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New cosmetics patch test series: A proposal

Nueva serie de pruebas de parches cosméticos: propuesta.

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Abstract

Contact dermatitis to cosmetic products is a common condition. It is likely the most frequent reason for performing patch tests because many substances used in cosmetics are potent allergens. Cosmetic contact dermatitis most frequently affects the face. Patch test series need to be continuously revised to identify outdated and emerging allergens. The aim of this study is to propose a reformulation of the patch test series for cosmetics. The list of European Surveillance System on Contact Allergies was initially used to select the allergens. Publications in PubMed from the last 10 years were sought, showing the frequency of positive reactions to cosmetic allergens that were tested as part of a baseline series or cosmetics series. Subsequently, large international databases evaluating retail products were consulted to verify if these substances were present in cosmetics, because the relevance would be their presence in commercially sold cosmetics. It was adopted a threshold of 0.3% positive patch test reactions for including a substance in cosmetics series. It was deleted those present in the baseline series (Associação Brasileira de Alergia e Imunologia), fragrances, and allergens limited to hair products. It is believed that choosing too few allergens may result in the non-identification of relevant allergens and treatable cases. On the other hand, testing a series with many allergens is time-consuming and more costly. Therefore, it seems appropriate to create cosmetics series with 20 elements.

Keyword: Contact dermatitis; Patch test; Cosmetic contact dermatitis; Allergens; Fragrances.

Resumen

La dermatitis de contacto, provocada por productos cosméticos, es una afección frecuente. Suele ser el motivo más frecuente para realizar pruebas epicutáneas, porque muchas sustancias utilizadas en los cosméticos son potentes alérgenos. La dermatitis cosmética de contacto afecta con mayor frecuencia la cara. Es necesario revisar continuamente series de pruebas epicutáneas para identificar alérgenos obsoletos y emergentes. El objetivo de este estudio es proponer una reformulación de las series de pruebas epicutáneas para cosméticos. Para seleccionar los alérgenos se utilizó inicialmente la lista del European Surveillance System on Contact Allergies. Se buscaron publicaciones en PubMed de los últimos 10 años que mostraran reacciones positivas frecuentes a alérgenos cosméticos, que se habían probado como parte de serie base o de serie de cosméticos. Posteriormente, se consultaron grandes bases de datos internacionales que evaluaban productos de venta para comprobar si estas sustancias estaban presentes en los cosméticos, y su relevancia en cosméticos de venta comercial. Se adoptó un umbral del 0.3% de reacciones positivas en pruebas epicutáneas para incluir una sustancia en series de cosméticos. Se suprimieron las presentes en la serie base (Associação Brasileira de Alergia e Imunologia), fragancias y alérgenos limitados a los productos capilares. Es probable que la elección reducida de alérgenos se asocie con deficiente o nula identificación de los mismos y de casos tratables. Probar una serie con gran cantidad de alérgenos lleva mucho tiempo y es costoso. Por lo tanto, es importante emprender series de cosméticos con 20 elementos.

Palabras clave: Dermatitis por contacto; Pruebas de parche; Dermatitis de contacto por cosméticos; Alérgenos; Fragancias.

INTRODUCTION

Cosmetic is broadly defined, according to European Union regulations, as "any preparation intended to be applied, spread, or sprayed or otherwise introduced into any part of the human body for the purpose of cleansing, beautifying, promoting attractiveness or altering the physical appearance of the individual".[1]

Contact dermatitis to cosmetic products is quite common, a very frequent reason for performing patch tests.[2] This occurs because many substances used in cosmetics are potent contact allergens, specially preservatives and fragrances.[3,4] It should be emphasized that before considering an allergy test, the diagnosis of cosmetic-related dermatitis should initially be suspected based on a thorough clinical history and the distribution of skin lesions.[2] On the other hand, the patch test is an essential tool for etiological elucidation of allergic.[5]

