



Evaluation of occupational dermatitis cases

Mesleksel dermatit olgularının değerlendirilmesi

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Abstract

Background and Design: We aimed to evaluate the characteristics of patients who were referred and evaluated within 3 years with the preliminary diagnosis of occupational dermatitis and to share our clinical experience.

Materials and Methods: A total of 23 cases with skin-related complaints were evaluated retrospectively between 2014 and 2017.

Results: Of 459 patients with occupational disease, 23 (3.7%) were diagnosed with occupational dermatitis. Five were female and 18 were male. The mean age of the patients was 39±6.61. Twelve of 23 patients with positive patch test were diagnosed as allergic contact dermatitis, four as irritant contact dermatitis, six as other dermatological diagnoses (psoriasis vulgaris, vitiligo, dermal mucinosis and chronic urticaria). Due to the loss of communication in one case, no specific patch test could be performed for the occupational factors.

Conclusion: Although occupational dermatitis is common among occupational diseases, the diagnosis rate is very low in our country. The specific patch test is important in the differential diagnosis.

Keywords: Occupational, dermatitis, patch test, allergic contact dermatitis

Öz

Amaç: Mesleksel dermatit ön tanısı ile 3 yıllık süreç içerisinde sevk edilen ve değerlendirilen olguların özelliklerini değerlendirmeyi ve klinik deneyimlerimizi paylaşmayı amaçladık.

Gereç ve Yöntem: 2014-2017 tarihleri arasında sevk edilen deri ile ilişkili yakınmaları olan toplam 23 olgu retrospektif olarak değerlendirildi.

Bulgular: Meslek hastalığı tanısı alan 459 olgunun 23'ünde (%3,7) mesleksel dermatit saptandı. Olguların 5'i kadın, 18'i erkek ve yaş ortalamaları 39±6,61 idi. Yama testi pozitif olan 13 olgunun 12'si allerjik kontakt dermatit, 4 olgu irritan kontakt dermatit, 6 olgu diğer dermatolojik tanılar (psoriasis vulgaris, vitiligo, dermal müsinozis ve kronik ürtiker) olarak değerlendirildi. Bir olguda iletişim kaybı nedeniyle mesleksel etkenlere spesifik yama testi yapılamadığından allerjik ve iritan ayırımı yapılamadı.

Sonuç: Mesleksel dermatitler, meslek hastalıkları içinde sık görülmesine rağmen ülkemizde tanı oranı oldukça azdır. Ayırıcı tanıda etkene spesifik yama testi önem arz etmektedir.

Anahtar Kelimeler: Mesleksel, dermatit, yama testi, allerjik kontakt dermatit

Introduction

The most important exposure pathway for occupational agents are through skin, respiratory tract and gastrointestinal tract. These agents may lead directly to local effects or may cause multisystemic immune response due to absorption of

the agent and distribution to the body, which may be the cause of specific or non-specific disorders¹.

Occupational dermatitis is the second most common cause with 10-40% after musculoskeletal disorders among all occupational diseases²⁻⁴. The percentage of occupational dermatitis among occupational diseases is 6.9% and 10.9%

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respectively according to the of European Occupational Diseases Statistics in 2001 and 2005⁵. In our country, occupational skin problems was found 3% in 2007 and 2.1% in 2013 and ranked 7th after problems such as musculoskeletal disorders, stress, depression and anxiety, respiratory system problems, headaches, ocular diseases, heart and circulatory system problems according to the community-based data of Turkish Statistical Institute⁶.

Occupational contact dermatitis may occur with toxic effect of direct exposure to occupational agents or by immunological mechanisms. This may show itself as allergic contact dermatitis (ACD) or irritant contact dermatitis (ICD). Skin problems can arise with different chemicals such as detergents, plants, acids and alkalis, ceramics, dyes, fiberglass, adhesives in professions such as farming, automobile industry, ceramics, cleaning, electric/electronics, food industry, hairdressers, health workers, dental technicians, metal industry, dying, plastic, leather etc. There is a certain latency stage after exposure so that allergic sensitization phase in ACDs or weak irritants in chronic ICDs can produce cumulative irritant potential, while clinical findings are expected to occur immediately after exposure to a strong irritant substance in acute ICDs.

In this study, we aimed to evaluate the characteristics of the cases referred to Dokuz Eylül University Faculty of Medicine, Department of Occupational Disease with occupational dermatitis as preliminary diagnosis in three-year period.

Materials and Methods

Between the years of 2014 and 2017, 459 out of 1.100 cases referred to our clinic were diagnosed with occupational diseases and 23 cases with skin related complaints were retrospectively evaluated. A detailed history was taken from the cases and a clinical evaluation was performed. In the course of this evaluation, material safety data sheet was requested from the workplace.

