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Cutaneous pathology in athletes
Boli dermatologice la sportivi

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Abstract
The most common medical sufferings of athletes are found in the skin. Cutaneous pathologies can be classified into: infectious, allergic/inflammatory, traumatic, environment-related and tumoral. Skin infections are the most common skin diseases in athletes: fungal, viral or bacterial. The most frequent cutaneous pathology seen in athletes is tinea pedis, also called "athlete's foot"; the plant and interdigital skin are the most exposed to this disease. It is estimated that at least 70% of the population have had an episode of tinea pedis during the course of life; the proportion in athletes is even higher due to additional risk factors: warm shoes, sweating, wet environmental conditions such as locker rooms and showers. It occurs more frequently in men and is slightly observed before puberty. Recognizing signs and symptoms of skin diseases in athletes and referral to the specialist is extremely important. Furthermore, knowledge of possible skin disorders that can occur in athletes compels technical staff to take measures for primary and secondary prevention.
Key words: sports medicine, skin diseases, infections, trauma, prevention.

Rezumat
Cele mai frecvente suferinţe medicale ale sportivilor se întâlnesc la nivelul pielii. Patologiile cutanate pot fi clasificate în: infecţioase, inflamatorii-alergice, traumatice, afecţiuni legate de condiţiile de mediu şi tumorale. Infecţiile cutanate sunt cele mai frecvente suferinţe dermatologice la sportivi: fungice, virale sau bacteriene. Cea mai frecventă patologie cutanată întâlnită la sportivi este tinea pedis, supranumită „piciorul de atlet", planta şi pielea interdigitală fiind cele mai expuse acestei patologii. Se estimează că cel puţin 70% din populaţie are un episod de tinea pedis în cursul vieţii, la sportivi procentul fiind chiar mai mare, datorită unor factori de risc suplimentari: încălţămintea nearisită şi temperatura crescută locală, hipersudoraţia, medii comune umede cum ar fi vestiarele şi duşurile. Apare mai frecvent la bărbaţi şi este puţin observată înainte de pubertate. Recunoaşterea simptomelor şi semnelor bolilor cutanate ale sportivilor şi trimiterea către specialist este extrem de importantă. Mai mult, cunoaşterea posibilelor interesări cutanate ce pot apărea la sportivi, obligă staff-ul tehnic să ia măsuri de prevenţie primară şi secundară.
Cuvinte cheie: medicină sportivă, boli cutanate, infecţii, prevenţie.

Introduction

Each day millions of people practice sports, and during these activities the most risk exposed area is the skin. Lesions can appear in professional athletes, as well as in those who practice leisure sports. These dermatoses are divided, based on etiology, into infectious pathologies, inflammatory reactions, traumas, environmental diseases and neoplasms. Some entities occur in epidemics and can affect an entire community (herpes gladiatorum, tinea corporis gladiatorum, impetigo, furunculosis), some are life threatening on individual level (cutaneous inflammatory states or intense workouts, which can both cause anaphylaxis), while other can cause traumatic lesions (nail dystrophy, corns and blisters). Athletes that spend most of the time outdoors, usually during free UV exposure peak hours, present a higher risk for melanoma, other skin cancer types or acute sunburn. Using the correct gear, sunscreen creams, and proper hygiene of the athlete and play surfaces are extremely important. It is essential that the supervision teams recognize, treat and prevent these entities, so that individual and team activities are not disrupted.

Epidemiology

A recent analysis shows that between 1922 and 2005, 56% of infections in athletes were cutaneous. Direct contact with other participants during practice and competitions renders vulnerable this professional category. The most frequently affected areas are the neck and the head (Steven

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M et al., 2010). The risk for someone to get a cutaneous infection through direct contact while competing against an infected athlete is 33% (Lincoln et al., 2011).

In teenagers, the highest incidence is that of bacterial infection (30%), followed by herpetic (20%) and fungal lesions (20%). In young adults, the prevalence was reported as follows: herpes virus infection 47%, impetigo 37%, fungal infections 7%, cellulite 6%, methicillin-resistant Staphylococcus aureus (MRSA) 3%.

From a fungal etiology point of view, the most frequent ailment is tinea pedis, with prevalence levels of 25%-70% during life. This is especially common in people wearing closed shoes, while those walking barefoot have 15 times less chances of being affected. Men are infected 2-4 times more frequently than women.

