

Case Report

Allergic Contact Dermatitis in Private Practice: Evolution in 16 Years

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Abstract

Background: Allergic contact dermatitis rates vary according to population's customs and period studied.

Objective: To describe the characteristics of allergic contact dermatitis in a private office.

Methods: Retrospective analysis of 105 cases of allergic contact dermatitis diagnosed on a private dermatology clinic between 2010-2016 was collected and compared with previous data from the same office related to the period 1999 to 2009. Frequency of allergic contact dermatitis, location of dermatosis, epidemiology and main sensitizers were evaluated.

Conclusions: Allergic contact dermatitis in private office is a current and growing dermatosis. Variations in the allergens sensitization rates reflect changes in habits and customs over time.

Keywords: Allergens; Allergic Contact Dermatitis; Contact Dermatitis; Patch Tests; Private Practice

Introduction

Allergic contact dermatitis is frequent on dermatologic care. In a study published in 2010, the frequency of this diagnosis in a dermatological public service in Sao Paulo city was 6.4% [1].

A retrospective study published in 2011 analyzed the frequency of allergic contact dermatitis between 1999 and 2009 in a private office in Sao Paulo [2]. Data from the main sensitizers detected after patch testing showed that the most common allergens during the period in question were similar to the ones observed on a public health service in the same city. The interest on the evolution of this dermatosis at the same private clinic led to the present study, in order to compare the updated data (2010-2016) with those of the previous period.

This study aims to evaluate the characteristics of allergic contact dermatitis in a private office, during the 2010-2016 period, concerning frequency, main sensitizers, location of lesions and patients' epidemiology (gender, age, profession); and compare

with data obtained during the 1999-2009 period (present on study performed at the same service, published in 2011).

Methods

This is a retrospective study, through the analysis of medical records from a private office. During the period 2010-2016, we counted the number of patients who attended to a dermatology private office, selecting those with hypothesis diagnostic of allergic contact dermatitis who underwent patch testing. Data was collected concerning age, gender, profession, location of dermatosis and patch tests positivity.

The patch tests were performed using the standard Brazilian series, recommended by the Brazilian Study Group on Contact Dermatitis (GBEDC, 1996) [3], the same used on the previous study. Patients with suspicion of cosmetic allergy were also tested with the cosmetics series, composed by 10 elements. Both series were manufactured by FDA Allergenic (Rio de Janeiro, Brazil).

The tests were applied on the patients' back using Finn Chambers® (FDA Allergenic, Rio de Janeiro, Brazil). The first reading was realized after 48 hours and the second reading was

performed in after 96 hours. For the tabulation of tests results it was considered the last reading.

The epidemiologic data and the results of the tests were plotted on a spreadsheet from Excel® program (Microsoft®, Redmond, WA, USA). Data was compared with previous records obtained during the 1999-2009 period. The analysis was performed through chi-square test and two tailed Fisher's exact test.

Results

On the 7-year period (2010-2016), 1195 new patients were attended in a dermatologic private office. Among these, 121 had the hypothesis diagnostic of allergic contact dermatitis and underwent patch testing. Of them, 16 had all negative tests, while 105 had at least one positive test, which were relevant with clinical history, confirming the diagnosis of allergic contact dermatitis. So, the frequency of this diagnosis was 8.8% (105/1195), while in the previous study, in the same office, it was 5.1% (134/2618); therefore, there was a statistically significant increase of allergic contact dermatitis on the recent period ($p < 0.001$; Table 1).

Period	With allergic contact dermatitis	Without allergic contact dermatitis	Total
1999-2009	134 (5.1%)	2484	2618
2010-2016	105 (8.8%)	1090	1195
$p < 0.001$			

Table 1: Frequency of Allergic contact dermatitis in a dermatology private office, during 1999-2009 and 2010-2016.

All the patients with allergic contact dermatitis were white, 77 (82.9%) female and 28 (17.1%) male. On the previous study, there were 127 (94.8%) women and only seven (5.2%) men. There was statistically significant increase on the number of male-gender patients ($p < 0.001$). The average age of the patients with allergic contact dermatitis was 47.6 years old, similar to that found on the previous study, 45 years old. The medium age was 46 years old.

Concerning the professions, the mean referred were: office worker in 77 cases (73.3%), health care professional in 11 cases (10.5%), cleaning staff in seven (6.7%), salesperson in four (3.8%), plastic artist in four (3.8%) and retired in two (1.9%). On the study performed during 1999-2009 there was a predominance

of health care and domestic workers. While on the current study only two patients (1.9%) had dermatosis related to the profession, on the prior period, nine (6.7%) of the cases were considered occupational. There was no statistically relevant difference between those data ($p = 0.24$).