The demographic characteristics, the sectoral analysis of the work they were doing, the body region where lesions first appeared were analyzed. The interval between the start of exposure and the date of occurrence of lesions was evaluated as a latent period. Wetwork was defined as either skin exposure to liquids more than two hours daily or very frequent washing of the hands. The very frequent washing of the hands was evaluated more than 20 times daily or less if the cleaning procedure was more aggressive¹.

Clinical evaluation of the cases was carried out by dermatology clinic and the patch test which includes 28 allergens by "European Standard Test Series (IQ Chambers Chemotechnique Diagnostics, Sweden)" was performed to the cases diagnosed with contact dermatitis. Test results were assessed according to the International Contact Dermatitis Study Group Criteria⁷. Specific patch testing is planned for those exposed to chemicals that are not listed in the European Standard Test Series.

Positive reaction in the patch test was made by examining the clinical relevance of the detected allergic/irritant reaction, the history of the reaction, the nature of the reaction, and the safety forms of the materials used in the workplace. The cases were classified clinically into two groups as ACD and ICD in terms of detected positive reactions.

Additional examinations such as biopsy and Wood's light were performed for the differential diagnosis in cases with no occupational contact dermatitis was suspected. The diagnostic algorithm used is

summarized in Figure 1. Ethics committee approval was obtained from the Ethics Committee of Dokuz Eylül University Faculty of Medicine (approval number: 2018/07-14).

Statistical Analysis

Statistical evaluation was performed using a statistical package program, the PASW Statistics for Windows (SPSS Inc. Version 18.0, Released 2009, Chicago, United States of America). The discrete variables were presented as number and frequency and continuous variables were given as mean \pm standard deviation (SD) or minimum and maximum values. Mann-Whitney U test was performed in a binary comparison and significance level was accepted as a $p < 0.05$.

Results

Occupational dermatitis was detected in 23 (3.7%) of 459 patients who were diagnosed as occupational diseases in Dokuz Eylül University Medical Faculty, Department of Occupational Disease and it was the fifth most common occupational disease in our clinic after systemic intoxications of respiratory, musculoskeletal, otorhinolaryngological system and chemical exposure.

The mean age and SD of 23 patients (5 female and 18 male) were 39 ± 6.61 (minimum: 28 and maximum: 51). There was no significant difference between the mean ages according to gender specific calculation ($p = 0.317$). The main complaint were itching in 15 cases, redness was in seven and hypopigmentation detected in one case. Mean duration of the onset of symptoms was 82 ± 68.5 months (3-234). In 12 cases, the lesion started on hand and spread to the arms and body (Table 1). In six cases only skin lesions were present, while in 17 cases additional comorbid conditions were detected. The most common disorders were asthma and allergic rhinitis (4 asthma, 2 allergic rhinitis, in 2 cases concurrence of both). Furthermore sectoral analysis of the workplaces was shown in Table 2 and according to the results, the healthcare industry was followed by the paint and coatings industry, metal and mining sector and textile sectors respectively. Also, the wetwork was found in 50% of the cases in terms of risk factors.

As a result of the clinical evaluations, 17 cases were diagnosed with contact dermatitis and a patch test was performed for the differential diagnosis of ACD/ICD. The result of the patch test by the European Standard Test Series was positive in 15 cases (allergic reaction in 13 cases, irritant reaction in 2 cases) and negative in 2 cases. Because the patch test was not able to establish occupational exposure in the two cases that were detected positive, for these two patients, specific

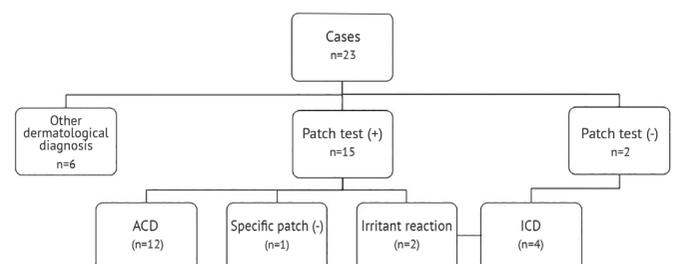


Figure 1. Diagnostic algorithm used in the study
ACD: Allergic contact dermatitis, ICD: Irritant contact dermatitis

patch test was carried out with materials found in their workplace. In one case, a positive allergic reaction was detected in the specific patch test made with diesel, whereas in the other case, specific patch test could not be performed due to loss of communication. This case was not included in the ACD/ICD classification. As a result, 12 out of 13 patients with positive patch test received ACD diagnosis.

Other than two cases with irritant reaction according to the patch test of European Standard Test Series, two cases who had negative patch tests and exposed to chemicals were included in standard patch list and diagnosed with ICD. Correlation between the history of exposure and clinical symptoms, physical examination of the cases were consistent with the findings of ICD, the absence of an allergic reaction to the patch test were taken into count during inclusion to this classification. Therefore, four cases were included in the ICD classification.