An alarming 7% increase of MRSA nasal colonization has occurred in recent years, both in children and adults. Strict measures of prevention, diagnosis and treatment of such infections are highly necessary (Zinder et al., 2010).

Infectious pathologies

The most frequent dermatosis in athletes is cutaneous infection. Due to intrinsic and extrinsic factors, athletes are at high risk to be exposed to this pathology. Once established, this can cause permanent lesions, withdrawal from competitions or temporary disqualifications. Prevention, early diagnosis and suitable treatment could minimize the adverse effects of cutaneous infections, both for the athlete and for the team.

Classification of cutaneous infections (Drăgan I, 2002):

a) Bacterial
b) Viral
c) Fungal
d) Atypical mycobacteria
e) Parasitic

The infection spreading mechanism

The high prevalence of this pathology type is due to various factors:

- The loading of the stratum corneum due to sweating and wet clothes allows the easy passage of microorganisms through the epidermis.

- Most athletes experience abrasions and cuts that allow the passage of microorganisms through the epidermis.

- Direct contact between athletes favors the spreading within the entire community.

- The presence of bacteria, viruses, fungi, atypical mycobacteria and parasites on play surfaces, showers and locker rooms.

a) Bacterial infections

- *Impetigo contagiosum*

The determining factor of this disease is group A streptococcus. It is transmitted through contact with the sea water or through direct contact. The National Collegiate Athletic Association (NCAA) data show that between 1991-2003, 14% of all cutaneous infections in young wrestlers were represented by impetigo (Adams, 2006). Also, athletes who developed cutaneous staphylococcal infections were 4 times more likely to have been exposed to sea water than those who did not. The most affected are therefore the swimmers, surfers or divers, rowers and contact sports athletes (wrestlers).

Clinically, symptoms usually appear 1-3 days from infection. The lesions are often accompanied by itching, but are usually not painful. Initially, small red spots appear which turn into scabs, especially around the nose and mouth. The liquid underneath the scabs contains bacteria that might infect other people, if they come in direct contact with the lesion. After a few days, the scabs fall off and the lesion heals without scars, while other lesions can appear. Differential diagnosis must be made with acne vulgaris, atopic dermatitis or folliculitis. Usually local antibiotic treatment is enough, but in severe cases per os treatment is advised (Adams, 2006).

The National Collegiate Athletic Association (NCAA) ruled that, in order to be able to take part in competitions, infected athletes must undergo antibiotic treatment within at least 72 hours and not present new lesions within 48 hours prior to the competition. After fulfilling the two conditions, athletes are compelled to bandage the existing lesions in such manner that the bandages cover the lesion and do not shift (Adams, 2006).

- *Cutaneous MRSA infections*

Infections caused by methicillin-resistant Staphylococcus aureus (MRSA) are increasingly frequent in athletes. There are numerous sports where this pathology is very common: basketball, athletics, rugby, football, volleyball, weightlifting and wrestling. While in some sports the way of transmission seems to be direct contact with the skin (basketball, football, rugby, wrestling), in others the gear plays a decisive role (athletics, volleyball and weightlifting). Actually, it is a combination of these factors that causes real S. aureus epidemics.

At a 2003 football competition, 9% of the participants developed furunculosis and missed out on 17 competition days (Adams, 2006). After a thorough investigation into the epidemic, the investigators identified several risk factors in the development of furunculosis among athletes: cutaneous lesions following friction against the turf, towel sharing, not showering before and after the competition, game surfaces and locker rooms not being cleaned on a regular basis. The increased resistance of MRSA in sports communities was also proved by isolating the Panton-Valentine cytokine and type IV staphylococcal cassette chromosome mec (SCC mec), both of which increase MRSA virulence (Kazakova et al., 2005).

Furunculosis clinically manifests though erythematous nodules on the exposed skin surface. Diagnosis is relatively easy to make, but they can easily be mistaken for acne or insect bites (in early stages) or epidermoid cysts (mature lesions). Bacterial culture of the suspected lesions is still required in order to establish the MRSA infection diagnosis and to determine antibiotic susceptibility to the isolated bacteria. The treatment of cutaneous MRSA infection consists of abscess drainage (either spontaneous or after incision) and systemic antimicrobial therapy (Cohen, 2005).

b) Viral infections

Athletes with viral infections are exposed to pain, missing practice hours and disqualifications. In some cases the virus spreads through direct contact with the skin, in others it is transmitted through contaminated gear. Even without contact, recurrent infections can develop through

exposure to various elements (no contact).

