

Cosmetic allergic contact dermatitis in facial dermatitis patients at the Institute of Dermatology, Thailand.

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ABSTRACT :

KANNAWAT N, PUANGPET P, TRESUKOSOL P, SAJJACHAREONPONG P. COSMETIC ALLERGIC CONTACT DERMATITIS IN FACIAL DERMATITIS PATIENTS AT THE INSTITUTE OF DERMATOLOGY, THAILAND. THAI J DERMATOL 2011; 27: 236-246.

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Background: The face is a common site for contact dermatitis comprising 6 to 10 percent of dermatologic patient in the US. At the institute of Dermatology, thirteen percent of patients who was patch testing has facial dermatitis. Cosmetics are believed to be one of the common causes of facial dermatitis. A study about prevalence of allergic contact dermatitis (ACD) from cosmetic in patients presenting with facial dermatitis had not been conducted in Thailand.

Objective: To determine the prevalence of allergic contact dermatitis and frequently positive patch test allergens in facial dermatitis patients.

Methods: During a 2-year period, facial dermatitis patients suspected allergic contact dermatitis were sent for patch testing. Patch testing with the European baseline series, cosmetic series, ammoniated mercury, toluene sulfonamide formaldehyde resin, thimerosal, cocamidopropylbetaine and personal care products was performed in each patient.

Results: A total of 76 (F=69, M=7) cases of facial dermatitis were included. Twenty three patients showed positive reaction to European baseline series alone. When we added patch testing with cosmetic series, number of patient with positive reaction increased to 28. Nevertheless patch testing with standard, cosmetic series and personal own products show positive reaction in 39 patients (51.3%). The most frequent relevant allergens is nickel (33.33%) and ammoniated mercury (8.64%) followed by fragrance mixed I (6.17%) and *Myroxylon pereirae* (4.94%).

Conclusion: The prevalence of allergic contact dermatitis in facial dermatitis patients is high (51.3%). Nickel and ammoniated mercury are the most common allergens causing facial allergic dermatitis. Patch testing with cosmetic series and substances supplied by the patient are an effective means to identify culprit allergens that might have been missed with only baseline patch test series (p value< 0.01).

Keywords: cosmetic, allergic contact dermatitis, facial dermatitis, prevalence

บทคัดย่อ :

ณัฐชา กรรณวัฒน์ ไพธิน พวงเพชร พุกกลิ่น ตรีตุโกศล ประณีต สัจจเจริญพงศ์ ผื่นแพ้สัมผัสจากเครื่องสำอางในผู้ป่วยผื่นผิวหนังอักเสบที่ใบหน้าของสถาบันโรคผิวหนัง ประเทศไทย วารสารโรคผิวหนัง 2554; 27: 236-246.

สถาบันโรคผิวหนัง กรมการแพทย์ กระทรวงสาธารณสุข

โรคผื่นแพ้สัมผัสที่ใบหน้าเป็นการอักเสบของผิวหนังชนิดหนึ่งที่พบได้บ่อย ซึ่งพบร้อยละ 6-10 ของผู้ป่วยโรคผิวหนังในประเทศสหรัฐอเมริกา¹ และพบเป็นร้อยละ 13 ของผู้ป่วยที่ส่งมาทำการทดสอบโดยการแปะสารทดสอบที่ผิวหนัง (patch testing) ในสถาบันโรคผิวหนัง ถึงแม้เครื่องสำอางจะเป็นสาเหตุหนึ่งที่พบบ่อยของผื่นผิวหนังอักเสบที่ใบหน้า แต่ยังไม่มีการศึกษาวิจัยในประเทศไทย

วัตถุประสงค์: เพื่อศึกษาความชุกของการเกิดผื่นแพ้สัมผัสจากเครื่องสำอางที่ใบหน้า และศึกษาสารก่อภูมิแพ้ที่เป็นสาเหตุ

