Result of Standard Patch Test in Patients Suspected of Having Allergic Contact Dermatitis

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Contact dermatitis is a common skin disease. Disease was diagnosed by a history of contact substance together with geographic distribution of lesion. Up till now, standard patch test is one of the most reliable test to identify and confirm causative agent of allergic contact dermatitis. To determine the rate of positive standard patch test and to identify the common allergen of contact dermatitis in Thailand, we performed the standard patch test in 129 patients, suspected having allergic contact dermatitis at Department of Dermatology, King Chulalongkorn Memorial Hospital, Thailand from June1, 2003 to September 1, 2004. The rate of positive standard patch test is 59.7% (n=77/129). The most 3 common positive allergens were nickel sulfate (18.60%), cobalt chloride (17.05%) and fragrance mix (14.73%), respectively. The chance of positive standard patch test significantly correlated with sex (woman), initial diagnosis as contact dermatitis and history of house-worker (p=0.017, p=0.005 and p=0.023, respectively). Whereas, there were no significant correlation between the chance of positive standard patch test and age of patient, location of lesion, history of recurrence, history of atopy, history of drug and food allergy. In addition, history of metal allergy significantly correlated with the chance of positive nickel sulfate or cobalt chloride in standard patch test (p=0.017). In conclusion, this study demonstrated the prevalence of causative allergen of contact dermatitis in Thai patients using that standard patch test. Moreover, our data shown that the chance positive standard patch test was greater in patient, who were women or initial diagnosed as contact dermatitis or had history of house-worker or history of metal allergy.

Keywords: *Contact dermatitis, Standard patch test, Allergen*

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Contact dermatitis is a common inflammatory skin disease, comprising 6 to 10% of all dermatology clinic visits[7]. The incidence and severity of the disease were higher in females than males[11]. It could affect the newborn as early as 1 week-old. However, it usually occurs in children older than 6 months. A previous report at Siriraj Hospital, Thailand revealed that the incidence of contact dermatitis in children less than 13 years was 4.9%[16]. Nonetheless, contact dermatitis has been estimated to represent 20% of all types of dermatitis in children in some countries[5]. Besides, contact dermatitis accounts for 85-95% of occupational skin diseases[9].

Disease caused by direct skin exposure to an offending substance. The mechanism of the disease can be either allergic or irritant. Whereas, allergic contact dermatitis is a disease mediated through immune mechanisms, irritant contact dermatitis is an inflammatory skin reaction caused by a substance that results in direct cellular injury upon skin contact. Patients with contact dermatitis usually come with eczematous skin lesion the same as eczematous dermatitis of other etiologies. The most reliable clinical clues for diagnosis are geographic distribution of the lesion and history of contact agent[2,6]. However, clinical distinction between allergic contact dermatitis, irritant contact dermatitis and eczema of other etiology can be troublesome[3]. To date, there are various therapeutic approaches of disease including topical and systemic corticosteroids,

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antihistamine, immunosuppressive drugs and UV radiation. The hint for treatment and prevention of disease is avoidance of the offending substance which is sometimes difficult to find out only by history taking and physical examination. Patch testing allows the physician to discover the causative agent rapidly, which results in early treatment and the prevention of chronic disease[13,14]. Moreover,the patch test enables investigators to monitor trends in the rate of causing agents in their communities. The aim of this study was to determine the rate of positive standard patch test, trends of common causative agents in Thailand and determine whether any clinical clue correlated with the rate of the positive standard patch test.

Material and Method

This study was conducted from June1, 2003 to September 1, 2004 at the Out-patient-clinic, Department of Dermatology King Chulalongkorn Memorial Hospital. One-hundred and twenty nine patients suspected of having allergic contact dermatitis by a dermatologist, were included in this study. Patients were excluded if they had applied topical corticosteroids at the test site within 2 weeks; taken systemic corticosteroid more than 20mg/day or other immunosuppressive drugs within 2 weeks or the skin at test site was abnormal. All patients were patch tested using Finn Chambers (Epitest Ltd Oy, Tuusula, Finland) on Scanpor tape (Norgesplaster Aksjeselskap, Vennesia, Norway) which were applied on the upper back[10,15]. The patch test was removed after 48 hours and the test sites were evaluated at that time and again 72 hours after initial placement. The result of the patch test was interpreted as negative or positive and grading the positive results on quantitative scale according to the recommendation of the International Contact Dermatitis Research Group as follows[6].