Prolonged exposure to UV radiation increases the risk of reactivation of a previous herpes simplex virus (HSV) infection (20% incidence increase during summer months). Thus, all athletes who practice outdoor sports and do not protect their lips run the risk of developing labial herpes. Athletes practicing winter sports at high altitudes are at even higher risk. This occurs because the snow reflects a high quantity of UV, multiplying the exposure level; also, because of the high altitude, a smaller amount of radiation is filtered. 12% of skiers with known HSV history developed lesions one week after skiing (Adams, 2006).

Clinically, infected athletes will feel burning and tingling sensations in the infection area. These precede the onset of cutaneous manifestations by a few days. At first, erythematous patches appear, followed by grouped vesicles with erythematous halo. The most frequent locations are on the head, neck and extremities. They might be accompanied by sore throat, high fever, myalgia, arthralgia and lymphadenopathy.

In the case of transmission through direct contact, wrestlers and rugby players are the most exposed. These develop a particular type of herpes, called Herpes gladiatorum. NCAA states that 39% of the infections that occurred in American college wrestlers between 1991 and 2003 were caused by HSV. The general prevalence among athletes is 20%. A characteristic is the location of lesions far from mucous tissues. The most frequent areas are the head and neck, the thorax, the hands and the hips. The differential diagnosis is done with acne vulgaris, tinea corporis, molluscum contagiosum and impetigo contagiosum (Lincoln, 2011).

Molluscum contagiosum, caused by a virus of the Poxviridae family, has been frequently reported, both in contact sports (rugby, wrestling) and in other categories (gymnastics). According to the NCAA, between 1991-2003, 0.3% of all cutaneous infections in young wrestlers were caused by molluscum (Adams, 2006). Papules are generally asymptomatic, well defined, discolored or having the skin color. They occasionally become itchy and may develop a surrounding rash. In terms of count, they can reach several hundreds, but usually they are around 20 in number, located on the hands, arms and face.

Warts are transmitted through direct skin contact or through gear. The lesions are far less contagious than those caused by molluscum. Wrestlers and football players are prone to infection as they come in direct contact with the opponents' skin. The other categories are at risk through gear, game surface, swimming pools, locker rooms and showers (swimmers, weightlifters, gymnasts). There is a 1.81 higher chance for swimmers to get warts than those who do not practice water sports. The result is not statistically significant, but it does show proneness towards this pathology (Penso-Assathiany et al., 1999).

Warts appear as well-defined papules, ranging in size from a few millimeters to a few centimeters. The most frequent locations are around the nails or at plantar level. Those which appear on the soles can easily be mistaken for corns and calluses.

c) Fungal infections

Globally, fungal infections occur in 15% of the population, 1 in 4 adults being affected (Bell-Syer, 2012). Usually, fungi grow in warm, humid and dark environments. Due to intense activity, heating of gear clad skin and sweating, the skin of the athletes is an ideal environment for the development of mycoses.

It is a proven fact that athletes develop tinea pedis more frequently than individuals who do not practice sports. There are no differences between genders and the most affected are the swimmers, runners, and football or basketball players. It would seem that transmission occurs through joint use of showers and locker rooms. It is caused by Trichophyton rubrum, Epidermophyton floccosum, Trichophyton mentagrophytes interdigitale. It is estimated that at least 70% of the population have had a tinea pedis episode during their life. In athletes, the percentage is even higher due to additional risk factors: unventilated shoes and high local temperature, excessive sweating, humid common areas, such as showers and locker rooms (Zinder, 2010).

Clinically, three types are described:

- Intertriginous tinea pedis, which appears as a white macerated patch, with discreet erythema and interdigital cracks. The lesions are itchy and sometimes painful, and in warm seasons they can spread to the soles or the dorsal side of the foot.
- Dyshidrotic tinea pedis, characterized by erythemato-vesicular lesions, arranged in plaques and patches with eccentric evolution and polycyclic edges. Sometimes they may take an inflammatory aspect, with significant edema and painful bullous lesions. The lesions are usually symmetrical, on both legs, located in interdigital spaces, the anterolateral edge of the sole and the plantar notch.
- Dry, scaly tinea pedis is a chronic form of mycosis, characterized by discreet erythematous patches covered with hyperkeratotic scales and cracks. It is characteristically located on the heel and plantar vault.

