin;
- slowing down of wounds and skin lesions healing process;
- the appearance of redness, which can result in contact dermatitis;
- the appearance of acne lesions;
- worsening of seborrheic dermatitis;
- aggravation of various types of allergic lesions [2]

In case when dry skin occurs due to the WKT metabolism deficit or disorders, the disorders of the epidermal keratinization process also frequently appear. Prostaglandin is responsible for these processes. Disorders of this kind are accompanied by diseases of acne vulgaris, psoriasis, atopic dermatitis and fishy scales. It was proven that omega 3 not only counteracts skin dryness, but also has a beneficial effect on UV-induced inflammatory changes [6].

#### *Vitamins*

Vitamin A is called the vitamin of youth. It has regenerative properties for cells and skin tissues. It participates in the process of collagen and elastin restoration. It stimulates the wound healing process and significantly smooths wrinkles. It regulates the process of epidermis keratinization and thereby facilitates the detachment of dead cells of the stratum corneum, which leads to smoothing the skin and improving its tone.

Vitamin A is a powerful antioxidant. It protects the skin structures from various types of damage caused by the action of free radicals and thus contributes to delaying the symptoms of skin aging process. Its deficiency is manifested by disorders in the area of nails, hair and skin. The skin becomes rough and dry, with a tendency to peel off. Keratinization may also occur around the follicles.

The sources of vitamin A are mainly animal products such as meat, eggs, fish, milk, animal fats and fish. Its large amounts can also be found in vegetables, such as pumpkin, carrots, broccoli, watercress, tomatoes, peas and fruits: plums, oranges, cherries and apricots.

Vitamins perform a special function in taking care of the appearance and condition of the skin. Apart from vitamin A, a significant role in the diet is also performed by:

- Vitamin C – has a sealing effect on capillaries, stimulates immunity and also participates in blood clotting processes. It counteracts viral and bacterial infections, participates in the process of herpes and shingles treatment. Its source are all fruits and green shoots;
- Vitamin P – regulates the circulation of blood vessels. In addition, it has a sealing effect on blood vessels, significantly reduces the level of their fragility, thanks to which it also has anti-inflammatory and anti-hemolytic effects. A valuable source of vitamin P is a strawberry leaf, elderberry, blackcurrant, wild rose, linden and lemon zest;
- Vitamin B – it has an immunizing effect on purulent infections, it is also an effective means for fighting seborrhea, acne vulgaris and rosacea as well as skin itching, urticaria and shin burn. It can be found in cereal bran, wild rose, nuts, cumin seeds and wholemeal bread;
- Vitamin B2 – participates in the process of regulating cellular transformation and keratinization of the epidermis. In prolonged deficiencies, the skin loses its elasticity and becomes older. The source of vitamin B2 is dandelion, wild rose, yeast, beets, eggs, cheeses, yogurts;
- Vitamin PP – It is extremely effective in the fight against rosacea, vascular neuroses, frostbite. Its valuable source is St. John's wort, wild rose, sage, carrots, blueberries, mushrooms and wheat bran;
- Vitamin B6 – is extremely effective in the process of excessive hair loss as well as in seborrheic dermatitis. Its best sources are bananas, brown nuts, brewer's yeast, oatmeal, wheat embryos, as well as brown rice, vegetables and oily fish [7];
- Vitamin B5 – its action eliminates skin inflammation, prevents excessive hair loss and balding. It is used for a variety of inflammations, sores in the area of the subdules, frostbite and shins. Its valuable source is peas, oatmeal, potatoes, tomatoes as well as strawberries;
- Vitamin B15 – stimulates the consumption of oxygen in tissues and also has a delaying effect on skin aging processes. Its largest amount can be found in pumpkin and sunflower seeds;

- Vitamin F – plays a very important role in the process of epithelium and collagen proper formation in the area of connective tissue. It also actively participates in skin regeneration processes. It is effective in fighting seborrhea, seborrheic dermatitis and excessively dry skin. Its valuable source are flax seeds, fenugreek, soybeans or sunflower;
- Vitamin H – it is a fundamental element that makes the skin maintain its proper condition. Its deficiency is manifested by excessive hair loss, dermatitis of a chronic nature, nervous disorders. Green shoots of plants, peas, wheat grains and fruits are its main source;
- Vitamin E – is a biological antioxidant. It has a strong effect to prevent premature skin aging. It increases the level of skin hydration. It is very effective in the process of treating acne. It reduces the level of seborrhea, affects faster and easier healing of scars and burns. Its valuable source are rosehip fruits, cereal sprouts, tomatoes, lettuce, hazelnuts, cabbage and leafy vegetables;
- Vitamin D - it is used in the process of treating acne, skin allergies and psoriasis. Its valuable source is blubber and fishmeat.

Vitamin deficiencies are manifested not only by poor health and well-being, but also by skin appearance [7].

### Impact of physical activity on skin condition and appearance

In modern studies on physical activity, the role of physical exertion in the general health condition of a human is repeatedly emphasized, but also in his or her external appearance, not only in the context of the silhouette, but also in skin condition. It has been established that the effect of physical activity on skin is positive [8].

Skin condition is influenced by many factors, such as diseases, living conditions, diet type, hobbies, lifestyle or type of work performed. It is also noted that the skin condition is practically impossible to establish objectively with sufficient accuracy despite the use of devices that serve it.

Physical exertion affects skin condition and thus its appearance through a specific change in the metabolism process as well as by changing exposure to exogenous (environmental) factors. Changes in metabolism are associated with the process of human body adaptation to increased muscle work and functioning under new respiratory and blood conditions.

Studies show that during physical exertion there is a gradual loss of water. At the same time, on the one hand, there is an increase in the level of systolic blood pressure, which causes the rise in the increased seepage of water from

the plasma area to the area of tissues that surround blood vessels, while on the other hand, water from the body is eliminated through sweat glands in order to maintain the proper body temperature. It is also indicated that physical activity due to the sympathetic system stimulation causes inhibition of the digestive system activity, which contributes to the impairment of water absorption process. Therefore, from the point of view of the dermis, physical exertion causes its dehydration, which adversely affects its condition and thus skin moisture and appearance.

Studies also reveal that aerobic exercises improve blood supply to the skin, and muscles stretching positively affects the connective tissue. Thanks to the exercises that strengthen the lower parts of the body, both muscle and skin tone are improved, which increases its elasticity. Physical activity and exercises influence significantly the process of cellulite reduction as well as the problem of fat cells hypertrophy.

Physical exertion improves the skin condition of hands, because it improves their shape, increases smoothness, as well as joints elasticity [9].

Błaszczak claims that physical activity can improve skin condition by changing both metabolism and exposure to environmental factors. Thanks to the change in the body's metabolism, the blood flow to the muscles increases [10].

Diet and physical activity is increasingly popular among people who want to take care of their own body and well-being. The level of awareness of adults is improving, with a growing number of popular trainers and nutritionists.

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