วิธีการศึกษา: ทำการศึกษาในผู้ป่วยที่มาตรวจที่แผนกผู้ป่วยนอก สถาบันโรคผิวหนัง ด้วยเรื่องผื่นผิวหนังอักเสบที่หน้ารายใหม่ เป็นเวลา 2 ปี โดยผู้ป่วยทุกรายได้รับทำการทดสอบโดยการแปะสารทดสอบที่ผิวหนัง (patch testing) ด้วยสารตรวจมาตรฐาน (European baseline series) 21 สาร และชุดเครื่องสำอาง 22 สาร รวมทั้งผลิตภัณฑ์ที่ผู้ป่วยใช้ในช่วงมีผื่น

ผลการศึกษา: จำนวนผู้ป่วยทั้งหมด 76 ราย เป็นหญิง 69 ราย และชาย 7 ราย ผลการทำการทดสอบ patch testing ด้วยการทดสอบกับ สารในชุดมาตรฐานเพียงอย่างเดียวพบว่า มีผลบวกเป็นจำนวน 23 ราย ซึ่งเมื่อทำการทดสอบเพิ่มเติมด้วยชุดเครื่องสำอาง จะมีผลบวกเพิ่มขึ้นเป็น 28 ราย และเมื่อทำการทดสอบเพิ่มด้วยชุดเครื่องสำอางและผลิตภัณฑ์ของผู้ป่วย จะมีผลบวกเพิ่มขึ้นเป็น 39 ราย (ร้อยละ 51.3) โดยสารที่ให้ผลบวกบ่อยที่สุดคือ nickel (ร้อยละ 33.33) รองลงมาเป็น ammoniated mercury (ร้อยละ 8.64) fragrance mixed I (ร้อยละ 6.17) และ *Myroxylon pereirae* (ร้อยละ 4.94) ตามลำดับ

สรุปผล: ผู้ป่วยที่มีผื่นผิวหนังอักเสบที่ใบหน้า ให้ผลบวกจากการทำทดสอบ patch testing ร้อยละ 51.3 สารที่ให้ผลบวกจากการทำทดสอบบ่งชี้ที่สุดคือ nickel รองลงมาเป็น ammoniated mercury และการทำ patch testing สารมาตรฐาน 21 สารร่วมกับ ชุดเครื่องสำอาง และผลิตภัณฑ์ของผู้ป่วยทุกราย ได้ผลบวกมากกว่าการทำการทดสอบด้วยสารมาตรฐานเพียงอย่างเดียวโดยมีนัยสำคัญทางสถิติ (p value < 0.01)

คำสำคัญ: เครื่องสำอาง, ผื่นแพ้สัมผัส, ผื่นผิวหนังอักเสบที่ใบหน้า, อุบัติการณ์

Background

Allergic contact dermatitis (ACD) is a common dermatologic disease comprising 6 to 10 percent of dermatologic patients in the US.¹ The prevalence study of allergic contact dermatitis in Thailand showing that the most frequent allergen was potassium dichromate followed by nickel sulfate, fragrance mix and cobalt chloride.² However, this study was not dedicated to facial location. Besides hand, face is the second most common site (13 percent) in patients who were sent for patch testing at the Institute of dermatology. Prevalence of allergic contact dermatitis of the face is difficult to establish because not all patients presenting with facial dermatitis was patched test. Previous study in the US in facial dermatitis patients had shown that final diagnoses after patch testing was relatively equally distributed among three categories: 1) ACD, 2) ACD with other contributing factors and 3) other eczema.³

Materials and methods

This is a prospective and descriptive study to determine the prevalence of allergic contact dermatitis and frequently of positive patch test allergens in facial dermatitis patients. During a 2-year period from October 2008 to September 2010, facial dermatitis patients suspected of having allergic contact dermatitis were included. Approval for this prospective study was obtained from the institutional review board and ethic committee. Consent form was also required. Inclusion criteria are age between 18 to 65 years, eczematous lesions distribute only on the face, negative KOH test for fungal infection or demodicosis, suspicious history of allergic contact dermatitis. Exclusion criteria are patient diagnosed with atopic dermatitis or seborrheic dermatitis, history of photoallergy, taking prednisolone more than 20 mg/day or other immunosuppressive drugs, pregnancy or lactation, patient with acute eczema, status eczematicus and history of anaphylaxis, Table 1.

