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Evaluation of patch test results in patients with contact dermatitis

Temas dermatitli hastalarda yama testi sonuçlarının değerlendirilmesi

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ABSTRACT

Objectives: Patch test is the most reliable method to diagnose allergic contact dermatitis and to find out the responsible contact allergen. The aim of this retrospective study was to evaluate the patch test results of patients with contact dermatitis in our region.

Materials and methods: One Hundred fifty patients (84 female and 66 male) with contact dermatitis were patch tested with European standard test series. The testing has been standardized by the international Contact Dermatitis Research Group (ICDRG).

Results: A majority of the lesions (36%) were localized on the hands. In 31 female (58,4%) and 21 male (4,6%) patients (a total of 72 patients) there were positive allergic reactions to at least one chemical. Nickel sulphate (13,3%), potassium dichromate (11,3%) and cobalt chloride (8,6%) were the most often allergens reacted.

Conclusion: Nickel sensitivity is more common. Comparing with healthy controls contact sensitization may be more prevalent in patients with contact dermatitis.

Key words: Contact dermatitis, patch test, nickel sulphate

ÖZET

Amaç: Yama testi, allerjik kontakt dermatit tanısını doğrulayan ve kontakt allerjinin sebebini bulmamızı sağlayan en önemli tanısal yöntemdir. Retrospektif olarak yapılan çalışmamızda, bölgemizde kontakt dermatitli hastaların yama testi sonuçlarının değerlendirilmesi amaçlanmıştır.

Gereç ve yöntem: Kontakt dermatit tanısı alan hastaların 84'ü (%56) kadın, 66'sı (%44) erkek, toplam 150 hastaya Avrupa standart test serisi ile yama testi yapıldı. Test, Uluslararası Kontakt Dermatit Araştırma Grubu tarafından standardize edilmiştir.

Bulgular: Lezyonların en sık ellerde (%36) yerleştiği görüldü. 31'i kadın (%58,4), 21'i erkek (%41,6) olmak üzere toplam 72 hastada (%48) bir veya birden fazla maddeye karşı pozitif allerjik reaksiyon elde edildi. En sık reaksiyon saptanan allerjenler ise nikel sülfat (%13,3), potasyum dikromat (%11,3) ve kobalt klorid (%8,6) idi.

Sonuç: Kontakt dermatite nikel hassasiyetinin daha fazla olduğu bulundu. Sağlıklı kontrollerle karşılaştırıldığında kontakt dermatiti hastalarda deri yama testini daha sık görülmüştür.

Anahtar kelimeler: Kontakt dermatit, yama testi, nikel sülfat

INTRODUCTION

Contact dermatitis is a type IV allergic reaction that occurs because of direct contact of both irritant and allergic substances to the skin in persons that have been sensitized before.¹ 3700 chemicals have been reported to cause contact dermatitis. These chemical molecules are generally smaller than 500 daltons and they become allergens by binding on carrier

proteins on Langerhans cells (LH). While allergens that might cause contact dermatitis can vary over time, they can also show geographical and social differences too.^{2,3}

The outset, course and vehemence of contact dermatitis changes depending on the sensitivity of the person. Moreover, certain factors such as the duration and frequency of contact with the allergen, concentration of the substance, previous edema in

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the skin, presence of dermatitis such as purulence, burnt, eczema, varicose ulcer and stasis dermatitis, sweating, alkali nature of the skin, pressure and friction regions, sensitive body parts (eyelids, ear lobes, genital, etc.), occlusion, clothing style and skin dryness affect the outset, course and vehemence of contact dermatitis too.⁴

The patch test that was defined by Jadassohn in 1985 was put into use by Bloch. While applying the patch test that shows the sensitivity of the person against any substance, it is crucial to prepare the contact allergen in the appropriate concentration and carrier, place of test, patch magnitude, provision of occlusion, application duration and evaluation of the test. The differences in application and different evaluations might cause wrong conclusions.⁵ Patch test is a valuable test in respect of both diagnosing allergic contact dermatitis and also preventing the disease and informing the patient by finding the reason.⁶

In our study, we aimed at evaluating the patch test that is applied to the patients that have been diagnosed with contact dermatitis in our polyclinic.

