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Occupational Contact Dermatitis

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ABSTRACT

Contact dermatitis is a common inflammatory skin disease with erythematous and itchy skin lesions that occur after contact with an allergic or irritant substance. Occupation is an important risk factor for contact dermatitis that presents in adulthood. Skin disorders comprise more than 35% of all occupationally related diseases, affecting annually approximately one worker per thousand. Contact dermatitis is responsible for 90-95% of occupational skin diseases. Most contact dermatitis cases are due to irritant causes. Occupational contact dermatitis often has significant negative effects on quality of life and the long-term prognosis is poor unless workplace exposures are addressed. For this purpose, measures to be taken by business owners are very important. In this article, features of occupational contact dermatitis, causative agents, diagnostic methods, prognosis, occupational risks, prevention and treatment methods are described.

Keywords: Dermatitis, contact dermatitis, occupational

ÖZ

Mesleki Kontakt Dermatit

Kontakt dermatit, alerjik veya irritan bir maddeyle temastan sonra ortaya çıkan eritemli ve kaşıntılı cilt lezyonları ile karakterize, yaygın bir enflamatuar cilt hastalığıdır. Meslek yetişkinlikte ortaya çıkan kontakt dermatit için önemli bir risk faktörüdür. Cilt hastalıkları meslekle ilgili tüm hastalıkların %35'inden fazlasını oluşturur ve yılda yaklaşık her bin işçiden birini etkiler. Mesleki deri hastalıklarının %90-95'inden kontakt dermatit sorumludur. Kontakt dermatit olgularının çoğu irritan sebeplere bağlıdır. Mesleki kontakt dermatit, genellikle yaşam kalitesi üzerinde önemli derecede olumsuz etkilere sahiptir ve iş yeri maruziyetleri ele alınmadığı sürece uzun vadeli prognozu kötüdür. Bu amaçla iş yeri sahiplerinin alacakları önlemler çok önemlidir. Bu yazıda mesleki kontakt dermatitlerin özellikleri, sebep olan ajanlar, tanı yöntemleri, prognozları, mesleki riskleri, önlem ve tedavi yöntemleri anlatılmaktadır.

Anahtar Kelimeler: Dermatit, kontakt dermatit, mesleki

INTRODUCTION

In the general population, contact dermatitis is common, its incidence is 5.5-8.5/1000 patient/year, and its prevalence is 9.7% (1). Even though the human skin is resistant to external factors, it is the leading organ that gets injured the most in the industry. More than 35% of occupation-associated diseases are skin lesions and disorders. The most important disorder in this respect is occupational contact dermatitis. The most fundamental underlying reason in these skin disorders is direct contact with chemicals. Today, there are over 90.000 chemicals-irritants around us, and their number tends to increase each day. In this study, it was aimed to evaluate the diagnosis, treatment and follow-up of occupational contact dermatitis and to raise awareness regarding occupational contact dermatitis providing basic information to primary care physicians, occupational physicians and specialists in occupational diseases and disorders. Occupational contact dermatitis is fundamentally divided into two types: irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD) (2).

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Pathophysiology of irritant contact dermatitis develops as a result of direct exposure to chemicals and physical agents. Sufficient irritant exposure, contact duration and frequency have an important role. Despite personal differences, irritant dermatitis is intensity-dependent. It is primarily seen on regions where stratum corneum is thinnest (finger tips, back of the hand). One of the facilitating factors is the thinning of the skin due to trauma and diseases. Wet and moist skin hydrates the stratum corneum. On the contrary, low temperature and moist redundantly decrease skin hydration. As a result, the development of delipidation and denaturation of the stratum corneum layer, rich of lipids, deteriorates the skin barrier. Once the corneum is damaged, even less irritation can be sufficient. It does not necessitate sensitization and genetic predisposition. ICD mechanism has been shown with surfactants and emulsifiers. Surfactants have hydrophilic and hydrophobic tails that decrease the surface tension. They cause proinflammatory cytokines (IL-1α, IL-6, IL-8, phospholipase A2, TNF-α) to be released after a physical or chemical contact. Following this event, morphologic changes occur and clinical findings manifest (2).

Allergic Contact Dermatitis: It is a late type (Type IV) hypersensitivity reaction. It is necessary for the individual with genetic predisposition to become sensitive against low molecular weight haptenes and come into contact with this molecule to which the individual has become sensitive. Sensitization occurs within approximately 10 days after first exposure. This time duration varies according to the characteristics of the sensitizer, exposure conditions and personal factors. Sensitization may take days, months and even years. 6-48 hours after being exposed to the agent again, eczematous reaction occurs. This is the manifestation stage. Even small exposures repeated once sensitization has occurred lead to dermatitis in a couple of days (4).