Table 2 shows the locations of allergic contact dermatitis: cephalic segment on 79 cases (75.2%), chest on 21 (20.0%), hands and remaining of the upper limbs on nine each (8.8%), feet on seven (6.7%) and the lower limbs on six (5.7%). Other locations had frequency lower than 4.0%. The total was higher than 100% because some patients presented dermatosis in more than one area of the body. On the previous period (1999-2009) the most common locations were the cephalic segment on 69 (51.5%), hands on 29 (21.6%) and chest on 18 (13.4%). The analysis showed statistically significant increase on the frequency of allergic contact dermatitis on cephalic segment on the period of 2010-2016 (75.2% vs. 51.5%; $p < 0.001$), although that location was the main one on both periods. Oppositely, there was decrease on the frequency of hand involvement (8.6% vs. 21.6%; $p = 0.0061$).

Location	2010-2016		1999-2009		P
	N	%	N	%	
Cephalic segment	79	75.2	69	51.5	<0.001
Chest	21	20.0	18	13.4	0.17
Hands	9	8.6	29	21.6	0.0061
Upper limbs	9	8.6	15	11.2	0.50
Feet	6	5.7	10	7.5	0.59
Lower limbs	6	5.7	15	11.2	0.14

Table 2: The location of Allergic contact dermatitis in a dermatology private office, during 2010-2016 and 1999-2009.

The sensitization frequencies of the tested substances are on table 3. The main sensitizers were: nickel sulfate, 36 (34.3%), cobalt chloride 28 (26.8%), thimerosal 18 (17.1%), tosylamide formaldehyde resin 16 (15.2%), potassium dichromate 17 (16.2%), Kathon-CG® and fragrance-mix 13 each (12.4%), formaldehyde nine (8.6%), turpentine, carba-mix and p-phenylenediamine eight each (7.6%), ethylenediamine dihydrochloride and paraben-mix seven each (6.7%), colophony six (5.7%), hydroquinone five (4.8%). The other tested substances had sensitization frequencies lower than 4.0%.

Substance	2010-2016		1999-2009*		P
	N	%	N	%	
Nickel sulfate	36	34.3	67	50.0	0.015
Cobalt chloride	28	26.7	35	26.1	0.92
Thimerosal	18	17.1	0		<0.001
Potassium dichromate	17	16.2	13	9.7	0.13
Tosylamide formaldehyde resin	16	15.2	16	11.9	0.46
Kathon-CG®	13	12.4	0		<0.001
Fragrance-mix 1	13	12.4	21	15.7	0.47
Formaldehyde	9	8.6			
Turpentine	8	7.6			
Carba-mix	8	7.6			
P-phenylenediamine	8	7.6			
Ethylenediamine dihydrochloride	7	6.7	13	9.7	0.40
Paraben-mix	7	6.7	28	20.9	0.0020
Colophony	6	5.7			
Hydroquinone	5	4.8			
Black rubber mix (PPD-mix)	4	3.8			
Chlorhexidine	4	3.8			
Balsam of Peru (<i>Myroxylon pereirae</i>)	3	2.9			
Thiuram-mix	3	2.9			
Propylene glycol	2	1.9			
Benzocaine	2	1.9			
Quaternium-15	2	1.9			
Neomycin	1	1.0			
Nitrofurazone	1	1.0			
Epoxyresin	1	1.0			
Amerchol	1	1.0			
Triethanolamine	1	1.0			
Promethazine	1	1.0			
Germall 115	1	1.0			

*Sensitization rates $\geq 10\%$ of substances tested between 1999-2009.

Table 3: The frequency of sensitization of the substances tested during the period of 2010-2016.

Other substances with negative test: Irgasan, mercaptobenzothiazole, lanolin, p-tert-butylphenol-formaldehyde resin, anthraquinone, quinoline-mix, 3,5-di-tert-butyl-4-hydroxytoluene (BHT), bronopol, chloracetamide, ammonium thioglycolate. There were seven substances with sensitization rate equal to or greater than 10%: nickel sulfate, cobalt chloride, thimerosal, tosylamide formaldehyde resin, potassium dichromate, Kathon-CG® and fragrance-mix. On the previous study, the allergens with sensitization frequency equal to or greater than 10% were: nickel sulfate 67 (50.5%), cobalt chloride 35 (26.1%), paraben-mix 28 (20.9%), fragrance-mix 21 (15.7%), tosylamide formaldehyde resin 16 (11.9%), potassium dichromate and ethylenediamine dihydrochloride 13 (9.7%) each (table 3).

The sensitizers' analysis on both periods of study showed statistically significant decrease on the number of positive cases for nickel sulfate ($p=0.015$) and paraben-mix ($p=0.0020$). On the other hand, there was increase on the sensitization rate to thimerosal ($p<0.001$) and to Kathon-CG® ($p<0.001$). The other substances with relevant sensitization rates did not present statistically significant differences between the periods of study (cobalt chloride, potassium dichromate, fragrance-mix 1, balsam of Peru (*Myroxylon pereirae*),

ethylenediamine dihydrochloride and tosylamide formaldehyde resin.

