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The Effects of Exercise on Skin Health: Benefits, Risks, and Preventive Strategies

Authors

Aleksandra Walendzik[1], Joanna Duda[2], Jakub Kędzia[2], Alicja Obcowska[2], Paweł Racisz[2], Kinga Racisz[3], Łukasz Sencerek[3]

Affiliations

1. Medical University of Lodz, Poland
2. Central Clinical Hospital, Medical University of Lodz, Poland
3. John Paul II Memorial Hospital, Belchatow, Poland

Aleksandra Walendzik
Medical University of Lodz, al. Tadeusza Kościuszki 4, 90-419 Łódź, Poland; aleksandrajulia.walendzik2@gmail.com

https://orcid.org/0009-0000-1883-0801
* Author to whom correspondence should be addressed

Joanna Duda
Central Clinical Hospital of Medical University of Lodz, ul. Pomorska 251, 92-213 Łódź, Poland; joannaduda24@gmail.com

https://orcid.org/0009-0009-6651-7831

Kinga Racisz
Central Clinical Hospital of Medical University of Lodz, ul. Pomorska 251, 92-213 Łódź, Poland; kingaracisz@gmail.com

https://orcid.org/0000-0001-8137-9275

Paweł Racisz
John Paul II Memorial Hospital, Belchatow, ul. Czapliniecka 123, 97-400 Bełchatów, Poland; pawelracisz@gmail.com

https://orcid.org/0000-0002-6660-7150

Alicja Obcowska
Central Clinical Hospital of Medical University of Lodz, ul. Pomorska 251, 92-213 Łódź, Poland; aobcowska@gmail.com

https://orcid.org/0009-0003-0390-0661

Jakub Kędzia
Central Clinical Hospital of Medical University of Lodz, ul. Pomorska 251, 92-213 Łódź, Poland; jakub.kedzia.1999@gmail.com

https://orcid.org/0009-0006-7971-6280

Łukasz Sencerek
Central Clinical Hospital of Medical University of Lodz, ul. Pomorska 251, 92-213 Łódź, Poland; lukasz.sencerek@gmail.com

https://orcid.org/0009-0004-2886-8431

Abstract

Introduction and Purpose
Physical activity has a great impact on skin health. It has been shown to improve microcirculation, enhance oxygenation, support collagen synthesis, and reduce chronic inflammation, thereby contributing to better skin condition and delayed aging. However, certain types of exercise and training environments may also expose the skin to increased risks of irritation, infections, and photoaging.

Aim of the Study
The aim of this study was to analyze and summarize the current knowledge regarding the impact of regular physical activity on skin physiology, aging processes, dermatological conditions, and associated risk factors.

Material and Methods
A review of relevant literature was conducted using sources retrieved from PubMed and Google Scholar.

Conclusion
Physical activity has a predominantly positive impact on skin health. It improves circulation,

reduces inflammation, enhances regeneration, and contributes to the prevention and improvement of dermatological conditions such as psoriasis and atopic dermatitis. However, the skin of physically active individuals is also more prone to damage from UV radiation, infections, and mechanical stress. Proper skin care, hygiene, and photoprotection are essential for maintaining skin health in active populations.

Keywords
physical activity, skin health, dermatology, skin aging, exercise-induced skin conditions, photoaging

Introduction

The skin is a vital organ that acts as the body's primary defence against external treatment such as microorganisms, dehydration, ultraviolet light and mechanical damage. The skin is also responsible for the sensation of touch, pain and temperature. Furthermore, it is an important element in the formation of vitamin D. Thermoregulation takes place through sweat glands, which regulate the release of water from our organism [1]. When performing physical activity, the skin begins to adapt to this state. The movement causes a reflex adjustment that reduces the activity of nerves that constrict blood vessels and increases active dilation of skin blood vessels to increase heat loss [2]. Sweat and sebaceous gland secretions also increase during sports [3]. Interestingly, a couple of papers have also shown that toxins from our bodies, such as arsenic or cadmium, can be secreted with sweat, which would be a major benefit of practising sports [4,5]. This enables individuals to effectively participate in high-performance sports.

Aim of the Study

The aim of this review is to evaluate the impact of physical activity on skin health, with a particular focus on its effects on skin aging, regeneration, collagen production, and inflammation. The study summarizes current scientific findings that explain how regular exercise can influence skin physiology, improve elasticity and structure, and reduce symptoms of dermatologic conditions such as acne, psoriasis, and atopic dermatitis. By reviewing existing research, this paper highlights the role of exercise as a supportive, non-pharmacological method in dermatologic prevention and skin care.