? Doubtful: faint macular erythema only

+ Weak (no vesicular) positive reaction: erythema, infiltration possibly papules

++ Strong (vesicular) positive reaction: erythema, infiltration papules vesicles

+++ Extreme positive reaction: bullous reaction

- Negative reaction

IR Irritation reaction of different type

NT Not tested

The data was analyzed by using descriptive statistic and the correlation was analyzed using Pearson's chi-square test. The significant level was taken as $P<0.05$.

Result

Patient demographics are described in Table 1 and 2. Of the 129 patients were recruited in this study, women comprised the majority of the total patient population (n=94/129). The average age for the 129 patients was 39.63 years. The average ages of men and women were 46±13 and 37±14 respectively. The youngest patient was 12 year-old and the oldest patient was 93 year-old. The 3 most common dermatitis

Table 1. Demographic data for the patients evaluated standard patch test

	Man (n=35)	Woman (n=94)	Total (n=129)
Average age(yrs)	46	37	39.63
Minimun age(yrs)	21	12	12
Maximun age(yrs)	74	93	93
Standard deviation	13	14	14.535

Table 2. Distribution of Dermatitis of the patients evaluated standard patch test

Dermatitis site	Man (n=35)	Woman (n=94)	Total (n=129)
Hands and feet	19	41	60 (46.51%)
Neck	3	4	7 (5.43%)
Lips	1	8	9 (6.98%)
Face	1	8	9 (6.98%)
Trunk	2	6	8 (6.2%)
Extremities	4	18	22 (17.05%)
Generalized/scattered	6	6	12 (9.30%)

sites were hands and feet (46.51%), extremities (17.05%) and generalized/scattered (9.3%), respectively. Women seemed to have dermatitis on the face, lips and trunk more frequetly than men.The number of patients,who had the initial diagnosis as contact dermatitis by history and clinical manifestation, was 58(44.96%). Other diagnosis were eczema of hands and feet (n=34/129) and unclassified eczema (n=33/129) (Table 3).

The number of patients positive for least 1 allergen in the standard patch test was 77(59.7%) The top 5 commonly encountered allergens were nickel sulfate (18.60%), cobalt chloride (17.05%), fragrance mix (14.73%), thimerosal (13.95%) and potassium dichromate (11.63%), respectively (Table 4). There was no

Table 3. Diagnosis of the patients evaluated standard patch test

Initial diagnosis	Man (n=35)	Woman (n=94)	Total (n=129)
Contact dermatitis	13	48	61
Eczema of hands and feet	10	24	34
Unclassified eczema	12	22	33

Table 4. Patch test results of the patients evaluated standard patch test

Allergen	negative	1+	2+	3+	?	not test	% positive
potassium dichromate	113	9	6		1		11.63
neomycin sulfate	123	2	4				4.65
thiuram mix	125	2	2				3.10
4-phenylenediamine	127	1	1				1.55
formaldehyde	125	2	2				3.1
colophony	124	1	4				3.88
balsum of peru	115	8	5	1			10.85
wool alcohol	124	3	1		1		3.1
Mercaptomix	124	2	2	1			3.88
epoxy resin	127		2				1.55
4-tert-butylphenol	128	1					0.78
fragrance mix	110	7	11	1			14.73
nickel sulfate	101	10	13	1	4		18.60
mecaptobenzothiazole	125	1	2	1			3.1
budesonide	128		1				0.78
quaternium-15	129						0
Cl+me-isothiazolinone	129						0
imidazolidinylurea	127	2					1.55
tixocortol	129						0
1,2-dibromo	125	3			1		3.1
Cobalt choloride	104	12	9	1	2		17.05
benzocaine	126	1	2				2.33
clioquinol	125	2	1				2.33
paraben	121	6	1		1		5.43
primin	127	2					1.55
ethylenediamine	127	2					1.55
urushiol	110	2	2		1	14	3.1
thimerosal	110	5	11	2	1		13.95
sequiterpene lactone	127	2					1.55
hydrocortisone	128				1		0
diazolidinylurea	128		1				0.78
cetylsteraryl alc	127	2					1.55
toluenesulfonamide	128				1		0
Propylene glycol	128				1		0
vaseline	128	1					0.78