Cosmetic contact dermatitis most frequently affects the face.[6] Conversely, when patients present with facial eczema, cosmetics are the most common suspected cause, leading them to seek specialized patch testing.[4] In a more specific evaluation of facial lesions, the eyelids are particularly affected by many products, such as shampoos/conditioners, eyeshadows, mascara, nail polishes, artificial nails, or other products transferred by hands (ectopic dermatitis).[2] Another common form is the so- called lateral facial dermatitis, in a rinse-off pattern, caused by shampoos or conditioners running laterally on the face. There is also central facial dermatitis, triggered by foundations, moisturizers, anti-wrinkle products, and other makeup. In this pattern, the lateral areas are spared, as patients tend to use the products more in the central area of the face. Finally, there is a generalized pattern, usually triggered by airborne, but which can also be due to the use of makeup removers, foundations or moisturizers.[2]

In Brazil, there has been commercially available for many years a manipulated cosmetics series for patch test. It is composed of 10 elements - a number apparently below what is necessary, given the range of products launched by the beauty industry. Moreover, patch test series need to be continuously revised to identify outdated, relevant, and emerging allergens.[6] The chosen series needs its components to have concentrations and vehicles based on important international reference publications, strictly following the CAS number of each element. Therefore, it is necessary to update and expand cosmetics patch test series, observing the frequency of positivity and relevance of these allergens, thus bringing a modernization of this important diagnostic tool.

METHODOLOGY

The primary objective of this work is to propose a new patch test series for cosmetics. To achieve the objective, publications in PubMed from the last 10 years were sought, showing the frequency of positive reactions to cosmetic allergens that were tested as part of a baseline series or cosmetics series. Subsequently, large international databases that evaluate commercial products were searched to observe if these substances can be found in cosmetics. Finally, new searches were carried out in PubMed for the selected allergens to determine the current scientific importance of these substances.

Initial Screening

The European Surveillance System on Contact Allergies (ESSCA) requested from its participating centers a list of allergens that are routinely used when attempting to identify contact allergy to cosmetics.[1] This list was adapted and initially used to select the allergens:

Preservative – benzyl alcohol, chloroacetamide, disodium EDTA, di-t- butylhydroquinone, ethylhexylglycerin, formaldehyde, bronopol, DMDM hydantoin, diazolidinyl urea, imidazolidinyl urea, quaternium 15, iodopropynyl butylcarbamate, methyldibromoglutaronitrile, methylisothiazolinone, sodium metabisulfite, paraben mix, methylchloroisothiazolinone/methylisothiazolinone, phenoxyethanol, potassium sorbate, sodium benzoate, sorbic acid and p-chloro-m-cresol.

Antimicrobial - benzalkonium chloride, chloroxylenol, chlorhexidine diacetate and chlorhexidine digluconate.

Antioxidant – BHA (Butylated hydroxyanisole), BHT (butylated hydroxytoluene), caprylyl gallate and propyl gallate.

Emollient - lanolin alcohols, amerchol L101, cetearyl alcohol and panthenol (Dexpanthenol).

Emulsifier / Surfactants - polysorbate 80, sorbitan sesquioleate, cocamide DEA, cocamidopropyl betaine, dimethylaminopropylamine, monoetanolamina, oleamidopropyl dimethylamine, triethanolamine, caprylyl glucoside, cetearyl glucoside, coco-glucoside, decil glucoside and lauryl glucoside.

Solvent / vehicle - propylene glycol.

Face, eye & lip – colophonium, abitol, retinyl palmitate and shellac.

Nail - tosylamide/ formaldehyde resin, adipic acid/neopentyl glycol/trimellitic anhydride copolymer, phthalic anhydride/trimellitic anhydride/glycols copolymer, 2-hydroxyethyl methacrylate and hydroquinone.

Relationship between baseline series and cosmetics series

Allergens contained in a baseline series, which should contain the main substances causing contact dermatitis, typically produce a frequency of at least 0.5 – 1% of positive reactions in those individuals tested. This series already includes several allergens related to cosmetics that do not need to be retested. However, they need to be considered when changes occur in this reference series, as finding a lower prevalence in a certain substance may suggest the need for its change from a baseline series to a cosmetics series.[1] Following this reasoning, when investigating cosmetic allergies, the cosmetics series should be used in conjunction with the baseline series, as many cosmetic components are already included in the standard series.

