

# Contact dermatitis at pediatric age. Clinical and etiological characteristics of population registered at the REVAC-GEIDAC network in Spain, between 2004-2014

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## BACKGROUND

Contact Dermatitis in children shows an increased interest in terms of epidemiology, diagnosis and management. Some general considerations must be taken into account (**Figure 1**). (1) An increase incidence was described in Italy, 9,3% to 10,8% from 2006 to 2012. (2) The prevalence of positive patch test reactions and allergic contact dermatitis increased in Denmark from 26.6 to 95.6% in the last 10 years in selected groups of children, with an associate relevance of 51.7 to 100%. (3) Children must be patch tested when there is a formal suspicious of acute or chronic contact dermatitis or when other types of chronic eczema as e.g. atopic dermatitis not improve with the treatment. Depending on the location of eczema may issue a suspected allergen involved. (**Figure 2**)(4) Multiple studies have evaluated different types of contact allergens in pediatric population. At least three were conducted in Spain; Camarasa (1983, n= 100) (5), Romaguera (1985, n=1023), (6) Sevilla (1994, n=272)(7). REVAC means “Red de Vigilancia de Alergia de Contacto” belongs to the GEIDAC and report to the ESSCA (European Surveillance for Contact Allergy).

Figure 1. General considerations CDCh

Children are sensitized as easily as adults  
Children have less time to develop sensitivities  
Increase epidermal absorption rate  
Contact dermatitis is less common than in adults  
Rates of contact sensitization have increased  
Repercussion in daily life  
Desitions regarding occupation in adults

Figure 2. Clinical Patterns CDCh

Patterns of dermatitis	Suspected allergens
Facial dermatitis	Cosmetics ingredients: fragrances, preservatives, and medicaments
Chronic otitis externa	Medicaments
Cheilitis	Cosmetics ingredients, flavoring
Flexures	Cosmetic ingredients , textil dyes
Hands	Cosmetic ingredients, rubber chemicals, plant materials
Anogenital	Medicaments and cosmetic ingredients
Feet	Footwear materials including chromate, rubber chemicals
Photosensitivite dermatitis	Sunscreens, cosmetic ingredients, medicaments
Airborne dermatitis	Volatile cosmetic ingredients, plant materials

## OBJECTIVE

Characterization of the pediatric population that is susceptible to be studied with patch test and identify the most common contact allergens, as health alerts in children with contact dermatitis.

## MATERIALS AND METHODS

It is a retrospective analysis of the data prospectively collected of patients studied in eight Dermatology Departments in Spain through the WinAlldat® system used in real life clinical practice, 2004-2014. WinAlldat® is a multilingual allergological documentation system of delayed hypersensitivity reaction that allow to collect demographic, clinical, patch test and diagnostic data in a standardized way. All patients included were suitable to be patch tested and showed an age ≤18 years old. Once patients identified in the database, demographic, clinical, patch test results and diagnostic data were analyzed by descriptive statistics.

## RESULTS

A total of 540 subjects were patch tested although the time of recruitment between centers ranged 18 to 2 years old. Female/male ratio was 1,4 and 230-showed ≤ 10 years old. Atopic dermatitis was reported by the 35.19% of the subjects. Hand, legs or face eczema was present in the 21,11%, 13,52% and 10,74 % of the patients respectively. 222 patients showed a positive patch test result (++ n= 24; +++ n= 198). Allergic contact dermatitis was the most common first final diagnosis (n=154; 28,51%) followed by atopic dermatitis (n=128; 23.70%) after patch testing. Once compared with the 9227 patch tested adults for which the female /male ratio is 2,10 and the percentage of atopic dermatitis was low 9.81%

**Table 1**, shows the percentage of the most common contact allergens showing a positive patch test reaction in children population compared with the adult one in the same period of time.

From which results takes special relevance false henna tattoos as source of sensitization to p-phenylenediamine, still new cases of of baboon syndrome due to mercury (**Figure 3**) and the increase sensitization to methylisotiazolinone which positivity already represent a 5,96% (n=150) of the children compared with the 12,88 % (n=2057) found in adults.

Except from the new contact allergens introduced at the European baseline the most common contact allergens found in our study is almost coincident with the results obtained from the meta-analysis conducted by Bonitsis. **Table 2** (1,8)

Table 1. Main allergens involved in Ch CD

Contact allergen	Children Percentage %	Adult Percentage %
Nickel sulphate	13.15	26.02
Thiomerosal	8.15	4.41
Cobalt chloride	6.97	6.40
MCl/MI	6.49	6.88
P-phenylenediamine	3.95	4.07
Potasium dichromate	3.77	4.89
Balsam of Peru	3.52	4.88
Fragrance mix I	2.07	5.45
Methylisotiazolinone	5.98 (n=150)	12.88 (2057)

