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6 Module 6. Occupational skin diseases"

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6.1 Introduction

Most occupational skin diseases result from contact with a chemical substance, of which there are more than 90,000 in the environment today. Under certain conditions, all of them can irritate the skin, and approximately 2000 substances are now recognized as contact allergens. In a condition of agriculture work there are a lot of possibilities for contacts with different chemical substances such as pesticides, insecticides, fertilizes, disinfectants, machine oils and other. Among the agriculture workers those who are working in greenhouses are having the biggest risk for development of skin allergic disorders.

Outdoor work means a work under the sun exposure. UV rays are a risk factor for the sun burning and they also constitute a risk for malignant transformation (skin cancer).

Workers in pig farms, ruminant animals farms (cows and sheep) and poultry are exposed to the development of skin forms of a number of zoonotic diseases, like brucellosis, tuberculosis, tularemia. Possible infections with skin form of anthrax may occurs during manipulation and work withdry soils.

Agriculture workers are performing predominantly physical and manual work. That is a reason for development of corns and calluses, painful fissures and profound wounds which may become infected.

The aim of this Module is to help trainees to understand and learn basic concepts of the following occupational skin diseases:

- Contact dermatitis (CD), which is deviated to irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD);
- Skin diseases related with sunlight exposure;
- Bacterial diseases (Bacterial diseases, Cutaneous tuberculosis, Cutaneous Leishmaniosis);
- Mechanical trauma;

Traineesshould be able to:

- Identify and provide explanations concerning etiological factors of occupational skin diseases;
- Explain the basic occupational skin diseases – pathological reaction, symptoms and signs;
- Explain the main principles of treatment;
- Explain the main principles of prevention;

6.1.1 Glossary

Term	Definition
Irritant Contact Dermatitis (ICD)	ICD is a nonimmunogenic skin reaction to toxic substances either in low or high concentrations.
Irritants	Any substance (including water after long-term exposure) has a potential to cause skin irritation.
Allergic Contact Dermatitis (ACD)	ACD is an immunologic reaction classified as a delayed type IV or cell-mediated hypersensitivity
Bacterial skin diseases	Staphylococcal and Streptococcal infections - these infections are common in certain occupations, especially agricultural workers
Cutaneous tuberculosis	Mycobacterium tuberculosis hominis is skin acquired infection through inoculation.
Cutaneous Leishmaniasis	The disease is transmitted by sandflies via blood sucking.Typical manifestation of *Leishmania tropica* infection includes persistent cutaneous ulcers healing with scar tissue
Mechanical trauma	Corns and calluses as are results of very heavy manual work and rower equipment and machinery.

6.2 Contact dermatitis

Contact dermatitis (CD) of the hands is the most common occupational skin disease. CD can be subdivided into irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD).

6.2.1 Irritant contact dermatitis (ICD).

In respect to etiologic factors for **ICD** the main irritants are: Soaps/detergents, Water, Acids/alkalis, Organic solvents, Metalworking fluids.

ICD is a nonimmunogenic skin reaction to toxic substances either in low or high concentrations. Any substance (including water after long-term exposure) has a potential to cause skin irritation. Skin exposure to irritating toxic substances in minor concentrations over a long period is a predisposing factor, as are atopic skin diathesis and hyperhidrosis.

ICD results from the denaturation and delipidation of the lipid-rich stratum corneum leading to altered barrier function and trans-epidermal water loss. This may result in the further penetration of and damage to the deeper epidermal layer containing living keratinocytes.

ICD symptoms and signs

- Acute and subacute effects: Single exposure to a strong irritant might be sufficient;
- Usually hands are involved;

- Raw appearance and erythema of the affected body part;
- Demarcated areas from the normal skin;
- Cracking / chapping of the affected body part;
- Fissuring;
- Bleeding;
- Pustular skin changes;
- Itching\burning with or without visible skin changes;
- Chronic effects;
- Repeated exposures required;
- Skin dryness;
- Hyperkeratosis;
- Skin itching (less than in ACD);
- Skin wrinkling;

Diagnosis of ICD

- Anamneses it is aiming to identify contact with irritant substances;
- The diagnosis of ICD is often confirmed by the exclusion of allergic contact dermatitis. Patch testing is necessary to rule out allergic contact dermatitis, and it should be emphasized.