Selection criteria

Allergens already present in the baseline series of the *Associação Brasileira de Alergia e Imunologia* (ASBAI) were initially excluded from our selection, as these are routinely tested as part of the standard protocol. This preliminary exclusion encompassed

18 allergens: formaldehyde, bronopol, diazolidinyl urea, quaternium-15, methylchloroisothiazolinone/methylisothiazolinone, methylisothiazolinone, sodium metabisulfite, paraben mix, propyl gallate, lanolin alcohol, amerchol L-101, propolis, cocamidopropyl betaine, decyl glucoside, propylene glycol, colophony, tosylamide/formaldehyde resin, 2-hydroxyethyl methacrylate.

To minimize the risk of omitting relevant cosmetic allergens, European researchers established a threshold of 0.3% positive patch test reactions for including a substance in their cosmetics series.[3] We adopted this value as a minimum reference for our proposal. However, we enhanced our selection criteria by also considering studies from other regions of the world, thereby broadening the scope of our analysis.

Fragrances, despite being considered important components of cosmetics, were not included in the analysis.[3] The primary reason is to prevent the proposed series from becoming excessively extensive. In the Brazilian baseline series (ASBAI series), fragrance allergy is already assessed through fragrance mix I and II, Lyral®, and balsam of Peru tests. Additionally, specific fragrance series exist for these cases.[7] Therefore, when the patient's history suggests sensitivity to perfumes, testing with the baseline series and/or the detailed fragrance series is recommended. The fragrance series proposed by the European Society of Contact Dermatitis comprises 47 substances.[8] In Brazil, the fragrance series from IPI ASAC® contains 29 elements, which align with national legislation requirements for product labeling.[9]

Substances used in hair products frequently cause facial contact allergy, with greater relevancy in the context of occupational eczema among hairdressers. Such situations are evaluated through specific hair series.[3] While preservatives used in shampoos are also present in makeup, allergens primarily limited to hair products should be included in the related series. A classic example is ammonium thioglycolate, which should preferably be reallocated to the hair series.[10]

Special considerations

Testing with the patient's own potentially implicated products may be necessary and should be encouraged.[3,5,11] The possibility of false-negative reactions due to low allergen concentration in commercial prod-

ucts should be considered.[3] It is important to note that leave-on cosmetics are safe for use in patch tests under occlusion. Rinse-off products, however, need to be diluted to avoid irritant reactions.[12]

Evaluation of the frequency of positive reactions in series

Studies from centers and internationally recognized groups were selected to evaluate the incidence of contact sensitivity to previously selected allergens. **Table 1**

The North American Contact Dermatitis Group (NACDG) conducts extensive surveys of patch tests performed in 13 centers using a series of 80 substances, many of which could be included in cosmetics series (survey with 4,121 patients).[13]

The Mayo Clinic, a world-renowned reference center, periodically publishes data on patch tests performed (survey with 2,667 patients).[14]

ESSCA, a working group of the European Society of Contact Dermatitis (ESCD), evaluated cosmetics series used in its 26 centers.[3]

The British Society for Cutaneous Allergy (BSCA) published data on patch tests with facial series from its 12 centers in the United Kingdom (survey with 4,224 patients).[6]

Determination of Relevance for Allergens

At an individual level, a patch test result can be clinically relevant depending on past or current exposure to the substance found positive in the exam. Past relevance occurs when a patch test is positive, but the exposure may have been long ago and no longer exists.[15] A classic example is thimerosal, a substance with high positivity prevalence due to exposure that typically no longer occurs.[16] A search in the Environmental Working Group's Skin-Deep Cosmetic Database® revealed no commercial products containing this allergen. Therefore, including such substances in a new series is not justified.

Thus, the relevance of substances chosen for inclusion in the series in question would be their presence in commercially sold cosmetics. To this end, we searched large databases to ratify the choice by frequency data or replace substances if not properly found.