In order to avoid the onset of mycosis, several prevention rules were established:

- using anti-humidity socks
- showering right after practice
- avoiding to walk barefoot in the locker room or to the showers
- thorough cleaning of the floors
- daily use of anti-fungal creams.

Onychomycosis (Tinea unguium) has been more frequently noticed in runners and swimmers, but any athlete is at risk. A study carried out on 100,000 subjects showed that tinea was 1.5 times more frequent in athletes aged under 18 years than in subjects of the same age group who did not practice sport. In adults, there were no statistically significant differences (Caputo, 2001).

The most frequent location of onychomycosis is distal. The exam of both hands and feet is very important, as almost always the two locations are associated. Clinically, the nail appears yellow, friable, thickened, and the green color may indicate superinfection with Pseudomonas aeruginosa. It may sometimes be accompanied by pain, but generally it is aesthetically unpleasant. For differential diagnosis, one must take into account the nail transformations due to the mechanical actions of the gear.

Tinea corporis gladiatorum causes real epidemics

among wrestlers during competitions. According to data from the National Collegiate Athletic Association Injury Surveillance System (NCAAISS), tinea corporis gladiatorum accounted for 23% of all skin infections in wrestlers between 1991 and 2003 (Adams, 2006). The causing agent is Trichophyton rubrum in wrestlers and Trichophyton tonsurans in all the other categories. Clinically it is characterized by round and well-defined erythematous-squamous plaques, with vesicular halo. It is associated with lymphangitis and painful local adenitis. The most frequent locations are the head, neck and arms (Adams, 2006).

d) Infections with atypical mycobacteria

A swimmer's skin is prone to atypical mycobacteria infections through 2 mechanisms: due to immersion in water, an oversaturation of the stratum corneum is achieved, which allows the easy passage of microorganisms through the epidermis; secondly, the possible abrasions caused by the contact with the pool walls or spring boards give way to bacteria, which can penetrate the skin.

The most frequently involved agent is Mycobacterium marinum. This causes swimming pool granuloma and occurs in real epidemics. This organism usually lives in sweet or salted water. The most affected by it are swimmers, lifeguards, sailors, divers, surfers, polo players. It starts as a small red lesion which, in time, increases in size and ulcerates. It is treated with difficulty, with suitable antibiotics, and it sometimes requires surgery for excision (Adams, 2006).

e) Parasitic infections

Of all skin infections, those caused by parasites are the least frequent among athletes. Despite the low incidence, these infections can seriously affect the athletes' capacity to attain performance or even compete. Pediculosis corporis (body lice), pediculosis capitis (head lice), pediculosis pubis (genital lice) and scabies are the most common parasitic infections in athletes. Anyone who practices contact sports is considered to be at risk, but the highest incidence is among wrestlers. The National Collegiate Athletic Association Injury Surveillance System (NCAAISS) concludes that 0.1% of all skin infections in wrestlers between 1991 and 2003 were caused by pediculosis and 0.5% by scabies. After exposure, a lapse of time passes, from a few days to a few weeks. Then, athletes complain about itching in the affected area. The parasites can be directly observed or there can be reactive dermatitis. The differential diagnosis is done with atopic dermatitis, contact dermatitis or allergic drug rashes (Adams, 2006).

The prevention of cutaneous infections

In order to decrease the high incidence of cutaneous infections in athletes, the National Athletic Trainers' Association (NATA) issued a prevention guide in 2010. Their recommendation for the team coordinating the athlete is to follow the seven principles (1):

1) Governmental organizations must supply the suitable financial and human resources in order to implement a global policy for infectious disease control.

2) Keeping clean the facilities is essential in limiting the spreading of infectious diseases (locker rooms, bathrooms, play surfaces).

3) Proper hand hygiene and taking showers after each sports activity are among the most important factors in reducing the spreading of infectious diseases.

4) Athletes and trainers must be educated and encouraged to follow the general hygiene good practices.

5) Athletes must be discouraged from sharing towels, gear, water bottles, shavers and trimmers.

6) All clothes and gear must be washed and/or disinfected on a daily basis.

