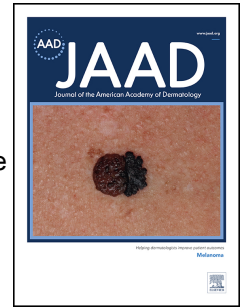


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Prevalence of Potentially Allergenic Ingredients in Products Labeled for Eczema Care

Ben L. Schwartz, BA, BS, Golara Honari, MD, Albert S. Chiou, MD, Justin Ko, MD, MBA, Kavita Y. Sarin, MD, PhD, Jennifer K. Chen, MD



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Title: Prevalence of Potentially Allergenic Ingredients in Products Labeled for Eczema Care

Authors: Ben L. Schwartz BA, BS¹; Golar Honari, MD¹; Albert S. Chiou, MD¹; Justin Ko, MD, MBA¹; Kavita Y. Sarin, MD, PhD¹; Jennifer K. Chen, MD¹

Affiliations: ¹Department of Dermatology, Stanford University School of Medicine, Redwood City, California

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Corresponding Author/Reprint Requests:

Jennifer K. Chen, MD
Clinical Associate Professor of Dermatology
Stanford University School of Medicine
450 Broadway Pavilion C 2nd Floor MC 5334, Redwood City, CA 94063
Phone: (650) 723-6316
Email: jenniferkchen@stanford.edu

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Abbreviations:

NACDG: North American Contact Dermatitis Group

ACD: Allergic Contact Dermatitis

Clinicians routinely recommend that eczema patients choose skin care products free of common sensitizers, to avoid allergic contact dermatitis (ACD).^{1,2} Previous studies have evaluated products labeled as “hypoallergenic” or “fragrance-free,” and discovered that such marketing claims lack regulation and are unhelpful in determining hypoallergenicity.^{2,3} However, over-the-counter products claiming to treat eczema have not been studied. These are ~~regulated~~ classified as drugs rather than cosmetics; thus, they are subject to oversight by the Food and Drug Administration and must 1) demonstrate safety and efficacy, or 2) contain colloidal oatmeal or hydrocortisone 0.25-1%, which are deemed generally recognized as safe and effective for eczema.⁴ Herein, we evaluated the allergen content in products labeled specifically for eczema.

We searched three major online retailers’ websites (CVS, Walgreens, and Amazon) to identify products labeled for eczema. For CVS and Walgreens, the term “eczema” was searched, while for Amazon, the best-sellers list was used, yielding 128, 84, and 100 products from CVS, Walgreens, and Amazon, respectively.

Products with the term “eczema” in the product name or label were included. Duplicates and products without verifiable ingredient lists were excluded, resulting in 74 unique products verified by the manufacturer’s website and/or product photographs on the retailer’s website. Allergens from the North American Contact Dermatitis Group (NACDG) series⁵ were cross-referenced with ingredient lists. We defined “fragrance” as ~~any~~ chemicals listed as a fragrance or cross-reactors in the American Contact Dermatitis Society Contact Allergen Management Program Database (accessed 9/16/2020). Our study was deemed Institutional Review Board exempt.

The average number of allergens per product was 2.4. 46% of products contained colloidal oatmeal, and 22% hydrocortisone. 12(16.2%) products had no NACDG allergens, 62(83.8%) had ≥ 1 allergen, 49(66.2%) ≥ 2 , and 12(16.2%) ≥ 5 (Figure1). The most common allergens were fragrance (47.3% products) and Compositae (37.8%) (Table1). 25 products bore the National Eczema Association seal, averaging 2.3 allergens per product.

~~Our study demonstrates that~~ Altogether, eczema products labeled for eczema frequently contained potential allergens. ~~The most common allergen was~~ most commonly fragrance, recently ranked by the NACDG as the second most clinically significant allergen overall after systematic assessment of allergen prevalence and relevance (Table1).⁵ Methylisothiazolinone and methylchloroisothiazolinone/methylisothiazolinone, ranked first and fourth, were not present; these were previously found frequently in “hypoallergenic” products.³ Three of our top 5 allergens (tocopherol, ethylhexylglycerin, parabens) have a prevalence of $<1\%$ according to ~~NACDG data~~, and thus are unlikely to be problematic.⁵

Notably, a novel finding was the high prevalence of Compositae plants (37.8%), greater than ~~that~~ previously found in products labeled as “hypoallergenic” ($<6\%$).³ A metanalysis recently demonstrated a statistically significant increased risk of Compositae contact allergy in atopic dermatitis patients.¹ The frequent inclusion of Compositae plants, which have purported soothing properties, in eczema products may be contributing to this heightened rate of sensitization, and further study is warranted.