Databases

We evaluated the substances previously selected in frequency studies using the Consumer Product Information Database® (CPID) (https://www.whatsinproducts.com),

a widely used database that shows products through component searches. This publicly accessible source contains approximately 8,000 products.[17] As the database includes several classes of non-cosmetic products, we used it for initial screening. **Table 2**

Three substances were excluded due to the absence of retail products containing them: caprylyl gallate, oleamidopropyl dimethylamine and abitol.

Caprylyl gallate, an antioxidant, was also not found in other databases. Allergy to gallates is frequently reported in the literature.[6] Therefore, we decided to use, instead, another allergen from the same group: dodecyl gallate (lauryl gallate), pointed by some authors as one of the main allergens for cosmetic consumers.[5] Although its presence in products is low, we believe it represents the entire family of gallates, explaining its inclusion.

The allergen oleamidopropyl dimethylamine was excluded for the same reason. In other databases, the number of products containing this substance was minimal (SkinSAFE: 1; EWG: 1). It is a surfactant from the same betaine group as cocamidopropyl betaine, already in the baseline series, and cocamide diethanolamine, in this cosmetics series proposal. Instead, another quaternary ammonium surfactant was selected - benzalkonium chloride, which is used in various topical and household products, besides cosmetics.[18]

Abitol (hydroabietyl alcohol) also yielded negative results in the CPID platform, as in other databases (SkinSAFE: 0; EWG: 1). Therefore, its replacement with another substance was justified. Following the specific series from Chemotechnique®, peppermint oil was selected.[8] This essential oil has been implicated in at least 45 published cases of contact dermatitis, with menthol appearing to be the primary allergen.[19]

Table 1. Cosmetic allergens with their respective relative frequencies of positive reactions (%) according to different published surveys.

Cosmetic allergens	ESSCA	NACDG	MAYO	BSCA
Preservative				
Benzyl alcohol	0.32	0.4	0.8	0.35
Chloroacetamide	0.4	NT	NT	0.07
Disodium EDTA	0.07	NT	NT	0.23
TBHQ (tert-butylhydroquinone)	1.91	NT	NT	0.62
DMDM hydantoin	0.51	NT	0.7	0.19
Imidazolidinyl urea	0.47	0.7	0.8	NT
Iodopropynyl butylcarbamate	1.5	2.4	1.4	0.17
Phenoxyethanol	0.39	0.1	0.1	NT
Sodium benzoate	0.33	0.5	2.5	>0.3
Sorbic acid	0.52	NT	NT	0.07
Antioxidants				
BHA (butylated hydroxyanisole)	0.36	NT	NT	NT
BHT (butylated hydroxytoluene)	0.13	NT	0.1	NT
Caprylyl gallate	1.89	NT	NT	NT
Dodecyl gallate*	NT	NT	NT	2.15
Tocopheryl acetate	0.02	NT	0.4	0.83
Antimicrobial				
Methenamine	0.45	NT	NT	>0.3
p-chloro-m-cresol	0.21	NT	NT	NT
Chlorhexidine digluconate	0.35	0.6	NT	NT
Triclosan	0.38	NT	NT	0.17
Emollients				
Cetearyl alcohol	0.79	NT	NT	NT
Stearyl alcohol	0.25	NT	0.2	NT
Cetyl alcohol	0	NT	0	NT
Panthenol (Dexpanthenol)	0.19	0.1	NT	0.47
Emulsifier / Surfactants				
Polysorbate 80	0	NT	NT	NT
Sorbitan sesquioleate	1.44	NT	0.3	0.52
Cocamide DEA	0.61	0.7	0.5	0.24
Oleamidopropyl dimethylamine	0.71	2.8	4.2	0.6
Benzalkonium chloride*	NT	0.5	6.1	3.96
Triethanolamine	0.11	NT	0.2	0.24
Lauryl glucoside	0.81	1.4	0.9	0.43
Coco-glucoside*	NT	1.4	NT	NT
Special Functions				
Abitol	1.52	NT	NT	1.16
Mentha piperita oil*	NT	0.7	NT	>0.3
Shellac	1.2	NT	NT	>0.3
Sunscreen Allergens				
Benzophenone-3	NT	0.6	0.8	0.17
Benzophenone-4	NT	1.4	4	0.79
Octocrylene	NT	NT	NT	NT
Butyl methoxydibenzoylmethane	NT	NT	NT	0.07

NT: not tested.
*Allergen added to replace excluded allergen.