7) Athletes should inspect their skin on a daily basis and report any suspicious lesions in order to get treatment.

Tumors

Athletes are also prone to cutaneous tumor formation, both malignant and benign. Unlike infections, tumors do not lead to acute pathologies that could result in temporary withdrawal from competitions. Even so, athletes have a high risk of skin cancer due to repeated and extensive exposure to the sun.

a) Benign tumors

The most frequent benign tumors in athletes are cutaneous nodules. These occur mainly in football players and rowers, due to chronic friction on the skin. They are caused by using inadequate gear (especially footwear) and appear as formations on the dorsal side of the foot.

b) Malignant tumors

The incidence of skin cancers is on the rise globally, the exposure to UV light being the main risk factor. This determines skin damage and, together with genetic, immunological factors or skin color, plays and important part in the development of skin cancer.

Studies on athletes have shown that certain sports are associated with high skin cancer risk, but research is limited and could not exactly establish mortality and morbidity.

Athletes who practice outdoor sports are prone to UV exposure. Altitude as well as high light reflections on snow and ice surfaces must also be taken into consideration (Adams, 2006).

Some athletes are exposed to high quantities of UV and present an increased risk of sunburn because of the training conditions. Summer sports are most of the time practiced during high UV exposure (midday for instance) and the gear does not provide protection. Intense physical activity causes sweat, which contributes to skin damage by increasing photosensitivity and thus, the risk of sunburn.

Epidemiological studies have shown that recreational activities such as sunbathing and water skiing are associated with a high risk of basal cell carcinoma, while skiing is associated with a high risk of squamous cell carcinoma (Harrison, 2009).

Cutaneous melanoma risk factors, such as solar lentigines and melanocytic nevus count, were more frequently encountered in athletes practicing outdoor endurance sports (for instance marathon runners) (Adams, 2006).

Moreover, besides sun exposure, the immunosuppression caused by intense physical activity can increase skin cancer risk in athletes.

Unfortunately, athletes are not educated regarding the risks of exposure to sunlight. Protection means, such as avoiding sun exposure during practice and competitions, choosing adequate clothing and using waterproof

sunscreen lotions must be intensely promoted within the sports community (Moehrle, 2008).

Inflammatory reactions

Acute inflammatory pathology in athletes includes contact dermatitis of allergic causes, as well as through irritation and hives. The severity of the lesions varies from focal damage with slightly itchy rashes to generalized afflictions (anaphylactic shock).

Athletes are confronted daily with numerous risks during their activity. An athlete's skin is exposed to trauma, heat, humidity and numerous allergens or chemical substances. These factors combined with each individual's genetic predisposition may cause allergic contact dermatitis and irritant contact dermatitis. Just like in other cases of contact dermatitis, these subacute eruptions in athletes may cause, in time, chronic dermatitis (Kockentiet, 2007).

Allergic contact dermatitis may occur following direct damage to the skin due to the gear. It may also appear as a reaction to any clothing or accessory, but the most frequent etiology is due to footwear. Any athlete can be affected, but the most frequent cases were recorded in runners and team sports players. The reaction develops due to some rubber components or coloring agents and it appears as itchy plantar eruption (plaques or vesicles), with onset after wearing a new pair of shoes (Ventura, 2001).

Another etiology of allergic dermatitis is the use of ointments (anesthetic, decontracturant) applied on the skin. The most frequent cases were recorded among cyclists and football players. A frequently used antibiotic applied on the skin is Neosporin. Up to 10% of the population is allergic to it and thus, any athlete using this cream risks getting plaques or well-defined itchy erythematous vesicles after topical use.

Athletes practicing nautical sports risk developing contact dermatitis as a reaction to water disinfectants (bromine or chlorine). Besides a macular erythematous rash, hair loss or discoloration was also observed (Adams, 2006).

Not all athletes develop contact dermatitis, but only those with an immune system sensitive to the allergen react. Irritant contact dermatitis, unlike allergic dermatitis, may appear in any athlete if the concentration of the irritant agent or exposure to it is high enough. The athlete's immune system is irrelevant for irritant contact dermatitis. Moreover, this type of dermatitis develops rapidly after exposure. The lesions may appear due to the gear, the play surface or even the athlete. The diagnosis of this pathology is generally based on the clinical aspect, the prolonged exposure to the irritant factor (Table I). The immediate exclusion of the causing factor is absolutely necessary. Recognizing irritant contact dermatitis is very important for physicians, in order to be able to protect other team members from developing similar reactions (Denig, 1998).