Table 1 Inclusion and exclusion criteria

Inclusion criteria
1. Age between 18 to 65 years
2. Eczema located only on the face
3. Suspected allergic contact dermatitis
4. Negative KOH test for fungal infection or demodex
Exclusion criteria
1. Patient diagnosed with atopic dermatitis or seborrheic dermatitis
2. Suspicious history of photoallergy
3. Taking prednisolone more than 20 mg/day or other immunosuppressive drugs
4. Pregnancy or lactation
5. Patient with acute eczema, status eczematicus
6. History of anaphylaxis

Patch tests were performed with the European baseline and cosmetic series, ammoniated mercury, toluene sulfonamide formaldehyde resin, thimerosal and Cocamidopropylbetaine. Suspicious products were also carried out e.g. personal care products, sunscreens, perfume and topical medications.

The substances to be tested were applied by Finn chambers (Epitest Ltd Oy, Tuusula, Finland) on Scanpor tape (Norgesplaster, Aksjeselskap, Vennesia, Norway) on the patients' upper back. Personal products tested by leave-on methods had same concentration as is applied but for rinse-off products, concentration was

kept around 1-2% in aqueous solution. The tests were read at 48 hours and 96 hours by dermatologist.

Patch testing results were reported according to Contact Dermatitis Research Group. Interpretation of current relevance was determined by history of confirmed or strongly exposure to products containing the allergen.

The clinical data recorded on each patients were age, sex, onset, site of lesions, morphology of eczema, previous treatment, atopy and history of allergic contact dermatitis.

In patients with positive patch testing to nickel, number of patients wearing glasses was collected and

dimethylglyoxime spot test was done on metal objects in some cases.

Data analysis

Descriptive analyses including percentage and means. Comparison between standard series only and standard plus cosmetic series are analyzed using *Chi* square test.

Result

One hundred and five cases of patients suspected for facial dermatitis were sent for enrollment but only 76 met inclusion criteria (10 patients had atopic dermatitis, 17 patients had seborrheic dermatitis and 2 patients had severe acute eczema). Mean age of patients evaluated in this study was 34.61 years (range 19-58 years). Most of the patients were female (n=69). Duration of the dermatitis ranges from less than 1

month to 10 years, most of them are less than 1 month. Of these 27 patients had home treatment prior to study including topical steroid, oral antihistamine and over the counter products. Fourteen patients had history of atopy or previous allergy. One patient has history of asthma and 6 patients had history of allergic rhinitis. Six had history of previous allergy to cosmetic products and 1 to jewelry. All patients had history of allergen contact including facial product in 61 patients, cleanser in 6 patients, 3 each for skin care and fragrance, 2 patients for hair product and 1 patient for nail product. Most common morphology of eczema are scales (94.74 %), other manifestation are oozing (2.63%) and vesicle (2.63%) (table 2). Thirty-nine patients (51.3%) showed positive reaction to one or more substance (table3).

Table 2 Demographic

Age		N
18-30		29
31-40		36
41-50		7
51-65		4
Total		76
Sex		
Male		Female
7 (9.2%)		69 (90.8%)

Onset	Total(N=76)	P- Value
< 1 month	29	0.36 ^a
1 month- 1year	24	
1- 6 years	17	
6 - 10 years	6	
Home treatment	N	%
Topical steroid	5	18.51
Oral Antihistamine	12	44.44
Over counter product	10	37.03
Total	27	100

Table 2 Demographic

Previous Allergy	N	%
History of atopy		
Asthma	1	7.14
Allegic rhinitis	6	42.86
History of previous contact eczema		
Cosmetic	4	28.57
Sunscreen	2	14.28
Jewelry	1	7.14
Medication	0	0
Total	14	100
History of contact allergen	N	%
Skin care	3	3.95
Hair	2	2.63
Facial product	61	80.26
Nail	1	1.31
Fragrance	3	3.95
Cleanser	6	7.89
Total	76	100

Morphology of eczema	N	%
Oozing	2	2.63
Vesicle	2	2.63
Scale	72	94.74
Crust	0	0
Lichenification	0	0
Total	76	100