Table 2. Presence of products containing selected substances in the CPID® database *(accessed 2024 Sep 4)*.

Allergen	Number of Products
Benzyl alcohol	920
TBHQ (tert-butylhydroquinone)	12
DMDM hydantoin	808
Imidazolidinyl urea	54
Iodopropynyl butylcarbamate	388
Sodium benzoate	912
BHA (butylated hydroxyanisole)	58
Caprylyl gallate	0
Tocopheryl acetate	905
Methenamine	15
Chlorhexidine digluconate	17
Cetearyl alcohol	763
Sorbitan sesquioleate	30
Cocamide diethanolamine	63
Oleamidopropil dimetilamina	0
Lauryl glucoside	71
Abitol®	0
Shellac	6
Benzophenone-3	77
Benzophenone-4	124

Thereafter, it was decided to exclude one more substance. Methenamine, an antiseptic, was also excluded. Although found in the CPID platform, many of these products were not cosmetics. In other databases, the occurrence of products was low (SkinSAFE: 3; EWG: 1). Moreover, a PubMed search revealed no specific publications emphasizing the current testing of this substance. Consequently, it was replaced with coco glucoside. The current perspective suggests that all possible alkyl glucosides should be tested when suspecting cosmetic allergy.[20]

Subsequently, the allergens were evaluated using SkinSAFE (https://www.skinsafeproducts.com), a platform developed by Mayo Clinic to identify suitable products for sensitive individuals. It contains approximately 43,000 products and allows ingredient searches, categorizing beauty products into various cosmetic subgroups.[17] **Table 3**

Next, we examined the allergens in the Environmental Working Group's Skin-Deep Cosmetic Database® (Washington, District of Columbia), a free online database. This platform allows ingredient searches among over 107,000 personal care products (https://www.ewg.org/skindeep).[21] We grouped the substances by categories such as lip products, hair products, men's products, etc. **Table 4**

The American Contact Dermatitis Society (ACDS) has developed a tool called the Contact Allergy Management Program (CAMP) to assist specialists in recommending topical products free of contact allergens.[17] This database contains approximately 5,000 retail products,[17] categorized into eye care, hair care, household products, makeup, medications, nail products, skin care, and oral care.[22] The selected substances were evaluated in the context of the makeup and skin care categories, with emphasis on explicating the type of cosmetic in which they are frequently found. **Table 5**

The **Table 6** presents the complete selection with concentration, vehicle, and respective CAS number of the 20 components of this new proposed cosmetic series.

CONCLUSIONS

We believe that a reformulation of the cosmetics series is necessary. Here, we have made an initial proposal to be discussed and improved. A cosmetics series with 10 allergens seems quite limited. We agree that choosing too few allergens may result in the non-identification of relevant allergens and treatable cases of contact dermatitis to cosmetics.[6]

In this reasoning, doubling the number of allergens to create a series with 20 elements seems appropriate. On the other hand, testing a series with many allergens is time-consuming, more costly, and theoretically may increase the risk of active sensitization.[6]

Given this, following the recommendation of Europeans and British to admit the need for a frequency cut-off plan of 0.3% seems very sensible.[3,6] However, we added that we should consult more references in globally accepted scientific works, as the values found can be variable, as we indeed observed. Furthermore, we

Table 3. Total number of products, beauty products, and beauty product subgroups in the SkinSAFE® database *(accessed 2024 Sep 4)*.