significant correlation between dermatitis site and the result of the patch test (data not shown). However, women had a significantly higher chance of positive standard patch test than men (p=0.017) (Table 5). This study shows that the chance of positive patch test was significantly correlated with this history of house-worker and patient's initial diagnosis (p=0.005 and p= 0.023, respectively) (Table 6, 7). Furthermore, patients with a history of metal allergy had significantly frequent positive standard patch test with nickel sulfate and/or cobalt chloride compared to patients without a history of metal allergy (p=0.017) (Table 8). There was no statistical significance in correlation between the chance of positive patch test and age of the patient, location of the lesions, history of atopy, drug and food allergy and history of recurrence of disease (data not shown).

Discussion

The result of our study showed that, women were suspected of having allergic contact dermatitis more often than men. This was similar to previous reports from a variety of countries[8,11]. Females seemed to have dermatitis on the face and lips more frequently than males which may result from cosmetic exposure. The allergens commonly positive in this study such as nickel sulfate and fragrance mix, appear to be similar to other previous studies[1,12]. However, the common allergens are not totally equivalent to previous published reports from other countries.The north American Contact Dermatitis group reported the top 5 allergens in a study from 2001-2002, to be nickel sulfate (16.7%), neomycin (11.6%), balsam of Peru (11.6%), fragrance mix (10.4%) and thimerosal (10.2%)[12]. Akyol A, et al, reported the most common allergens in Turkey, were

Table 5. Patch test results evaluated standard patch test: compared between male and female patients

Sex	Result of test		Total
	negative	positive	
Man	20	15	35
Woman	32	62	94
Total	52	77	129

p=0.017

Table 6. Patch test results evaluated standard patch test: compared between patients with and without history of cleansing work

History of house-worker	Result of test		Total
	negative	positive	
History of house-worker	20	49	69
No history of house-worker	32	28	60
Total	52	77	129

p=0.005

Table 7. Patch test results evaluated standard patch test: correlated with initial diagnosis

Diagnosis	Result of test		Total
	negative	positive	
contact dermatitis	17	44	61
eczema of hands and feet	17	17	34
other eczema	18	16	34
Total	52	77	129

p=0.023

Table 8. Patch test results of nickel sulfate or cobalt evaluated by standard patch test: compared between patients with and without history of metal allergy

History of metal allergy	Result of test		Total
	negative	positive	
History of metal allergy	22	20	42
No history of metal allergy	64	23	87
Total	86	43	129

p=0.017

nickel (17.6%), cobalt chloride (5.3%), potassium dichromate (4.6%), neomycin (2.4%), fragrance mix (2.1%) and balsam of Peru (2.1%)[1]. Krob HA, et al., reported the meta-analysis of 15 years of MEDLINE database for all publications from 1966 to 2000 using the standard patch test (T.R.U.E test). This study established that the 5 most prevalent allergens were nickel (14.7%), thimerosal (5.0%), cobalt (4.8%), fragrance mix (3.4%) and balsam of Peru (3.0%)[7]. The difference in trend of positive allergen in many reports may result from the difference in ethnic and the chance to be exposed the certain allergens. Deleo VA, et al, demonstrated that Black patients exhibited higher rates of positive patch test to para-phenylenediamine, cobalt chloride, thioureas, and p-tert-butylphenol formaldehyde resin than white patients[4].

Our data demonstrated that the patient who was a woman or has a history of being a house-worker, will have a greater chance in the positive standard patch test. It is possible that women are more frequently than men to contact allergens such as cosmetic substances. In addition, house-workers seem to have a high possibility to contact chemical substances used in their work. Furthermore, patients with a history of metal allergy have significantly increased chances of positive nickel sulfate or cobalt chloride in the standard patch test. This data reflected that history of metal allergy should be reliable indicator for nickel or cobalt allergy. Since, allergic contact dermatitis is sometime difficult to distinguish from irritant contact dermatitis. Our study did not subgroup patients who were diagnosed as contact dermatitis into irritant contact dermatitis or allergic contact dermatitis. Although, the patch test is the reliable method to find out the allergen causing allergic contact dermatitis, but not in irritant contact dermatitis. The rate of positive standard patch test in patients initially diagnosed as contact dermatitis in the present study was high (72.13%, n=44/61). Moreover, there was significant correlation between the rate of positive standard patch test in patients initially diagnosed as contact dermatitis. Thus, if patients are woman or house-workers, or have a history of metal allergy, dermatologists should test the patient with the standard patch test to find or confirm the causative agent.