6.2.2 Allergic Contact Dermatitis (ACD)

In respect to etiologic factors for ACD the main allergens are: Chromate, Epoxy resins, Biocides, Fragrances, Formaldehyde, Rubber chemicals, Methacrylates.
ACD is an immunologic reaction classified as a delayed type IV or cell-mediated hypersensitivity. This distinguishes it from type I reactions, which are immediate and antibody mediated.
Development of ACD results from a very complex interplay of inherited risk factors such as polymorphism (genetic variations) and acquired risk factors which can include atopic dermatitis, ICD, and venous stasis.

ACD symptoms and signs:

- Once allergic sensitization has occurred, the dermatitis begins within 24–48 hours after contact;
- Pruritus — it is very prominent feature;
- Erythema — it is installed usually very fast;
- Papule formation;
- Vesicles;
- Blistering;

ACD diagnostic methods

- Patch Testing - the key to diagnosis of allergic contact dermatitis is diagnostic patch testing.
- Two methods are used: 1) The Finn chamber; 2) The T.R.U.E. test (Thin-layer Rapid Use Epicutaneous patch) test.

6.2.3 Treatment of ICD and ACD

The are no essential differences between the treatment of ICD and of ACD. On a first place, the contact between irritants/allergens and skin must be terminated. Medical treatment stars with skin cleaning, treating the skin with emollients in a form of creams, ointments, lotions and gels. Antibiotics and corticosteroids are needed.

6.2.4 Prevention of ICD and ACD

- The workers have to be familiar with the health effects of the chemical substances they are dealing with at the workplace;
- It is necessary to perform the education of workers to promote their awareness of potential irritants and allergens both at work and at home;
- Engineering control on automated closed systems must be permanent;
- Personal and environmental hygiene are important for skin protection. All necessary personal protective equipment must be used, gloves especially, and it needs to be kept clean at all times;
- It is necessary to perform the education of employees to enhance their awareness concerning potential irritants and allergens both at work and at home.
- Pre-employment and periodic health screening should include assessment of teguments exposed to chemical substances and other hazards.

6.3 Skin diseases related to sunlight exposure

Workers in agriculture are the group with the highest risk for prolonged sunlight exposure. From the sun spectrum UV rays are the posing the highest risk for skin diseases.

6.3.1 Skin erythema.

The acute effect of excessive UV exposure is erythema, the familiar skin reddening which it is termed the sunburn. Most people will tan from the UV stimulation of melanin production, which occurs within a few days following exposure. A further, less obvious adaptive effect is the thickening of the outermost layers of the skin that attenuates UV penetration to the deeper layers of the skin. Both changes are a sign of damage of the skin.

Susceptibility to skin damage depends on skin type; individuals with fairer skin are more likely to suffer of a sunburn or erythema, than people with darker skin. Similarly, the ability to adapt to UV exposure also depends on skin type.
Exposure to UV radiation also causes a number of degenerative changes within the cells, of the fibrous tissue and of the blood vessels of the skin. These include freckles, nevi and

lentigines or liver spots - they are benign lesions that occur on the sun-exposed areas of the body. UV radiation accelerates skin aging, and the gradual loss of the skin's elasticity results in wrinkles and dry, coarse skin.
The medical treatment of skin erythema includes emollients in a form of creams, ointments, lotions and gels.

6.3.2 Skin cancers.

Professionals who are at risk of developing skin cancers as a result of chronic sun exposure include farmers, horticulturists, especially those with fair skin and light or ginger hair.
Skin cancers represent a common and locally destructive (malignant) growth of the skin.
The main types of skin cancers are:

- Basal cell carcinoma (with high frequency);
- Squamous cell carcinoma (second in frequency);
- Melanoma, witch originate from the pigment producing cells (less in frequency);

The most common risk factors for developing of skin cancer:

- The UVB range (290–320 nm) and the UVA (320–400 nm) rays also are photo-carcinogenic. UVA rays accelerate UVB-induced malignancy;
- A chronically suppressed immune system;
- Exposure to ionizing radiation;
- Exposure to chemical compounds known to predisposed to cancer;

Skin cancersare subject to special ontological treatment

6.3.3 Prevention of Skin diseases related with sunlight exposure

Prevention is directed towards the decreasing of the sun exposure and to wearing suitable clothes and hats.