~~ACD is often difficult to identify when coexisting with other forms of eczema and may be a significant, yet curable, driver of disease. Clinicians should consider providing eczema patients with recommendations for products free of fragrance or Compositae.~~

Clinicians should be aware that products labeled for eczema may contain allergens, with the most likely to be relevant being fragrance and Compositae. Patch testing should be considered for treatment-refractory eczema patients, and patients with allergy to fragrance or Compositae plants should be made aware of their frequent presence in eczema products. Further study is required regarding the sensitization potential of allergens in eczema products.

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Figure 1. Number of allergens from the North American Contact Dermatitis Group (NACDG) series found in 74 products labeled for use in the treatment of eczema

147 **Table 1. Potential allergens in 74 products labeled for use in the treatment of eczema**

Allergen	Number (%) of Products Containing Allergen	Significance-Prevalence Index Number (SPIN) Ranking ^a
Fragrance	35 (47.3%) ^b	2 ^c
<i>Traditional Fragrance Chemicals^d</i>	27 (77.1%) ^b	
Benzyl alcohol	15 (42.9%)	
Lavender (<i>Lavandula angustifolia</i>) oil	5 (14.3%)	
"Fragrance/Parfum"	4 (11.4%)	
Menthol	2 (5.7%)	
Eucalyptus (<i>Eucalyptus globulus</i>) leaf oil	1 (2.9%)	
Bulgarian Rose (<i>Rosa damascena</i>) flower oil	1 (2.9%)	
<i>Other Fragrance Chemicals^d</i>	10 (28.6%) ^b	
Ginger (<i>Zingiber aromaticus</i>) extract	7 (20.0%)	
C12-15 alkane/cycloalkane/aromatic hydrocarbons	5 (14.3%)	
Clover (<i>Trifolium pratense</i>) flower	1 (2.9%)	
Clary amber oil	1 (2.9%)	
Apple flavor	1 (2.9%)	
Compositae (Asteraceae)	28 (37.8%) ^b	29
Bisabolol ^e	8 (28.6%)	
Chamomile (<i>Chamomilla matricaria</i> & <i>Anthemis nobilis</i>)	6 (21.4%)	
Sunflower (<i>Helianthus annuus</i>)	6 (21.4%)	
Safflower (<i>Carthamus tinctorius</i>)	4 (14.3%)	
Marigold (<i>Calendula officinalis</i>)	3 (10.7%)	
Feverfew (<i>Tanacetum parthenium</i>)	2 (7.1%)	
Arnica (<i>Arnica montana</i>)	1 (3.6%)	
Yarrow (<i>Achillea millefolium</i>)	1 (3.6%)	
Tocopherol	26 (35.1%)	45
Ethylhexylglycerin	19 (25.7%)	64
Paraben	18 (24.3%)	48
Hydrocortisone	16 (21.6%)	69
Propolis	13 (17.6%)	31
Propylene glycol	9 (12.2%)	10
Tea tree (<i>Melaleuca alternifolia</i>)	5 (6.8%)	36
Diazolidinyl urea	3 (4.1%)	40
Decyl glucoside	2 (2.7%)	25
Cocamidopropyl betaine	2 (2.7%)	26
Ethylenediamine dihydrochloride	2 (2.7%)	62
Iodopropynyl butylcarbamate	1 (1.4%)	16
DMDM hydantoin	1 (1.4%)	51

148

149

- a. The significance-prevalence index number (SPIN) score ranks allergen significance using prevalence data weighted by clinical relevance. Rankings presented are sourced from NACDG 2015-2016 data.⁵
- b. If multiple fragrance chemicals were identified in a single product, these were counted as one fragrance-containing product when calculating the total number of products containing fragrance, traditional fragrance chemicals, or other fragrance chemicals. When multiple Compositae ingredients were identified in a single product, these were likewise only counted as one allergen: "Compositae."
- c. SPIN ranking for Fragrance Mix I provided.
- d. Categorization of traditional versus other fragrance chemicals taken from Kullberg, et al.⁶
- e. Note that bisabolol is a plant extract isolated from naturally occurring sesquiterpene alcohol that is the primary component of German chamomile (*Chamomilla matricaria*) flower oil.

Figure 1. Number of allergens from the North American Contact Dermatitis Group (NACDG) series found in products labeled for use in the treatment of eczema