Ingredients	Number of products	Beauty products	Where is it found in these products
Benzyl Alcohol	13532	12166	Body and bath products: 857 Fragrances: 408 Hair care: 5104 Makeup: 1260 Skin care: 4561
Tert Butylhydroquinone	71	67	Body and bath products: 2 Fragrances: 1 Hair care: 20 Makeup: 32 Skin care: 12
DMDM Hydantoin	2851	2660	Body and bath products: 340 Fragrances: 6 Hair care: 1359 Makeup: 70 Skin care:883 Manicure and pedicure:4
Imidazolidinyl Urea	622	548	Body and bath products: 22 Hair care: 150 Makeup: 105 Skin care:265 Manicure and pedicure:6
Iodopropynyl Butylcarbamate	2358	2135	Body and bath products: 240 Hair care: 946 Makeup: 215 Skin care:728 Manicure and pedicure:4
Sodium Benzoate	19916	17445	Body and bath products: 1814 Fragrances: 23 Hair care: 6989 Makeup: 1509 Skin care: 7082 Manicure and pedicure: 70
BHA Butylated Hydroxyanisole	242	187	Body and bath products: 2 Hair care: 19 Makeup: 58 Skin care: 89 Manicure and pedicure: 18
Tocopheryl Acetate	25284	21839	Body and bath products: 900 Fragrances: 34 Hair care: 2691 Makeup: 7813 Skin care: 10094 Manicure and pedicure: 374
Chlorhexidine Digluconate	705	672	Body and bath products: 3 Hair care: 308 Makeup: 143 Skin care: 218
Cetearyl Alcohol	16963	15351	Body and bath products: 141 Fragrances: 4 Hair care: 6715 Makeup: 641 Skin care: 7839 Manicure and pedicure: 39

Sorbitan Sesquioleate	1444	1304	Body and bath products: 1 Hair care: 9 Makeup: 1069 Skin care: 218 Manicure and pedicure: 7
Cocamide DEA	214	196	Body and bath products: 38 Hair care: 87 Skin care: 77 Manicure and pedicure: 1
Lauryl Glucoside	2424	1750	Body and bath products: 247 Hair care: 655 Makeup: 73 Skin care: 779 Manicure and pedicure: 1
Shellac	40	39	Hair care: 1 Makeup: 33 Skin care: 3 Manicure and pedicure: 2
Benzophenone-3	1162	669	Body and bath products: 21 Fragrances: 46 Hair care: 103 Makeup: 77 Skin care: 3688 Manicure and pedicure: 54
Benzophenone-4	2169	2006	Body and bath products: 143 Fragrances: 5 Hair care: 988 Makeup: 16 Skin care: 844 Manicure and pedicure: 10
Dodecil Gallate	3	3	Makeup: 1 Skin care: 2
Benzalkonium Chloride	1128	690	Body and bath products: 54 Hair care: 97 Makeup: 92 Skin care: 479 Manicure and pedicure: 1
Mentha Piperita	2377	1748	Body and bath products: 141 Fragrances: 7 Hair care: 750 Makeup: 131 Skin care: 734 Manicure and pedicure: 8
Coco Glucoside	2058	1628	Body and bath products: 324 Fragrances: 1 Hair care: 568 Makeup: 64 Skin care: 678

Table 4. Number of products in the Environmental Working Group's Skin Deep Cosmetic Database® and its cosmetic subgroups *(accessed 2024 Sep 4)*.