6.4 Bacterial diseases with skin forms

6.4.1 Staphylococcal and Streptococcal infections

These infections are common in certain occupations, especially agriculture and construction workers, butchers, meat packers, and slaughterhouse workers. To establish a correct diagnosis the physician needs skin samples to be investigated microbiologically.
The treatment is local and systemic with specific antibiotics.

6.4.2 Cutaneous tuberculosis

Mycobacterium tuberculosis hominis is a skin acquired infection through inoculation.

The typical skin lesions are slowly progressive, warty, hyperkeratotic plaques, which, if left untreated, eventually regress after many months or years, leaving disfiguring scars
Diagnosis is difficult sometimes and it requires microbiological investigation.
The treatment has to be deployed over a long period of time and usually workers are losing many workdays for undergoing the specific tuberculostatic cures.

6.4.3 Cutaneous Leishmaniosis

The disease is transmitted by sandflies via blood sucking. The typical manifestation of aLeishmania tropica infection includes persistent cutaneous ulcers healing with scared tissues.
The treatment could make use of the following Glucantim, Lomidine, Metronidazol and Amfotericine B.

6.4.4 Cutaneous anthrax

Cutaneous anthrax is the most common form of the anthrax infection. The disease usually develops from 1 to 7 days after infection. This can happen when a person handles animals or infected products, or has been in a contact with infected dry soil.
The cutaneous anthrax has a form of blue pustule and it is most common on hands, neck, and head.
Without treatment, up to 20% of the patients with Cutaneous anthrax may die. However, with proper treatment, almost patients survive.

More information about these and other infectious diseases which are relevant for the employees working in agriculture are presented in great detail within the “Module 1- Infectious diseases for employees working in Agriculture”.

6.4.5 Mechanical trauma

Agricultural workers are permanently exposed to different risk factors – one group related to various environmental exposures and another group related to the equipment and machinery, and a last group related to the very heavy physical work and manual work the agriculture employees are performing regularly.
As a results from the physical and manual work the agriculture employees develop corns and calluses, fissures and profound wounds. Very often they become infected.
As results of accidents mechanical trauma may happen and it could lead to work disability or early retirement, and in some situations even to death.

6.5 Facilities for practical use

6.5.1 Glossary

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Allergic Contact Dermatitis (ACD)	ACD is an immunologic reaction classified as a delayed type IV or cell-mediated hypersensitivity. Once allergic sensitization has occurred, the dermatitis begins within 24–48 hours after contact
Min allergens	Chemical compounds who produced an immunologic reaction. The most known are Chromate, Epoxy resins, Biocides, Formaldehyde, Rubber chemicals, Methacrylates.
Exposure	The duration time of contact between subject and risk factors. It is measuring in hours (during the day) or in yeas (respect for professional exposure assessment).
Heavy manual work	Manual work with physical efforts of hand muscles.

6.5.2 Recommended dermatologic examinations for occupational physicians

For performing the assessment of occupational diseases the following information is needed:

- Job description;
- Exposure assessment on risk factors during the work;
- Environmental risk factors;
- Present complains;
- Medical, family and social history;
- Physical examination, special tests investigation;
- Diagnosis and description for treatment;
- Assessment of disability status and rehabilitation;
- Improvement of working conditions;

6.6 Conclusions & Recommendations

Agriculture is an occupational sector where exposure to environmental factors and working condition, as well as prevention measures, are not formally regulated at sufficient levels. More regulations, preventive facilities and control measures are required and expected in the occupational health and safety field, including workplace health promotion guides for rural areas. In this respect, agricultural employers should develop, implement, and enforce a comprehensive safety and health program that includes standard operating procedures.

Skin disorders among employees working in agriculture are generally easy to be diagnosed after the first symptoms appear, but for the occupational physician is difficult to make a decision whether they are occupational diseases or in fact the medical condition has appeared earlier (and therefore it is derived from the working environment). Fully developed and well documented **Job descriptions** and **Exposure assessments** (on relevant risk factors during the work) will help the occupational physician to make the right decision.

The occupational physician is recommended to give specialized support to employees and employers so as to learn and implement procedures and prevention programs in order to improve the working conditions.

The occupational medicine physician will manage better the risk of exposure (to hazards relevant for skin diseases) should she / he collaborate with the family physician.

The occupational medicine physician needs to take into account the fact that weather conditions may significantly influence (increase / decrease) other occupational risk factors. Irritated and damaged skin could help the absorption of toxic substances. In this respect, a holistic approach is recommended in risk assessment and risk management.

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