Materials and Methods

Articles for this review were retrieved from several scientific databases, including PubMed, ScienceDirect, Google Scholar, and SpringerLink. The search strategy included combinations of the keywords "physical activity", "exercise", "skin", "skin aging", "collagen synthesis" and "dermatology". Additional terms related to skin physiology and skin conditions, such as "acne", "psoriasis", and "atopic dermatitis", were also included to expand the scope of relevant findings.

Only peer-reviewed articles published in English and Polish were considered. Reference lists of included papers were manually screened to identify additional sources. Original studies, systematic reviews, and meta-analyses published between 1992 to 2024 were included. The final literature search was completed on June 29, 2025.

Conclusion

1. Benefits of physical activity for skin health

1.1. Better oxygenation and nourishment of the skin.

Microvascular dysfunction is one of the underlying mechanisms in common diseases such as heart failure [6] or stroke [7], so it is important to keep circulatory system in good condition. Exercise has been proven to increase blood flow through the microcirculation, which increases the delivery of oxygen and nutrients to skin cells. This, as a result, promotes regenerative processes and can contribute to healthier-looking skin [8]. Also, the results showed that regular exercise can prevent age-related endothelial dysfunction by improving and protecting plasma antioxidant defences in the cutaneous microcirculation [9-12].

1.2. Impact of sports on skin aging.

Collagen is a protein that is responsible for the proper architecture of the tissue, its shape and tissue resistance to factors such as stretching or abrasion in the skin [13]. Exercise stimulates the production of collagen and elastin, proteins responsible for skin firmness and elasticity. Studies have shown that resistance training can increase the expression of genes related to the skin's extracellular matrix, which contributes to skin rejuvenation [14]. A study conducted at Ritsumeikan University in Japan found that both aerobic and strength training improved skin elasticity and dermis structure in women aged 50-61. However, only strength training significantly increased the thickness of the dermis, which may contribute to younger-looking skin. The mechanism is related to increased collagen production and reduced inflammatory factors in the bloodstream [14]. Another study found that endurance exercise increases interleukin-15 (IL-15) levels, which improves mitochondrial function in the skin [15]. Interleukin-15 is one of the main regulators of the inflammatory and protective immune response [16]. Improving mitochondrial function can counteract skin aging by increasing energy production and reducing oxidative stress [17]. Other studies show the effect of levels of IL-18, which is also involved in activating the inflammatory response [18]. A study published in Medicine & Science in Sports & Exercise suggests that aerobic exercise and strength training can delay skin aging by reducing levels of interleukin-18 (IL-18) and its receptor IL-18R. Reducing these inflammatory factors may help improve skin structure and barrier function [19]. Another study found that regular physical activity can significantly speed up the healing process of skin wounds in older adults. Physical activity may reduce the level of chronic inflammation that is often present in obese and elderly people, which may contribute to better wound healing [20]. Moreover, a study conducted in 2017 showed that stretching inhibits neutrophil migration into connective tissues, thereby reducing inflammation [21].

1.3. Reducing stress and improving mental health through sports.

Sport has repeatedly been shown to reduce stress, so it is crucial for the body [22,23]. Physical activity can help reduce levels of cortisol - the stress hormone [24]. Moderately stressed individuals show significantly reduced antioxidant potential and impaired skin barrier integrity, as well as significantly increased signs of microrelief alterations. At the cellular level, DNA integrity, extracellular matrix synthesis, wound healing and skin barrier parameters deteriorated under the influence of increased stress hormone levels. This proves that chronic psychological stress significantly affects skin homeostasis and accelerates the ageing process, so reducing stress levels can be beneficial for skin health. [25]. One meta-analytic study found that physical activity effectively lowers cortisol levels (SMD = -0.37) and improves sleep quality (SMD = -0.30), which may benefit skin health by reducing inflammation and improving recovery [26]. Another study found that mental stress and one night of sleep deprivation can delay skin barrier regeneration, underscoring the importance of stress reduction in maintaining skin health [27].

1.4. Effects of physical activity on skin diseases.

Several studies have found that sports also have an effect on better functioning during dermatological illnesses. Review studies show that regular physical activity can have a beneficial effect on the course of psoriasis, alleviating its symptoms and reducing the risk of developing the disease. Exercise, especially of an aerobic nature, improves circulation, reduces body weight and lowers levels of pro-inflammatory cytokines, which translates into a reduction in the inflammation characteristic of psoriasis. A review published in 2022 highlights that patients who engage in regular physical activity, especially when combined with dietary intervention, report improvements in Psoriasis Area and Severity Index (PASI), as well as quality of life [28]. Physical activity also promotes metabolic health, which is important given the frequent co-occurrence of psoriasis with obesity and metabolic syndrome [29]. A review of the literature indicates that regular physical activity can benefit inflammatory skin diseases such as atopic dermatitis (AD) as it reduces inflammation and improves skin barrier function [30].