	Hair care	Eyes	Lip	Face	Oral hygiene	Children´s products	Men´s Products	Body	Others	Total
Benzyl Alcohol	3679	373	777	2108	103	140	230	1905	1157	10472
Tert Butylhydroquinone	34	44	2	4	0	0	2	11	3	100
DMDM Hydantoin	1169	25	0	396	1	3	30	211	169	2004
Imidazolidinyl Ureia	131	44	0	132	0	0	1	54	19	381
Iodopropynyl Butylcarbamate	894	160	8	338	0	39	28	372	76	1915
Sodium Benzoate	5036	831	112	2625	427	728	197	3429	1220	14605
BHA Butylated Hydroxyanisole	29	64	100	2	0	6	8	13	69	317
Tocopheryl Acetate	3377	2026	5229	6630	14	3583	490	4746	1776	27871
Chlorhexidine Digluconate	153	54	1	125	0	0	4	27	1	365
Cetearyl Alcohol	5789	257	148	1869	8	38	149	2599	765	11622
Sorbitan Sesquioleate	54	520	133	738	0	51	1	190	14	1701
Cocamide DEA	40	0	0	12	0	0	0	21	29	102
Lauryl Glucoside	1215	15	0	301	49	140	10	479	34	2243
Shellac	1	35	1	1	0	0	0	3	0	41
Benzophenone-3	84	12	37	108	0	8	68	126	98	541
Benzophenone-4	542	3	9	100	0	4	13	316	313	1300
Benzalkonium Chloride	42	22	1	60	0	7	29	53	252	466
Mentha Piperita	12	0	1	0	3	0	0	6	0	22
Dodecil Gallate	0	0	0	2	0	0	0	0	0	2
Coco Glucoside	568	102	0	448	2	261	57	758	199	2395

Hair care: conditioner, hair relaxer, shampoo, styling gel/lotion, hair fixers, demister, hair mask, gel, hair coloring and bleaching, hair relaxer, spray, hair treatment/serum, dry shampoo, styling mousse/foam, leave-in and oil.
Eyes: concealer, mascara, eye cream, eye makeup remover, eyeliner, eyebrow liner, eyeshadow.
Lip: lipstick, lip balm, lip gloss, lip balm with SPF, lip dye, filler and eyeliner
Face: moisturizer, facial whitener, makeup remover, anti-aging, facial hydration mask, blush, foundation, facial cleanser, toners/astringents, CC Cream, BB cream, sunscreen, bronzer/highlighter, powder, makeup primer, powder/spray fixing, after sun care, facial cleansing water
Oral Hygiene: toothpaste, mouthwash, teeth whitening.
Children's products: barrier cream, baby wipes, sunscreen, bubble bath, lotion, shampoo, toothpaste, soap and oil.
Men's products: shaving cream, antiperspirant/deodorant, fragrance, beard cleanser, beard care, beard oil, soap, aftershave.
Body: body firming lotion, moisturizer, after-sun product, liquid soap, artificial tanning, exfoliant, tanning oil, bath oil/salts/immersion, body spray, oil, body foam, body powder, bar soap, sunscreen, highlighter body, after sun, depilatory wax, wet tissue.
Others: women's fragrances, muscle/joint pain cream, hand cream, nail polish, foot moisturizer, serums and essences, liquid hand soap, muscle/joint pain patches, antiperspirant/deodorant (female), hand sanitizer, nail treatment, foot cleaning, cuticle treatment, nail polish remover, nail glue, talcum powder, foot deodorant, hand and foot scrub, nail polish, lubricants, moisturizing foot socks.

Table 5. Products in the Contact Allergy Management Program® (CAMP) database and its cosmetic subgroups (accessed 2024 Sep 4).