Six cases with no occupational contact dermatitis were evaluated for other dermatological diseases, and psoriasis vulgaris was present in

three cases, vitiligo was present in one case, dermal mucinosis was present in one case and chronic urticaria diagnosed in one case.

When the results of all patch tests were examined, the most common allergens were nickel sulfate in 11 cases (73.3%), potassium dichromate in 6 cases (40%) and thiuram in 3 cases (20%). Furthermore, occupational exposure was found in 36% of patients with nickel sulfate allergies, 66% of those with potassium dichromate allergies and 50% of those with thiuram allergies.

When the latency period of ACD and ICD were evaluated, shortest duration was found as one month in a patient works as a courier because of an allergic reaction to the mixture of 5-chloro-2-methyl-4-isothiazolinone and thiuram found in the rubber band, plastic materials, and paper exposure. However, the most extended duration was measured as 118 months in a chemistry lab technician exposed to Sodium Lauryl Sulfate and thiomersal. In some cases, multiple allergen exposures were present. The allergens and their latent periods are shown in Graphic 1, latent periods according to occupational sectors are shown in Graphic 2.

Table 1. Demographic characteristics of the cases in the study and the origin of the lesions

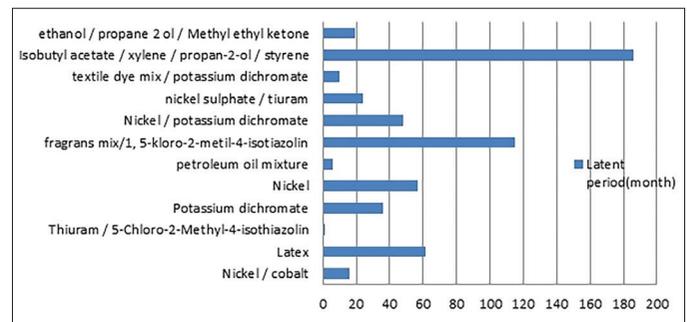
| Gender | n (%) |
|---------------------------------------|-------------|
| Female | 5 (21.74%) |
| Male | 18 (78.26%) |
| Age, year (mean ± standard deviation) | |
| Female | 35.2±3.11 |
| Male | 40.5±6.99 |
| Lesions started at | |
| | n (%) |
| Hand | 12 (52%) |
| Body | 3 (13%) |
| Arm | 2 (9%) |
| Foot | 1 (4.5%) |
| Leg | 1 (4.5%) |
| Face | 1 (4.5%) |
| Neck | 1 (4.5%) |
| Glans penis | 1 (4.5%) |
| Genital area | 1 (4.5%) |

Table 2. Sectoral distribution of the cases in the study

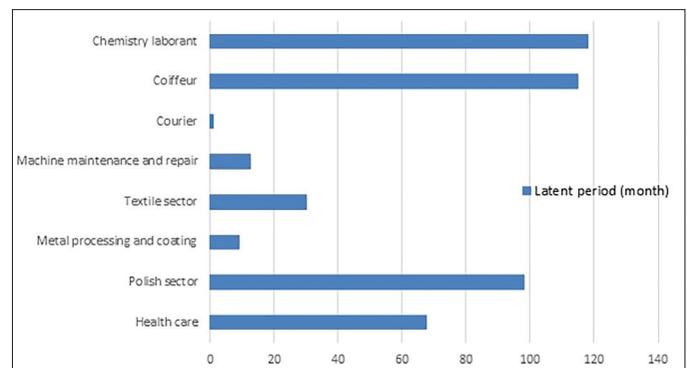
| Sectoral distribution | n (%) | |
|-------------------------|-----------------|----------|
| Healthcare | 7 (30%) | |
| Chemistry | Paint | 3 (13%) |
| | Ceramic | 1 (4.5%) |
| | Laborant | 1 (4.5%) |
| | Plastic coating | 1 (4.5%) |
| Textile | 2 (8.5%) | |
| Metal-Machining/Coating | | |
| Welder | 1 (4.5%) | |
| Machine maintenance | 2 (8.5%) | |
| Service (courier) | | |
| Coiffeur | 1 (4.5%) | |
| Driver | 1 (4.5%) | |

Discussion

Occupational dermatitis is one of the most common occupational diseases, although the incidence is very low. Exposure data of diagnosed cases support the presence of severe occupational dermatitis. The reasons for the diagnostic rate is less than the expected could be the lack of professional experience about occupational dermatitis and the lack of information of the referral



Graphic 1. Relation between allergen/irritant agent and latent period in cases diagnosed with occupational contact dermatitis-average/month



Graphic 2. Relation between occupational distribution and latent period in cases diagnosed with occupational contact dermatitis-average/month

sites. In a study examining the awareness on occupational dermatitis in our country, the methodology and approach differences of dermatologists, occupational physicians, and family physician were examined. When physicians were asked about the reasons for lack of diagnosis, dermatologists have stated that most frequently there are no materials and media to test and family physicians have told that they do not have enough knowledge and experience in this particular area. In the same study, it was also emphasized the importance of that the dissemination of centers where patch testing was conducted⁸.