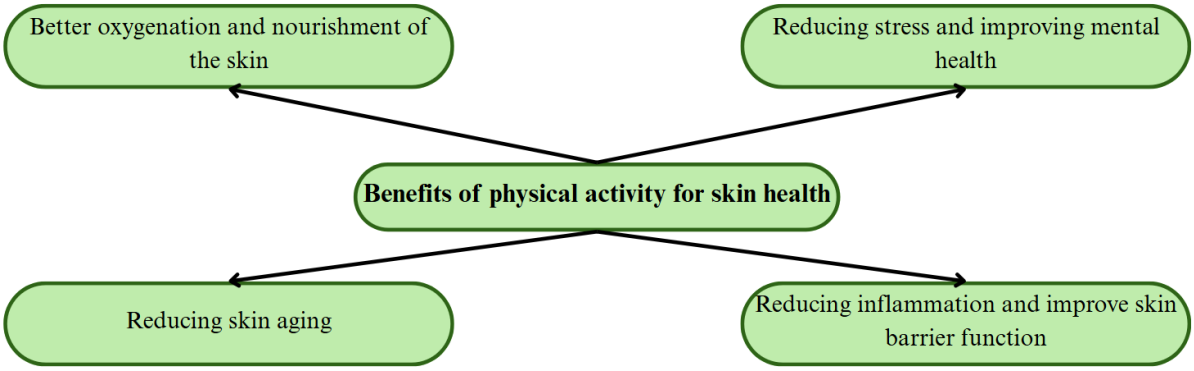

Figure 1. Benefits of physical activity for skin health.

2. Skin dangers associated with physical activity

2.1. Sweat and its effects on the skin

Miliaria, commonly known as heat rash, is a skin condition caused by the blockage of eccrine sweat ducts, leading to sweat retention and the formation of small vesicles or papules.. It often occurs in hot and humid conditions, especially in physically active people [31]. One of the lesser-known but clinically significant complications of exercise can be sweat allergy, classified as type I (immediate) hypersensitivity. It manifests as an itchy, erythematous rash that appears after an increase in body temperature and sweating, making physical activity a trigger for symptoms. This phenomenon is particularly common in patients with atopic dermatitis, where the skin's immune hyperreactivity increases its sensitivity to its sweat. The composition of sweat, which contains immunogenic proteins, among other things, can act as an allergen in predisposed individuals, leading to a generalized skin reaction. This response can exacerbate inflammation and damage the epidermal barrier, worsening overall skin condition in physically active individuals [32].

2.2. Friction and micro-injuries to the skin.

Sports involve the risk of skin injuries [33]. These can lead to the development of, among other things, mechanical acne. Acne mechanica is a specific form of acne resulting from chronic friction, pressure and heat on the skin. Unlike classic acne vulgaris, acne mechanica has no hormonal basis - its main causative factor is physical stimuli. Skin lesions usually appear in areas where the skin comes into contact with tight clothing, helmets, backpacks, pads or belts - especially on the forehead, back, shoulders and thighs. It manifests itself in the form of blackheads, papules and sometimes pustules. Prolonged mechanical pressure causes closure of the sebaceous glands' outlets and local inflammation. Athletes, soldiers and physically active people are particularly prone to this type of skin lesion [34].

2.3. Increased risk of skin infections

Physical activity, especially in humid, crowded, or contact environments (e.g. gyms, swimming pools, locker rooms, team sports), increases the risk of various skin infections. Mechanical micro-trauma, excessive sweating, and the shared use of sports equipment create favorable conditions for microbial growth. The most common infections among physically active people are fungal, bacterial and viral infections. Fungal skin infections are among the most common infections found in athletes, especially those who train in conditions of increased humidity and heat. Tinea pedis (athlete's foot fungus) and tinea cruris (athlete's groin fungus) are common in users of communal showers, locker rooms and training mats. Dermatophytes, such as Trichophyton rubrum, proliferate in moist environments, and micro-injuries to the epidermis facilitate their penetration into the skin. Symptoms of dermatophytosis include peeling of the epidermis, itching, cracks and blisters, mainly in the interdigital spaces of the feet or groin

area. Poorly dried feet, unventilated footwear and not changing sportswear after training significantly increase the risk of infection [35-36].