Allergen	Makeup (n = 1316)	Emphasis	Skin care (n = 3120)	Emphasis
Tocopheryl	57.44%	Foundation 68.53% (98/143)	47%	Sunscreens 75.85% (311/410)
Sorbitan sesquioleate	36.01%	Mascara 47.77% (75/157)	36.95%	Moisturizers 40.58% (289/712)
Sodium benzoate	15.72%	Foundation 24.47% (35/143)	36.53%	Soaps\Cleansers 43.13% (248/575)
Benzyl alcohol	12.84%	Foundation 18.88% (27/143)	24.8%	Moisturizers 28.37% (202/712)
Mentha piperita	5.77%	Lip; Balm 35.84% (19/53)	5.6%	Shaving 19.25% (26/135)
Coco-glucoside	4.33%	Remover 21.91% (16/73)	18.26%	Soaps\Cleansers 22.95% (132/575)
Lauryl glucoside	4.33%	Remover 21.91% (16/73)	15.54%	Soaps\Cleansers 22.78% (131/575)
DMDM hydantoin	2.65%	Mascara 5% (8/157)	5.67%	Soaps\Cleansers 8.52% (49/575)
Imidazolidinyl urea	2.65%	Mascara 5% (8/157)	5.67%	Soaps\Cleansers 8.52% (49/575)
Cetearyl alcohol	2.58%	Remover 8.21% (6/73)	20.54%	Moisturizers 35.67% (254/712)
Benzophenone-3	1.67%	Remover 5.47% (4/73)	3.14%	Facial Moisturizers with SPF 11.57% (14/121)
Dodecyl gallate / lauryl gallate	1.51%	Lipstick 7.5% (6/80)	1.95%	Anti-Aging\ Skin Firming 3.59% (13/362)
Iodopropynyl butylcarbamate	1.44%	Remover 9.58% (7/73)	5.16%	Soaps\Cleansers 9.73% (56/575)
Benzalkonium chloride	1.21%	Remover 8.21% (6/73)	3.42%	Hand Soap/ Sanitizer 25.4% (30/118)
Benzophenone-4	0.75%	Remover 4.1% (3/73)	1.85%	Toners\Astringents 13.79% (8/58)
Chlorhexidine digluconate	0.68%	Lipstick 3.75% (3/80)	2%	Eye Creams 11.36% (15/132)
Shellac	0.68%	Lipstick 3.75% (3/80)	1.25%	Sunscreens 2.19% (9/410)
Butylated hydroxyanisole (BHA)	0.53%	Lipstick 3.75% (3/80)	1.44%	Sunscreens 2.19% (9/410)
Cocamide DEA	0.45%	Lipstick 3.75% (3/80)	1.34%	Soaps\Cleansers 1.91% (11/575)
TBHQ (tert-butylhydroquinone)	0.45%	Lipstick 3.75% (3/80)	1.31%	Soaps\Cleansers 1.73% (10/575)

Table 6. Proposed cosmetics series.

Number	Allergen	Concentration (%)	Vehicle	CAS number
1	Tocopheryl acetate	10	Pet	7695-91-2
2	Benzyl alcohol	10	Softisan	100-51-6
3	Cetearyl alcohol	20	Pet	67762-27-0
4	Sodium benzoate	5	Pet	532-32-1
5	Benzophenone-3	10	Pet	131-57-7
6	Benzophenone-4	10	Pet	4065-45-6
7	Butylated hydroxyanisole (BHA)	2	Pet	121-00-6
8	Benzalkonium chloride	0.1	Aqua	63449-41-2
9	Coco-glucoside	5	Pet	68424-94-2
10	Cocamide diethanolamine	0.5	Pet	68603-42-9
11	Chlorhexidine digluconate	1	Aqua	18472-51-0
12	DMDM hydantoin	2	Aqua	6440-58-0
13	Dodecyl gallate / lauryl gallate	0.25	Pet	1166-52-5
14	Shellac	20	Alc	9000-59-3
15	Imidazolidinyl urea	2	Pet	39236-46-9
16	Iodopropynyl butylcarbamate	0.2	Pet	55406-53-6
17	Lauryl glucoside	3	Pet	110615-47-9
18	Mentha piperita	2	Pet	8006-90-4
19	Sorbitan sesquioleate	20	Pet	8007-43-0
20	TBHQ (tert-butylhydroquinone)	1	Pet	1948-33-0

assessed the relevance of substances by finding them in large databases. This provided support for the positivity case series.

The study was limited by consulting international databases. We know that large multinationals produce cosmetics worldwide; so many national products have similar compositions to those produced in other countries. However, this does not consider the national industry, including regional products. We would like this work to be the impetus for related specialty societies to create Latin American databases, with free access for patients and specialists, which would certainly greatly help in addressing contact dermatitis.

In summary, continuous revision and updating of the patch test series is crucial for accurately diagnosing cosmetic-related contact dermatitis and keeping pace with the evolving beauty industry.

Conflict of interest

There was no conflict of interest.

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