Athletes may develop various rashes or hives as a result of genetic predisposition and influence of internal or external stimuli. Body temperature increase or the play environment may cause the eruptions to appear. Also, the sun and water can cause the same effects. Therefore, a proper diagnosis of the allergic reaction is necessary, as well as identifying the causing factor and preventing any future exacerbations. Clinically, hives are usually associated with itching. Special concern must be given to athletes practicing water sports, because in these cases intense itching may appear even in the absence of obvious cutaneous lesions (Adams, 2006).

The most frequent type of eruption in athletes is cholinergic urticaria. Most athletes develop the lesions after practice, the severity being correlated with the duration and intensity of the physical activity. It would seem that runners are those who most frequently develop it, but it can be caused by any body temperature increasing activity. In terms of pathophysiology, it seems that mast cells play an important role in triggering the disease. It has been shown that the serum level of histamine (the primary mediator) is higher during exercise, being accompanied by an increase in eosinophil and neutrophil chemotactic factor, as well as that of tryptase, leading to a possible occurrence of urticarial lesions. Also, there is a decrease in the level of alpha-1 antitrypsin, as it happens in other forms of urticaria.

Urticaria due to cold is the most frequent in athletes. Swimmers and athletes who practice winter sports are the most susceptible. It is usually idiopathic, but other secondary causes must be excluded (cold hemolysis, cryoglobulins or connective tissue disorders). The temperature at which injuries occur is specific to each individual; injuries disappear after heating the skin, not the environment (Adams, 2006).

The most significant emergency of all dermatological diseases in athletes is angioedema. Athletes prone to anaphylaxis should be cautious, but not all athletes develop this pathology. It appears in several categories (cyclists, skiers, basketball, handball, tennis players), but it seems that runners develop symptoms even after moderate or light activities. The average age of onset is 25 years and women are predominantly affected. Itching occurs in 90% of cases and urticaria is present in 86% of athletes. Angioedema occurs in 70% to 80% of cases and is usually located on the face, hands and arms. Symptoms may start within 5 minutes of exercise, as well as after exercise (Adams, 2006).

Table I

Factors involved in the onset of contact dermatitis.

Category	Sports	Name	Irritant factor
Play surface	Mountain climbing	Lesions on the hands	Natural elements (rocks, water, wind)
	Indoor football	Lesions caused by concrete	Calcium oxide
	Swimming	Swimming pool dermatitis	Halogenated compounds in water
Gear	Basketball	Finger lesions	Grit in the cracks of the ball
	Hockey	Hockey dermatitis	Fiber glass
The athlete	Swimming	Shoulder lesions	Freshly cut beard or hair

(Adams, 2006)

Diagnosis is based on the presence of angioedema and itching, with or without respiratory failure. Patients may experience hypotension, laryngeal edema, altered consciousness, and differential diagnosis is mainly done with cholinergic urticaria.

Table II
Differentiating exercise-induced angioedema/ anaphylaxis from cholinergic urticaria.

Disease	Complaint	Findings on physical examination
Cholinergic urticaria	Shortness of breath Skin rash	Expiratory lung wheeze Small discrete red papules Appropriate blood pressure Appropriate heart rate
Exercise-induced angioedema/ anaphylaxis	Shortness of breath Skin rash Lightheadedness Heart racing	Inspiratory laryngeal stridor Large angioedema areas Hypotension Tachycardia

(Adams, 2006)

Inflammatory skin disorders can hinder athletes from participating in competitions and cause secondary infections. Doctors treating athletes with post-practice hives should monitor their patients closely and make the difference between cholinergic urticaria and anaphylaxis induced by exercise (Adams, 2004).

Traumas

Athletes are frequently affected by trauma. These include not only the skin, but also the hair or nails. Friction is the force that causes the most common injuries in athletes. Some conditions are common to all athletes (scratches, abrasions, blisters, calluses and corns), others are specific to certain sports (weightlifters' hand bandages).

The most common are abrasions and scratches, which are present in most sports. However, the most affected are marathon runners, divers, skiers and cyclists (63%). Open wounds usually occur in contact sports. Rugby players present 2.75 wounds per 1000 hours of playing (Adams, 2006).