The fact that the cases in our study are predominantly young male is similar to the results of other studies. In two studies conducted in occupational hospitals in our country, it was determined that the diagnosis of occupational dermatitis was mostly in the male gender and the mean age was third and fourth decades^{9,10}. This can be explained by the fact that the frequent admissions were arisen from male-dominant professions in our country.

When the cases evaluated according to the sectoral point of view, it was understood that our cases were coming from high-risk areas for dermatitis. However, when we look into other studies, high dermatitis risk has also been reported in different business sectors such as manufacturing, dental technicians, tailors, screen printers, florists, hazelnut workers¹¹⁻¹³, hairdressers and military personnel^{9,10,14,15}. So the wide range of the sectoral distribution emphasizes the importance of specific occupational exposure on dermatitis formation.

In our cases, the complaints firstly appeared in the hands, and this supports the principle of "complaints begin in the area of contact"^{9,10}. On the other hand, when the onset of exposure and the duration of the occurrence of complaints and the symptoms are evaluated, it is seen that responsible factors do not affected by the molecular weight of the active substances. This situation might be related with small sample size and limited information about the materials were used in workplace.

It is expected that allergic sensitization to be associated with other allergic diseases as well as dermatitis¹⁶. In our study, we observed that allergic asthma and/or rhinitis were the most common comorbid conditions of occupational dermatitis. These cases frequently seen in healthcare employees and latex was the most identified responsible allergen. This finding indicates the importance of providing a latex-free working environment¹⁷.

Potassium dichromate, nickel sulfate, cobalt chloride and thiomersal were the most common allergens in studies evaluating agents responsible for occupational dermatitis^{9,10,18-20}. In our results, the most commonly detected allergens were nickel sulfate, potassium dichromate, and thiuram respectively. Nickel sulfate and potassium dichromate are commonly identified as common allergens in different populations in different studies in our society, and this could be the reason for their high potential for dermal sensitization as well as their widespread use²¹.

Regarding risk factors for occupational dermatitis, it was determined that 50% of our cases were working in accordance with the wet job definition. Cases working in wet jobs have a high risk for dermatitis in the presence of atopic dermatitis as a result of the damaged skin barrier. Other factors that increase dermatitis risk besides wet job are known as dry skin, daily and total working hours, type of protective

equipment^{22,23}. In a study assessing the incidence of occupational skin disease in the automobile industry by Yakut et al.²⁴, contact dermatitis was found at a rate of 5.7%, and it was detected higher in cases with atopy story and more than ten years of working experience. There was no significant relationship between occupational dermatitis and other risk factors except for wet work in our study.

Identification of specific allergen causing contact dermatitis is crucial regarding follow-up and treatment processes for the prevention of the contact by the removal from exposure. For this reason, it is essential to identify the exposures of occupational dermatitis in suspected cases and perform specific patch tests containing identified agents^{25,26}. In standard patch test series, it may not always be possible to determine workplace-specific exposures. The limitation of our study is that patch testing, which is the gold standard for dermatitis, cannot be explicitly done in all cases due to the limited knowledge of exposure agents in the different environment. It is not possible to comment on this issue since the purpose of our study was not investigating the diagnostic value of the general test panel. However, the application of the general test panel has also been helpful in establishing a correlation between agents such as nickel, thiuram etc. with occupational disorders.

Study Limitations

The limitations of our study were its retrospective design and small population size because of comprising only the patients who applied to our outpatient clinic. But, we think that our study results can serve awareness of occupational dermatoses and shed light on future studies.

Conclusion

Although, occupational dermatitis is vital among the frequently seen occupational diseases, the diagnostic rate is lower than expected due to lack of importance given to the subject and inadequate examination of the suspected cases. The usage of the patch test, especially the agent-specific patch test, should be disseminated. Identification of the specific agent and elimination of allergen/irritant agents in these cases could prevent undesirable consequences such as treatment resistance, disease-related-job loss, and psychological problems.

Ethics

Ethics Committee Approval: Ethics committee approval was obtained from the Ethics Committee of Dokuz Eylül University Faculty of Medicine (approval number: 2018/07-14).

Informed Consent: Retrospective study.

Peer-review: External and internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: E.A.Ö., A.H.Ç., Concept: E.A.Ö., Design: E.A.Ö., Data Collection or Processing: E.A.Ö., Analysis or Interpretation: E.A.Ö., A.H.Ç., Y.D., Ö.Ö., Literature Search: E.A.Ö., Writing: E.A.Ö., A.H.Ç., Y.D., Ö.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

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