Preparatory Factors

Age: Sensitivity to irritants is inversely associated with age. ICD is seen more frequently in children than in the adult population.

Sex: It has been observed in experimental studies oriented at irritant contact dermatitis that there is no difference between the sexes.

Race: Less sensitization occurs in blacks than in whites. In cosmetics testing, the Japanese have developed much severe reactions compared to the Caucasians.

Environmental factors: Wetting and drying repeated on the skin facilitates dermatitis development. Hot, cold and windy weather conditions are among the irritation-intensifier reasons. Chemicals start to melt in hot places with high humidity and dermatitis occurs when they come into contact with the skin. When humidity is low, the skin dries and the epidermal layer gets damaged. These repetitive microtraumas cause contact dermatitis to develop by provoking decomposition on the epidermal barrier.

Occupational risks: Some specific occupation groups constitute high risk. Similar aspects of these occupations include exposure to water, dissolvents and/or microtraumas. Repairmen, hotel housekeepers, construction workers, metal workers, sanitation workers, florists, healthcare workers, painters, hairdressers, printing press workers, beauty experts, bakers, cooks and butchers are among these occupation groups.

Genetics: Recent studies have unfolded two genes considered to be associated with the function of the skin barrier: Flaggirin (FLG) and Late Cornified Envelope (LCE) genes. Both genes are located in the epidermal differentiation regions of the 1q21 chromosome and are associated with the formation and differentiation of the corneum striatum. It has been determined that the mutation in the FLG gene constitutes a significant risk for the development of atopic dermatitis (4,6).

Exposure Sources

Irritants: The most common reasons of ICD include soap, detergent, fiberglass, food products, cleaning products, solvents, plastics, mineral fibers, pesticides, cosmetic products, metal working fluids, and organic solvents (7).

Allergens: The most common reasons of ACD include metallic salts, organic dyes, plants, thermoplastic resin, and rubber components (7). Occupational workers who carry high risk for ACD developments include workers of adhesive agents, isolations materials, resin, and plastics, farmers, construction workers, dental technicians, leather workers, rubber and textile workers (8). The most common reasons reported to cause contact dermatitis by occupational physicians in the UK are soap and cleaners, personal protective equipment, nickel, petroleum products, solvents and alcohols, cooling oils and coolers, epoxy and other resins, aldehydes, non-epoxy adhesives and dyes (9). Table 1 summarizes the risk factors for occupational contact dermatitis.

Clinical features:

Clinical findings are as same as classic contact dermatitis.

ICD: Belsito has classified ICD in four groups.

1. Corrosion (third degree burn).
2. Acute irritation (second degree burn): The dose of the irritant agent and reaction severity are interconnected. It can cause a wide array of clinical manifestations from mild skin findings to chemical burns.

Table 1. Occupational contact dermatitis risk factors

Mechanical factors	Physical factors	Chemical factors	Biological factors
• Trauma	• Radiation	• Acids, bases	• Bacteria
• Friction	• Humidity	• Detergents, solvents	• Viruses
• Pressure	• Heat	• Metals, resins	• Mites
• Dusts	• Cold	• Metalworking fluids	• Parasites
		• Paints, tar, rubber	• Plants
			• Insects

Steam in the air cause dermatitis findings on the face. Once the agent resolves, so can the clinic.

3. Chronic cumulative contact dermatitis: It is the most common and resistant condition. Chronic exposure to irritants like soap, oil and solvents is present. Dermatitis continues for a long time even when the agent is removed. Dermatitis may aggravate even with a trace of irritants as a result of repetitive exposure. Sensitivity to other irritants increases even if it is ameliorated.
4. Phototoxicity (4).

ACD: Clinical manifestation depends on the stages of the disease

- Acute stage: Erythema, edema, vesicles.
- Subacute stage: Desquamation, papulovesicular
- Chronic stage: Lichenification (11).

Microscopically, chronic eczema is characterized with reactive epidermal changes and acute eczema with spongiosis (10). In some cases, the surface of the lesions can be wider than the contact area. Clinical manifestation may not always be sufficient to differentiate between ICD and ACD.

Diagnosis

Suspicion and working conditions are mostly helpful in diagnosis. If it occurs for the first time during work, there is aggravation history with the work the person is doing, it ameliorates once being distanced from the working environment, there is exposure to irritants/allergens and it is a risky occupation, then it is necessary to be suspicious of occupational reasons. Mathias has argued that diagnosis can be made with the answers given to the questions listed in Table 2. Known as Mathias criteria, four "yes" answers to seven questions is sufficient to make an occupational connection. Allergy tests should be performed in necessary conditions.