Discussion

Allergic contact dermatitis is common in the private office. Its frequency has increased in recent years, going from 5.1% to 8.8%. It is a considerable percentage for a dermatosis, out of a universe with thousands of skin diseases. Nevertheless, the frequency of occupational allergic contact dermatitis had small relevance on both periods of study; therefore, the increase on the diagnosis occurred mostly for substances not related to the patients' profession.

Allergic contact dermatitis prevailed on women, despite a significant increase in men. The age range was similar on both periods of study. Concerning the location of lesions, data obtained between 2010-2016 are similar to those from the previous study, showing the cephalic segment as the main region of impairment. This location is related specially to contact with cosmetics. There was significant decrease of hand location, probably associated to a lower frequency of occupational disease.

Allergic contact dermatitis to cosmetics has increased on recent years, probably because of both the generalization of use of those products, and the greater variety of articles available on the market. Although the practice of using cosmetics is still higher on the female universe, it is possible that the significant increase of allergic contact dermatitis in men might be attributed to higher consumption of those products by this group.

In a study conducted on University of Valencia with 5419 patients, data from both periods of 1999-2004 and 2005-2013 were compared, and it was observed that there was an increase from 9.8% to 13.9% on the diagnosis of cosmetics allergic contact dermatitis [4]. The main sensitizers seen on the present study were the same as the ones on the previous study, with small variations. These data are compatible with those found in the others studies conducted in care centers [5,6].

Nickel sulfate was the main sensitizer on both periods of study. On recent years, there has been significant decrease on the sensitization rate to that metal, although the value of 34.3% still maintains it as the main allergen. In a Brazilian retrospective study involving 618 patients who underwent patch testing between 2006 and 2011 the main sensitizer was nickel sulfate, with frequency of 28.2%⁵. Some European and North-American publications show rates varying from 10.4% to 19%, which evidence a frequent sensitization to that metal on our environment [5,7-9]. This fact may be attributed to the point that in Brazil there is no regulatory guidelines to control the presence of nickel in materials, as it occurs in European countries since 2000.

In a study published in 2014, 184 Brazilian products were

searched for presence of thimerosal (151 topical drugs and 33 vaccines), which was found on only three ophthalmic solutions and five vaccines [10]. The increase on the sensitization rate to thimerosal on this study shows that despite its withdrawal from topical drugs, its presence in eye drops and vaccines maintain a sensitization rate greater than other substances present on patch tests series. This fact has been observed in other populations. For that reason, some authors argue in favor of the return of thimerosal to the European standard series [11,12]. Even though some studies still show high sensitization rates to this substance, usually the results of patch testing have no clinical relevance.

Paraben-mix has presented significant decrease of sensitization rate compared to the previous study. Those preservatives were largely used on the past, but on the last 20 years some studies have raised the possibility of their being related to higher risk of breast cancer. Although this evidence is still discussed on the literature and the capacity of sensitization to this allergen is low, the industry has substituted it by other preservatives, among them, Kathon-CG[®], on cosmetics and topical products [13,14]. Those data justify its low sensitization frequency worldwide.

Kathon-CG[®] was the main sensitizer among the preservatives tested, reflecting a global tendency [15-17]. It is widely used on industry, formed by a mix of two substances: methylisothiazolinone and methylchloroisothiazolinone, which have high capacity of sensitization. The prevalence of allergic contact dermatitis to Kathon-CG[®] has increased significantly on recent years around the world, reaching epidemic values, thus, becoming a public health concern. Therefore, some measures have been taken on Europe and United States in order to regulate its use in cosmetics, cleaning and industrial products.

In relation to tosylamide formaldehyde resin, it showed sensitization rate greater than 10%. Even though studies have shown decrease on its sensitization frequency due to its substitution by other alternatives [18,19], the contact to this substance is still considerable in Brazil.

The other substances tested had irrelevant variation during 1999-2009 and 2010-2016 periods, as potassium dichromate and cobalt chloride, common sensitizers on care services. The first one is the main sensitizer on cement and therefore is related to occupational allergic contact dermatitis. Accessing the North American Contact Dermatitis Society (NACDS)'s website [20], it is possible to find the potassium dichromate in over 180 products, and the cobalt chloride in over 550. Those products include mostly cosmetics, besides domestic products and topical drugs, demonstrating that these allergens are present in varied materials.

On conclusion, allergic contact dermatitis in private office presented high frequency when compared to other dermatosis, mainly non-occupational character. Among the patients with

allergic contact dermatitis, there was a predominance of women, in the 45-year range, with cephalic segment lesions, suggesting the importance of etiology by cosmetics. Out of the sensitizers, we can highlight Kathon-CG[®], with presented significant increase during the analyzed period, reflecting worldwide tendency. Besides that, nickel sulfate maintains high sensitization rate, evidencing the need of establishing guidelines to control the use of this material in order to protect the population. Allergic contact dermatitis in private offices is a current dermatosis and the variation in substances' sensitization rates are directly related to population's customs.

DISCLOSURES

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