Bacterial infections of the skin are particularly common in contact sports (wrestling, judo, rugby), where there is damage to the epidermis and direct physical contact. Staphylococcus aureus, including methicillin-resistant strains (MRSA), is the most common pathogen responsible for folliculitis, furuncles, and other purulent skin lesions. The bacteria can be transmitted through towels, mats, shared exercise equipment, and contact with infected skin. Symptoms include painful nodules, pimples with purulent contents, and redness. Infections of this type can spread easily in sports groups, which is why proper hygiene and disinfection of equipment are so important [37-39].

Viruses such as HPV (human papillomavirus) and molluscum contagiosum virus (molluscum contagiosum) are another threat to physically active people. Transmission occurs through direct skin-to-skin contact or through infected surfaces (mats, benches, towels, equipment). These lesions are most common in contact sports and water sports. Viral warts can occur on the feet or hands and are particularly difficult to treat. Molluscum contagiosum manifests as small, dome-shaped papules with a depression in the center. The high infectivity of these viruses means that even minor hygienic negligence can lead to outbreaks among players [40,41].

2.4. Photo-aging and sun damage

Athletes who practice outdoor physical activity are exposed to prolonged and intense ultraviolet (UV) radiation, which can lead to several negative skin changes, including photoaging, hyperpigmentation and an increased risk of skin cancer. Despite the growing awareness of the harmfulness of UV radiation, studies indicate inadequate use of sunscreen among athletes. Photoaging is a process of premature skin aging caused by chronic exposure to UV radiation. It manifests as reduced skin elasticity, the appearance of wrinkles, hyperpigmentation, and changes in collagen and elastin structure. Studies show that athletes, especially those involved in endurance sports, are particularly vulnerable to photoaging due to prolonged exposure to the sun and increased production of free radicals during intense exercise [42-44]. Long-term exposure to UV radiation increases the risk of developing skin cancers, including malignant melanoma and non-melanoma skin cancers such as basal cell carcinoma and squamous cell carcinoma. Athletes who participate in outdoor sports, such as runners, swimmers and skiers, are at particular risk for these cancers due to frequent and intense sun exposure [45-47].

2.5. Allergic reactions and skin hypersensitivities

Athletes are exposed to a variety of factors that can cause allergic reactions and skin hypersensitivities. Among the most common are contact allergies to materials used in sports equipment and irritation caused by cosmetics used before, during, and after physical activity. Skin contact with materials such as latex, neoprene, or synthetic fabrics can lead to allergic reactions, manifesting as redness, itching and rashes. Studies have shown that athletes can develop allergic contact dermatitis (ACD) as a result of exposure to chemicals used in

the manufacture of sports equipment, such as thiouramines and mercaptobenzothiazole, present in rubber and neoprene [49-52].

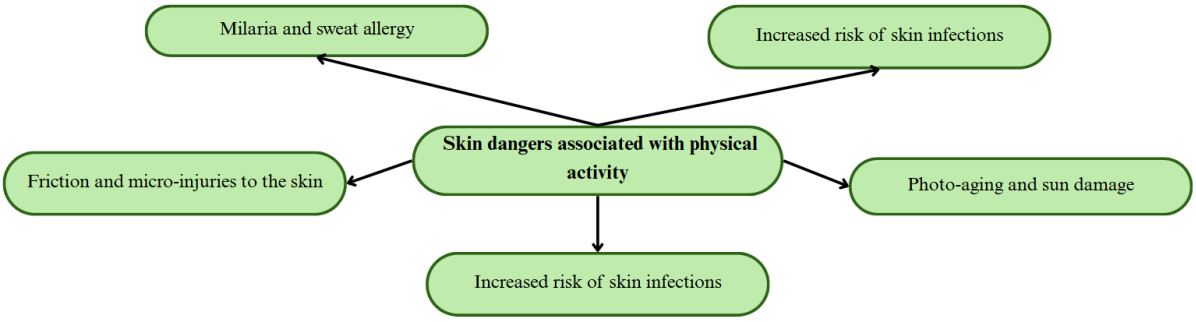

Figure 2. Skin dangers associated with physical activity.

3. Prevention and skin care in physically active people

Regular physical activity has numerous health benefits, but intense exercise can also affect the condition of the skin. To minimize the risk of skin irritation, infection or premature aging, physically active people should use appropriate prevention and care methods.