Table 3 Number of patients who had at least one positive patch test reaction

Sex	Positive	Negative	Total(%)
Female	37	32	69(90.8)
Male	2	5	7(9.2)
Total	39	37	76

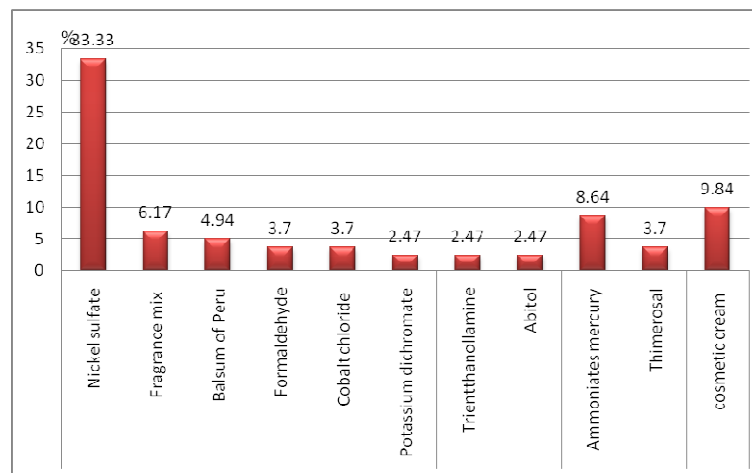


Figure 1 Allergens associated with facial allergic contact dermatitis

Patients who were diagnosed as ACD, The most frequent relevant allergens is nickel (33.33 %), followed by personal care product (9.84%), ammoniated mercury (8.64 %), fragrance mixed I (6.17%), *Myroxylon pereirae* (4.94%) and thimerosal

(3.7%) (figure1). Other allergens that positive patch testing in 1 patient (1.2%) are kathon CG, wool alcohols, colophony, quaternium -15, Amerchol L 101, Phenyl salicylate, Propolis, cinnamic aldehyde, cinnamic alcohol, ylang-ylang, butyl metacrylate,

benzoyl peroxide and acne cream. In 25 patients who had positive patch testing to nickel, Dimethylglyoxime (DMG) spot test was done on cell phone and showed positive results in 2 of 25 patients. Fifteen of 25 nickel positive patients had history of wearing glasses. All 7 patients with ammoniated mercury sensitivity had history of using whitening cream.

Comparing with baseline series alone, when we added cosmetic series, ammoniated mercury, toluene sulfonamide formaldehyde resin, thimerosal and

cocamidopropylbetaine it could detect 5 more patients with positive results (from 23 to 28). If cosmetic, ammoniated mercury, toluene sulfonamide formaldehyde resin, thimerosal, cocamidopropylbetaine and personal care products are added, 16 more positive results (from 23 to 39) could be demonstrated. When comparing baseline series with baseline series plus cosmetic series, there is a significant difference ($p < 0.01$) in sensitivity of patch testing (table 4).

Table 4 Positive results by using standard patch test with additional cosmetic and own product.

Test	Number of patients with positive reaction	P value*
1. Baseline series alone	23	< 0.001
2. Baseline plus Cosmetic series, ammoniated mercury, toluene sulfonamide formaldehyde resin, thimerosal and cocamidopropylbetaine	28	< 0.001
3. Baseline plus Cosmetic series, ammoniated mercury, toluene sulfonamide formaldehyde resin, thimerosal, cocamidopropylbetaine plus personal care products.	39	< 0.001

*Cochran Q Test between 3 product series

Discussion

In our institute, chronic facial dermatitis is one of the most common disease reported, making up approximately 6-10% of out patient cases. However, it is sometime difficult to diagnose and manage, partly because of the frequent use of topical skin care product that may aggravate inflamed skin. Of the allergens causing ACD, nickel is the most common relevant allergen especially in women. Common sites of nickel

sensitivity are hands, ears and the temples, as reported in the US and Belgium.^{4,5} Mercury are less added as a component for topical medicaments nowadays so sensitivity to mercury had decreased due to less contact frequency⁶