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ผลการทดสอบ patch test ชนิดมาตรฐานในผู้ป่วยที่คาดว่าเป็นผื่นผิวหนังอักเสบจากสารสัมผัส

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โรคผื่นผิวหนังอักเสบที่เกิดจากสารสัมผัสเป็นโรคผิวหนังที่พบได้บ่อยในเวชปฏิบัติโรคผิวหนัง การวินิจฉัยโรคทำได้โดยการซักประวัติ ตรวจร่างกาย โดยดูลักษณะผื่น ตำแหน่งและการกระจายของผื่น ในปัจจุบันการตรวจทดสอบโดย patch test ชนิดมาตรฐานจัดเป็นการทดสอบที่ได้รับการยอมรับว่าช่วยในการวินิจฉัยโรคผื่นผิวหนังอักเสบจากสารสัมผัสและยังสามารถช่วยหาสารก่อภูมิแพ้ที่เป็นสาเหตุของโรคตลอดจนช่วยยืนยันว่าสารนั้นเป็นสาเหตุของการเกิดโรคจริง จากการทดสอบ patch testชนิดมาตรฐานที่โรงพยาบาลจุฬาลงกรณ์ตั้งแต่ 1 มิถุนายน พ.ศ. 2546 ถึง 1 กันยายน พ.ศ. 2547 ในผู้ป่วยที่คาดว่าเป็นโรคผื่นผิวหนังอักเสบจากสารสัมผัสจากประวัติและอาการแสดงทางคลินิก จำนวน 129 คน เป็นเพศชาย 35 คน เพศหญิง 94 คน พบว่าอัตราการให้ผลบวก patch test ชนิดมาตรฐาน ของสารที่ทำการทดสอบอย่างน้อย 1 ชนิดคิดเป็นร้อยละ 59.7 (77 คน) โดยสารก่อภูมิแพ้ ที่เป็นสาเหตุมากที่สุด 3 ลำดับแรกคือ 1. nickel sulfate พบร้อยละ 17.7 (29 คน) 2. cobalt chloride พบร้อยละ 17.05 (22คน) และ 3. fragrance mix พบร้อยละ 14.73 (19 คน) พบว่า เพศหญิง ประวัติการทำงานบ้าน และผู้ป่วยที่ได้รับการวินิจฉัยเบื้องต้นว่าเป็นผื่นอักเสบจากสารสัมผัสมีความสัมพันธ์กับโอกาสให้ผลบวกต่อการทดสอบโดย patch test ชนิดมาตรฐานอย่างมีนัยสำคัญทางสถิติ (p=0.017, p=0.05 และ p=0.023 ตามลำดับ) แต่อายุ และตำแหน่งของผื่น การกลับเป็นใหม่ของโรค ประวัติ atopy ประวัติแพ้อาหารและยา ไม่มีความสัมพันธ์ อย่างมีนัยสำคัญทางสถิติกับการให้ผลบวกต่อการทดสอบด้วย patch test ชนิดมาตรฐาน นอกจากนี้ประวัติการแพ้ โลหะมีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับการให้ผลบวกต่อ nickel sulfate หรือ cobalt chloride ในการทดสอบ patch test ชนิดมาตรฐานอีกด้วย (p=0.017) โดยสรุปการศึกษาในครั้งนี้แสดงความชุกของสารที่อาจเป็นสาเหตุของโรคผื่นแพ้จากสารสัมผัสในประชากรไทยโดยการใช้ patch test ชนิดมาตรฐานนอกจากนี้ผลการทดลองยังแสดงให้เห็นว่าโอกาสการให้ผลบวกต่อ patch test ชนิดมาตรฐานสูงขึ้นในผู้ป่วยที่สงสัยว่ามีผื่นผิวหนังอักเสบจากสารสัมผัสที่เป็นเพศหญิง ผู้ป่วยที่มีประวัติการทำงานบ้าน หรือผู้ป่วยที่มีประวัติแพ้โลหะอีกด้วย