MATERIALS AND METHODS

Totally 150 contact dermatitis patients that applied to our polyclinic between May 2009 and February 2010 and 40 healthy persons were included in this study. All patients submitted their informed consent before participation. Ages, genders, occupations and lesion localizations of patients were noted. All of the patients were applied a standard allergen series consisting of 28 substances (IQ Chamber Manufactured by Chemotechnique Diagnostics Sweden) and patch test.⁷ Test wasn't applied in the presence of active dermatitis, topical corticosteroid in the last week, systemic corticosteroid in the last 4 weeks, immunosuppressive medicine usage and pregnancy. It was prohibited for patients to have shower, sweat or use any kind of medicine during the test. Test place was opened after 48 hours and first evaluations were made after waiting for 30 minutes. Test readings were evaluated and recorded as (-) in no reaction; (+/-) in slight erythema, suspicious reaction; (+) in erythema, infiltration; (++) in erythema, infiltration, papule, vesicle; (+++) erythema, infiltration, bulla according to the criteria of International Contact Dermatitis Research Group (ICDRG) at 48th and 72nd hours.¹ In the event that at least one

positive reaction is detected against a certain substance, patch test was regarded as positive.

RESULTS

Totally, 56% of 150 contact dermatitis patients that participated in the study were female while 44% were male whereas 45% of 40 healthy individuals were female and 55% were male. The age average of contact dermatitis patients were 30,82±14,84 (8-78) years while age average of healthy individuals were 25,82±17,16 (5-69) years. When the occupational groups of the patients are examined, it can be seen that 30% are housewives, 26,6% are students, 14% are farmers, 11,3% are construction workers, 10% are teachers and 4,6% are healthcare personnel.

The distribution of positive ratios in patch test is given in Table 1. In 72 (48%) of one hundred and fifty patients positive reaction against at least one substance in patch test was detected. 41,6% of these seventy two patients were male whereas 58,4% were female. In 7,5% of the control group, positive reaction against at least one substance in patch test was detected. In 72,2% of seventy two positive allergic reactions 1+, In 20,8% 2+, in 1,4% 3+, in 4,2% 4+ and in 1,4% 5+ reactions were detected. Of the patients in which positive reaction was detected against at least 1 substance as a result of patch test, 49,6% were female and 40,4% were male. 43,3% of patients with positive reaction against 2 substances were female while 46,7% were male; 100% of patients with positive reaction against 3 substances were male, 66,7% of patients with positive reaction against 4 substances were female and 33,3% were male and 100% of patients with positive reaction against 5 substances were female.

Table 1. Distribution of positive ratios of patch test in contact dermatitis patients according to genders

Number of Positive Reactions	Total (n=150)	Male (n=66)	Female (n=84)
1+	52	21	31
2+	15	7	8
3+	1	1	-
4+	3	1	2
5+	1	-	1

Localizations of lesions and positivity ratios of patch test are given in Table 2. There was hand involvement in 36% of patients, face involvement in 20,6% of patients, hand-foot involvement in 12,6% of patients, foot involvement in 11,4% of patients, body involvement in 10% of patients and arm-leg involvement in 9,4% of patients. In 48,1% of patients with hand involvement, positivity in patch test was detected. The ratios of positivity are found as follows: in 45,2% of patients with hand involvement, in 57,9% of patients with hand-foot involvement, in 35,3% of patients with foot involvement, 46,6% of patients with body involvement and in 57,1% of patients with arm-leg involvement.

Table 2. Comparison of lesion localizations and patch test positivity ratios in contact dermatitis patients

Localization	Total (n=150)	Patch test positivity
Hand	54	26
Hand-foot	19	11
Arm-leg	14	8
Body	15	7
Foot	17	6
Face	31	14

The substances in our test series and distribution of positive reactions according to genders are summarized in Table 3. The most frequently reaction detected allergens are nickel sulfate and potassium dichromate 11,3% and cobalt 8,6%. The following substances are detected in following ratios in female patients: potassium dichromate 15,1%, nickel sulfate 10,6%, cobalt 12,1% while ratios were found as follows in male patients; nickel sulfate 14,2%, potassium dichromate and cobalt 8,3%.