3.1. Proper hygiene after training

Immediate cleansing of the skin after exercise is crucial to remove sweat, sebum and impurities that can lead to clogged pores and skin lesions. It is recommended to wash the skin with mild cleansers, using gentle cleansing gels or foams that effectively remove impurities without compromising the skin's hydrolipid barrier. After bathing, it is recommended to gently pat the skin dry with a clean towel, avoiding intense rubbing, which can lead to irritation. After cleansing, it's a good idea to apply a light, non-comedogenic moisturizer to restore the skin's hydration level.

3.2. Selection of sportswear

Choosing the right clothing is important for comfort during training and skin health. It is recommended using breathable fabrics such as polyester, nylon, or bamboo effectively wick away moisture, minimizing the risk of skin irritation and infection. People should avoid tight clothing because it can cause friction and lead to abrasions and mechanical acne and after each workout wash clothes to remove sweat, bacteria, and other impurities. Proper selection of sportswear supports thermoregulation and protects the skin from the negative effects of intense exercise

3.3. Protecting against skin infections

Athletes are at risk of various skin infections, especially in high humidity environments such as gyms and swimming pools. To minimize the risk of infection it is recommended to avoid direct contact with shared equipment. It is crucial to use your own towels or mats when exercising on shared equipment.

Regular clean and disinfect sports equipment after each use to remove potential pathogens is also really important. After training, change wet clothes to dry ones as soon as possible and use clean towels. Following these hygiene rules helps prevent the spread of skin infections among physically active people.

3.4. Photoprotection

Exposure to UV radiation during outdoor activities can lead to skin damage, photoaging and increased risk of skin cancer. To effectively protect the skin, it is recommended before exercising outdoors, apply a cream with SPF 30 or higher to protect against UVA and UVB rays. For prolonged sun exposure, sweating or swimming, to reapply sunscreen every 2 hours. People also should wear sunglasses with UV filters and headgear, such as baseball caps, to protect against direct sunlight. Regular use of photoprotection is key to maintaining skin health and preventing premature aging.

Conclusion

The analysis of current literature shows that physical activity has both beneficial and potentially harmful effects on skin health. On the positive side, exercise improves microcirculation and oxygenation of the skin, stimulates collagen production, delays signs of aging, enhances wound healing, and modulates inflammatory pathways through changes in interleukin levels (e.g., IL-15 and IL-18). Additionally, regular exercise has been associated with improved skin condition in chronic dermatological diseases such as psoriasis and atopic dermatitis. Mental health benefits of physical activity, including stress reduction and improved sleep quality, help in better preservation of skin barrier function and prevention of premature aging. On the other hand, exercise can also increase the risk of certain skin conditions. These include sweat-related disorders (e.g., miliaria, sweat allergy), mechanical skin damage (e.g., acne mechanica), and skin infections (fungal, bacterial, and viral), particularly in shared environments like gyms and pools. Prolonged outdoor activity may lead to photoaging and increased risk of UV-induced skin cancers. Moreover, athletes are more frequently exposed to allergens and irritants found in sportswear and equipment, increasing the risk of contact dermatitis. Overall, the evidence suggests that sports and regular physical activity have a largely beneficial impact on skin physiology and disease prevention. However, proper hygiene, skin protection and preventive measures are crucial for achieving these benefits.

Disclosure

Author's contribution

Conceptualization: Aleksandra Walendzik, Kinga Racisz, Łukasz Sencerek

Methodology: Aleksandra Walendzik, Kinga Racisz, Alicja Obcowska

Software: Jakub Kędzia, Łukasz Sencerek, Joanna Duda

Check: Joanna Duda, Jakub Kędzia, Alicja Obcowska, Kinga Racisz, Paweł Racisz

Formal analysis: Joanna Duda, Paweł Racisz

Investigation: Aleksandra Walendzik, Paweł Racisz

Resources: Alicja Obcowska, Jakub Kędzia, Łukasz Sencerek

Data curation: Aleksandra Walendzik, Joanna Duda

Writing-rough preparation: Kinga Racisz, Joanna Duda

Writing-review and editing: Aleksandra Walendzik, Joanna Duda, Paweł Racisz

Visualization: Aleksandra Walendzik, Paweł Racisz

Supervision: Aleksandra Walendzik, Kinga Racisz, Łukasz Sencerek

Project administration: Aleksandra Walendzik, Łukasz Sencerek

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Conflict of Interest

The authors declare no conflict of interest.

All authors have read and agreed with the published version of the manuscript.

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