In this study, of the 76 patients diagnosed with facial dermatitis, 39 patients (51.3%) were found having positive patch testing result. Nickel and personal care product were the two most common allergens for

facial ACD followed by ammoniated mercury, fragrance mixed I, colophony, thimerosal and formaldehyde resin. These results are slightly difference from study done in Taiwan⁷ which showed that the most common allergens were nickel, ammoniated mercury, cobalt chloride and formaldehyde resin. In contrast to our study, a study in United Kingdom showed that the most common allergens were personal care products, preservative and fragrance mixed.³ A study in China showed that paraphenylenediamine, fragrance mixed and nickel sulfate were the 3 most common causes for facial ACD.⁸ The difference probably due to geographic difference, race and products used in each country.

Our hypotheses for source of nickel in these patients are 1) patients' own product 2) metal spectacle frame and 3) cell phone parts. Nickel is reported to cause facial dermatitis in eye shadow⁹, eye pencil¹⁰, and cosmetic.¹¹ Further study to analyze cosmetic compositions should be carried out to screen for nickel and mercury in the patient's own cosmetic product. Classically, patients diagnosed with facial dermatitis from metal spectacle frames should present with eczema at contact sites such as nose, temple, forehead and ears but a study in China had showed that spectacle-frame dermatitis can also present with eczematous lesions diffusely over the face.⁶ This is due to low nose ridge results in poorly fit spectacle frame. Excessive sweating (especially in tropical climate like Thailand) could dissolve nickel spectacle and spread to

other areas of the face. Also, spectacle-frame dermatitis could be misdiagnosed if patient had visited the clinic without wearing glasses.

Ammoniated mercury was the third most common allergens for facial ACD in our study. In Thailand, the main exposure to ammoniated mercury was probably from skin whitening cream bought from flea market. Mercury is prohibit by Thai Food and Drug Administration (Thai FDA) in cosmetics but are still illegally sold because of cheap price and its good short term result.

Fragrance mix I and myroxylon pereirae were the fourth and fifth common allergens in our study. Fragrance was a frequent cause of cosmetic-related allergic reactions in our study but were demonstrated to be the most common causes for cosmetic-related allergic reactions in United Kingdom¹², Europe¹³ and India.¹⁴ A new fragrance mix, fragrance mix II, has been shown to have a lower number of false positive reactions and to detect additional patients sensitive to fragrances missed by the original fragrance mix I.¹¹ Fragrance mix II was not tested in this study.

Thimerosal was reported to be the sixth frequent allergen having positive patch testing result. However, according to previous study¹⁵, thimerosal is frequent positive but often clinically irrelevant. Thimerosal is used in antiseptic and preservative. The main responsible compound in is ethylmercury chloride (EtHgCl). Cross-reaction with methylmercury chloride (MeHgCl) was demonstrated in previous study¹⁶ since

EtHgCl and MeHgCl are similar in structure. Subjects reacting to thimerosal or EtHgCl does not give constantly positive reactions to other organomercury compounds such as mersalyl acid, p-amino-phenylmercuric acid, mercury acetate and methyl mercury chloride.¹⁷ In our study, all patients with positive reaction to thimerosal also have positive reaction to mercury while not all patients with positive reaction to mercury have positive reaction to thimerosal.

Formaldehyde was reported to be the sixth frequent relevant allergen in our study but infrequent reported in Belgium¹⁸ and United Kingdom.¹⁹ This could be due to formaldehyde are commonly used as preservative in Thailand. These substances are use for preventing overgrowth of microorganisms in cosmetic products. Other frequently used antimicrobial preservatives in cosmetics and toiletries are paraben esters followed by imidazolidinyl urea, quaternium-15, formaldehyde, and isothiazolinones²⁰

Conclusion

Nickel, personal own products and ammoniated mercury are the most common allergens causing facial allergic dermatitis in our study. Unfortunately further investigation for source of these substances could not be done. Patch testing with cosmetic series and substances supplied by the patient are an effective means of identifying contact allergens that might otherwise could be missed with only standard patch testing.

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