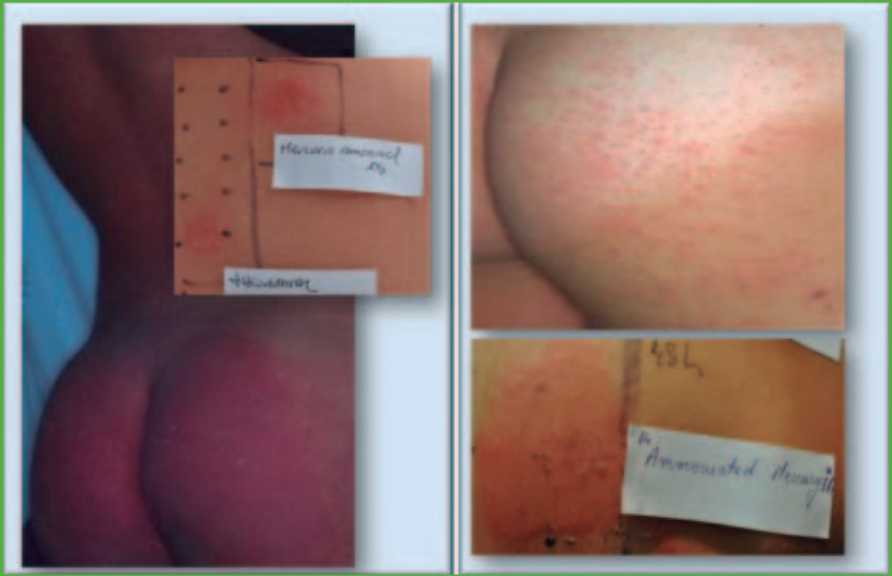
Table 2. Main allergens involved in CD Ch, Results of a meta-analysis

- 49 studies, 1963-2010
- Highest sample, 2.482 patients (Buckley et al, 2003) \*

Allergens tested in at least two studies in wich the lower 95% confidence interval (CI) based on random effects calculations ensured the proportion of positive reactions was at least 1%. P-value for Q test. (ref 1. \* ref 8).

Nickel sulphate *	14.52 (12.31-16.89)	<0.001
Gold sodium thiosulfate	9.34 (6.00-13.31)	0.19
Thiomerosal	6.19 (3.91-8.96)	<0.001
Toluene-2,5-diamine	6.03 (1.02-31.64)	<0.001
Palladium chloride	5.95 (3.93-8.37)	0.12
Cobalt chloride *	5.91 (4.68-7.27)	<0.001
Metallic mercury	5.33 (1.02-12.74)	<0.001
Mercuric chloride	5.22 (3.64-7.04)	0.02
Fragrance mix I *	4.04 (3.21-4.98)	<0.001
Bacitracin	3.64 (2.20-5.42)	0.67
Mix of cassia ,citronella	3.14 (2.06-4.43)	0.96
Potassium dichromate *	2.93 (2.15-3.83)	<0.001
Ammoniated mercury	2.63 (1.62-3.89)	<0.001
Amerchol L-101	2.54 (1.84-3.37)	0.53
Neomycin sulfate *	2.34 (1.51-3.35)	<0.001
Myroxylon pereirae *	2.29 (1.71-2.96)	<0.001
Lanolin *	2.25 (1.46-3.22)	<0.001
Cocamidopropylbetaine	1.93 (1.33-2.63)	0.64
p-Phenylenediamine *	1.85 (1.23-2.62)	<0.001
P-tertiary butyl phenol	1.69 (1.21-2.25)	<0.001
formaldehyde resin *		
Disperse Blue 124	1.58 (1.09-2.17)	0.30

Figure 3. Baboon Syndrome / SDRIFE



## CONCLUSION

Contact dermatitis in children should be suspected, must be studied based in the clinical history using the European baseline series recommendations and according with the ESCD patch test guidelines. This will help to identify environmental hazards and new contact allergens also important in children.

## REFERENCES

- Bonitsis NG, Tatsioni A, Bassioulas K, Ioannidis JPA Allergens responsible for allergic contact dermatitis among children: a systematic review and meta-analysis. Contact Dermatits 2011;64:245-257.
- Cantarutti A, Dona D, Visentin F, Borgia E, Scamarcia A, Cantarutti L, Peruzzi E, Egan CG, Villa M, Giaquinto C, Pedianet. Epidemiology of frequently occurring skin diseases in Italian Children from 2006 to 2012: A retrospective, population-based study. Pediatr Dermatol 2015; 32:668-78.
- Simonsen AB, Deleuran M, Johansen JD, Sommerlund M. Contact Allergy and allergic contact dermatitis in children- a review of current data. Contact Dermatitis 2011;65:254-6.
- De Waard-van der Spek FB et al. EAACI position paper for practical patch testing in allergic contact dermatitis in children. Pediatr Allergy and Immunology 2015; 26: 598-606.
- Camarasa JM, Aspiolea F, Alomar A. Patch tests to metals in childhood. Contact Dermatitis. 1983 Mar;9(2):157-8.
- Romaguera C, Alomar A, Camarasa JM, Garcia Bravo B, Garcia Perez A, Grimalt F, Guerra P, Lopez Gorretcher B, Pascual AM, Miranda A, et al. Contact dermatitis in children. Contact Dermatitis. 1985 May;12(5):283-4.
- Sevila A, Romaguera C, Vilaplana J, Botella R. Contact dermatitis in children. Contact Dermatitis. 1994 May;30(5):292-4
- Buckley DA1, Rycroft RJ, White IR, McFadden JP The frequency of fragrance allergy in patch-tested patients increases with their age. Br J Dermatol. 2003 Nov;149(5):986-9.