The positive reaction detected substances in the control group of 40 individuals and their comparison with the study group are shown in Table 4. In the control group, totally 4 positive results were detected as potassium dichromate in 2 cases, PPD in one case and nickel in one case.

Table 3. Distribution of the results of patch test in contact dermatitis patients

Allergens	Total (n=150)	Male (n=66)	Female (n=84)
Potassium dichromate	17	10	7
PPD* Base	10	4	6
Tiuram	4	3	1
Neomycin	3	2	1
Cobalt	13	6	7
Benzokain	3	2	1
Nickel	20	8	12
Clioquinol	-	-	-
Colophony	6	3	3
Paraben	-	-	-
IPPD**	-	-	-
Wool alcohols	4	1	3
Mercapto mix	-	-	-
Epoxy resin	-	-	-
Peru Balsam	4	1	3
4-tert-butylphenol formaldehyde resin	1	-	1
2-merkaptobenzotiasol	3	1	2
Formaldehyde	1	-	1
Fragrance	4	1	3
Sesquiterpence lacton mix	-	-	-
Qaternium 15	-	-	-
2-Metoxyl-6-n-pentil- 4-Benzokinon	-	-	-
Cl+Me+isoiazolinon/ Me+isoiazlolinon	-	-	-
Budesonide	1		1
1,2-Dibromo-2,4- dicyanobutane	-	-	-
Liral	-	-	-
Tixocortol-21-pivalate	3	1	2
Fragrance mix II	1	-	1

* PPD: Para-phenylendiamin, ** IPPD: Isopropylaminodi-phenylamin

Table 4. Comparison of the results of patch test of contact dermatitis patients and control group

Allergen	Study Group (n=150)	Control Group (n=150)	P
Potassium dichromate	14	2	0,154
PPD* Base	27	1	0,67
Tiuram	3	-	
Neomycin	2	-	
Cobalt	11	-	
Benzokain	2	-	
Nickel	17	1	0,112
Colophony	5	-	
Wool alcohols	3	-	
Peru Balsam	3	-	
4-tert-butylphenol formaldehyde resin	1	-	
2-merkaptobenzotiasol	2	-	
Formaldehyde	1	-	
Fragrance	3	-	
Budesonide	1	-	

* PPD: Para-phenylendiamin

DISCUSSION

Patch test has an important place in the diagnosis of contact dermatitis and determination of its cause.^{8,9} Standard test series are formed by bringing together the most frequently encountered allergens. In the standard series of patch tests, there are certain group of allergens that are active in 80% of contact dermatitis.^{8,9}

Neslihan et al. detected positive reaction against at least one substance in 41% of 100 contact dermatitis patients in their patch test.⁶ This ratio was followed by following researchers in relevant ratios: Hogan et al. 89,6%, Kotoğyan et al. 77,9%, Tunalı et al. 73,7%, Sarıcaoğlu et al. 72%, Christophersen et al. 63,5%, Zug et al. 51,2%, Utaş et al. 50%, Demirgüneş et al. 50%, Zhang et al. 47,5%, David et al. 45,8%, Alakloby et al. 3,6%, Su et al. 29,3%.^{1, 3, 4, 10-18} In our study, the positivity ratios against at least one substance in the ratio of 48% in our patch test was found to be in conformity with the literature.

Tunalı et al. found out that housewives came at the first place when they studied the relationship

of contact dermatitis patients with their occupations.⁴ Similar findings were reported by Utaş et al., Sarıcaoğlu et al. and Atakan et al. too.^{1, 10, 19} When the occupations of dermatitis patients were questioned in our study, the first place was taken by the housewives.