There is no diagnostic test for ICD. Diagnosis is based on occupation history, clinical findings and exclusion of ACD. In order to rule out ACD, patch test is needed; however, testing with skin irritants should be avoided (2). Evaluation of irritant factors is subjective, but evaluation of allergic factors is objective (patch tests). Patch tests give information on the presence or absence of important allergens. Delay in diagnosis does not only affect prognosis but also the occupational future of the individual (12).

Occupational Contact History:

1. Description of the job, occupational behavior, and features of the working environment.
2. Potential allergens and irritants in the working environment.
3. Contact characteristics: dose, frequency and place.
4. Accompanying contact factors: heat, humidity, occlusion, friction and etc.
5. Personal protective measures in the workplace: gloves, mask, barrier creams.

Table 2. Mathias criteria

Mathias criteria
1. Is the clinical appearance compatible with contact dermatitis?
2. Is there exposure to potential irritants or allergens in the workplace?
3. Is the anatomical distribution of the rash compatible with occupational exposure?
4. Is the temporal link between exposure and onset consistent with contact dermatitis?
5. Were non-occupational exposures excluded?
6. Does dermatitis improve while away from suspected irritant or allergen exposure at work?
7. Can patch or provocation tests identify a possible allergic cause?

6. Other co-workers affected the same way at the workplace.

Non-Occupational Contact History: An individual who became sensitive to a material he/she exposed to at workplace should be evaluated in terms of everyday life exposure. For instance, since potassium dichromate is a common everyday life allergen other than cement, it is vital to find out about such contacts (13).

1. Household items: Cleaners, detergents.
2. Leather care products, scents, hair and nail products.
3. Pharmaceutical products.
4. Accessories and clothes.
5. Housework and hobbies.

Treatment

True diagnosis and partial or definite removal of the patient from the agent that causes dermatitis are fundamental in the treatment of OCDs (14).

ICD:

- According to clinical manifestation, mollients, steroids and antibiotics are used. In watery lesions, twice daily 15 minutes foment is recommended. There are debates on steroids. Oral antihistaminic drugs are used in the event of itchiness. Various moisturizers are recommended to help in repair the barrier function. In severe cases, distancing oneself from the agent or work is necessary.
- Decreasing exposure duration and intensity, preferring less harmful chemicals.
- Keeping the area open if the irritant effect has begun.
- Avoiding trauma, excessive moist, heat and formation of cracks.
- Using gloves that fir for purpose.
- Benefits of barrier creams are limited. Their usage is inappropriate in some conditions.
- Regular moisturizer use is protective of detergent-associated irritant dermatitis.
- Regular hygiene and working habit are important.

ACD:

- According to clinical manifestation, mollients, steroids and antibiotics are used. Considering the severity of the condition, topical (crema in acute cases, pomade in chronic phase) and systemic (oral steroids in serious conditions) treatments are given. Medical treatment is not always a solution on its own. Long term steroid use causes atrophy on the skin.
- Changing of the allergic agent with the non-allergic one.
- Using appropriate personal protective equipment.
- Recommendation of a job change. It is necessary much more in allergic dermatitis than in irritant dermatitis (14).

Complications

84-78% of occupational contact dermatitis are resolved. Chronic cumulative ICD has a much worse prognosis when compared to ACD or acute ICD. Prognosis differs according to the characteristics of the allergen or irritant and the rate of being exposed to these materials outside the working environment. The reasons for bad prognosis include having allergic contact dermatitis to chrome or nickel, dermatitis becoming chronic, delayed treatment and atopic dermatitis history. Job change is required in some cases with severe occupational contact dermatitis. However, changing the job may sometimes not prove to be fruitful in terms of prognosis (4).

Protection

Measures to be taken at the workplace:

- Training.
- Removal or cutback in agent materials.
- Changing the agent material with a less harmful one.
- Covering.
- Technical protective measures (15).

CONCLUSION

Occupational contact dermatitis has become a common occupational skin disorder in many countries. It is actually more common than generally accepted, it can be severe and mutilating, and it is generally preventable. Early diagnosis and efficient preventive measures help avoid work loss and the disorder to become chronic. Therefore, occupational contact dermatitis catches the attention of clinicians, health and safety experts, researchers, decision-makers in health politics, workplace hygienists and those interested in preventing occupation-related disorders and diseases.

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