Physical exercise has been correlated with hyperkeratotic lesions such as corns and calluses. These occur due to friction and excessive or prolonged pressure by increasing skin thickness at the spot of maximum mechanical irritation. In time, the lesion increases and causes in turn increasing pressure in that area. Usually these lesions are found on the hands and feet, being related to the interaction with the playing surface or gear. Pain only occurs when the skin is extremely thick and it cracks (Grouios, 2004).

The nail and the region around the nail also suffer from the force and pressure during exercise. The result is a color change and thinning, dystrophy being often confused with onychomycosis or nail melanoma. In order to exclude infectious pathology, bacterial cultures are necessary. For the exclusion of neoplastic pathology, a careful clinical and dermatoscopic examination of the region is required. In malignant melanoma, an extension of the brown longitudinal coloration of the nail appears at cuticle level - the Hutchinson sign (Adams 2002).

Nipple irritation occurs due to constant rubbing against the clothing. It is more common in men and occurs in those who wear shirts made of thick fibers (cotton) and women not wearing a bra while running. The prevalence is 6.7% during marathons and is usually described under low temperature and moisture conditions (Adams, 2006).

There are situations where traumatic conditions cause certain effects on hair as well. While the means by which skin adapts to friction is hyperkeratosis, hair is more fragile than that and it falls off. Thus, various sporting activities can cause alopecia (e.g. bandanas worn by marathon runners).

Friction, heat and unventilated clothing can cause mechanical acne. Clinically, erythematous papules and pustules appear on the shoulders and posterior chest or on the areas covered by gear (hockey or American football players) (Adams 2002).

In general, strong pressure causes the most important skin damage. "Talon noir" is a well-defined asymptomatic lesion, with irregular shape. It looks like a black macula or petechia, approximately 1 cm in size, observed in the posterior region of the heel. Rarely, it can be located on soles or toes. It is more frequent in basketball, soccer, tennis players or weightlifters. There are no differences between genders and it usually appears between the ages of 12 and 24. It occurs due to high forces, sudden stops or jumping, by the rupture of blood vessels in the superficial dermis.

Environment-related diseases

Athletes are directly exposed to a variation of environmental factors. Water, both salt water and pool water, is an important factor in the appearance of skin pathology. Exposure to cleaning products based on copper can lead to green hair, while chlorine based products lead to hair discoloration and thinning. Contact with salt water and various marine animals can cause allergic contact dermatitis. In order to avoid that, special protective gear and showering after exposure are recommended (Basler, 2000).

Since the emergence of anabolic and androgenic steroids, they have been used by athletes to improve performance. Prolonged use may cause dangerous complications in the body. These supplements increase the risk of heart disease (hypertension, atherosclerosis, and stroke), liver disease (hepatitis, cancers) or mental illness (manias, neuroses, depression, irritability, sleep problems). Men experience gynaecomastia and testicular atrophy, and women develop amenorrhea, clitoral hypertrophy, hirsutism and irregular menses. Cases of HIV infection through the use of unsterilized needles have been reported. It is estimated that 50% of professional athletes have used steroids at least once in a lifetime. Most commonly, they are used by weightlifters and can cause acne (53%), hirsutism (47%), alopecia (20%) and skin and hair fattening (27%). Cutaneous manifestations of anabolic steroid use are extremely important in order to raise awareness among athletes about the numerous and harmful effects they are exposed to.

Extreme temperatures are another cause of skin damage. In the case of outdoor sports, the most common injuries are frostbites. They occur not only due to low

temperatures, but also due to strong wind. At the highest risk are skiers (20% of injuries are due to cold), but also cyclists or athletes. High temperatures cause acute and chronic complications. In time, various neoplasms may arise, while in case of short-term exposure, skin burns may occur (marathon runners, golfers, football players, etc.). The use of sunscreen creams and special gear is recommended (Adams, 2006).

Conclusions

1. Cutaneous pathology in athletes is a vast field, which should receive maximum consideration.

2. Monitoring of an athlete with cutaneous pathology must be performed by a complex team consisting of dermatologists, sports medicine and internal medicine physicians, orthopedic surgeons, coaches and public health officials.

3. In order to avoid repercussions on the athlete's career and health, it is very important to recognize and treat any lesions at very early stages.

Conflicts of interest

Nothing to declare.

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