Tunalı et al. found out the positivity of an allergen in 44% of patients in which they detected allergic reaction while positive result with more than one substance in 56%.⁴ Sarıcaoğlu et al. detected reaction with single substance in 61% of 72 patients.¹⁰ In our study, at least one allergen positivity was detected in 72,2% of seventy two positive allergic reactions.

Tunalı et al. detected allergic reaction against at least one substance in their patch test in 295 patients with contact dermatitis in 76% of female and 70% of male patients.⁴ Şendür et al. detected positive allergic reaction against more than one substance in 70,7% of female and 29,3% of male patients.⁶ Ballevi et al. detected allergic reaction against at least one substance in 33% of males and 18,7% of females.⁸ In our study, allergic reaction against at least one substance was detected in 58,4% of females and 41,6% of males.

Utaş et al. observed reactions in ratios of 21,6% for nickel sulfate, 9,6% for fragrance mix and 8,8% for cobalt chlorine in their tests containing 23 substances.¹ Tunalı et al. detected the first three substances among 617 allergic reactions as 23% nickel sulfate, 21% potassium dichromate and 11% benzokain.⁴ Sarıcaoğlu et al. detected positive reaction in ratios of 28% nickel sulfate, 15,2% potassium dichromate and 11,8% benzokain in their tests of 24 substances.¹⁰ Hogan et al. observed allergic reaction in the ratios of 17,4% nickel sulfate, 8,7% ethylenediamine and 7,4% formaldehyde in their tests on 20 substances.¹² Kotoğyan et al. detected 9,4% nickel sulfate out of 53 allergic reactions and this was followed by potassium dichromate 30,4% and PPD 19%.¹³ Zhang et al. detected reactions in the ratios of 17,9% potassium dichromate, 13,8% nickel sulfate and 10,6% cobalt chloride in their patch test with 22 substances.¹⁴ Alakloby et al. detected sensitivity in the ratio of 26,7% for nickel sulfate and 11,9% for potassium dichromate on 101 patients.¹⁵ Zug et al. detected positivity in ratios of 28,3% nickel sulfate, 17,9% cobalt chloride, 15,3% thimerosal in their test on 391 contact dermatitis patients.¹⁶ Demirgüneş et

al. detected the nickel sensitization ratio as 24%.¹⁸ Atakan et al. detected sensitivity in ratios of 16,4% for nickel sulfate, 12,97% for fragrance mix and 12,3% for Peru balsam in their patch test for 23 substances.¹⁹ Storrs et al. reported sensitivities against nickel, p-phenylenediamine quaternium-15 and neomycin as a result of the patch test on contact dermatitis patients.²⁰ Rui et al. detected positivity in the ratios of 24,6% for nickel sulfate, 10,2% for cobalt chloride and 8,7% for potassium dichromate.²¹ In other studies, the sensitivity ratio against nickel is reported to be 10-28,3% and it is emphasized to be higher in young ages and females. The other most frequently encountered allergens are reported to be cobalt chloride, potassium dichromate, fragrance mix and Peru balsam.²²⁻²⁷ In our study, the most frequently detected allergens were nickel sulfate with 13,3%, potassium dichromate with 11,3 and 8,6% with cobalt among 28 substances.

The most frequently reaction detected allergens in the patch test of Tunalı et al. were nickel sulfate with 28,3%, potassium dichromate with 16,6%, cobalt chloride with 9,5% in females; and potassium dichromate with 28,8, benzocaine with 15,5 and cobalt chloride with 9% in males.⁴ Balevi et al. detected nickel sensitivity in 24,2% of females and 4,7% of males.⁸ In our study, following ratios were obtained; potassium dichromate 15,1%, nickel sulfate 10,6% and cobalt 12,1 in female patients and nickel sulfate 14,2%, potassium dichromate and cobalt 8,3% in male patients.

In conclusion, nickel sulfate, potassium dichromate and cobalt chloride were detected to cause highest sensitization in the patient group on which patch test was applied. European standard patch test series contain most of the contact allergens that we face frequently every day. For this reason, when allergic contact dermatitis is suspected, it should be tested routinely.

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