Comparison of Contact Allergens in Bar Soaps and Liquid Body Washes

To the Editor:

Allergic contact dermatitis (ACD) describes a delayed classic T-cell–mediated (type IV) hypersensitivity immune response to external substances that contact the skin. This often manifests as pruritus, erythema, and vesiculation that may progress to lichenification, xerosis, and fissuring.[1] Identification and avoidance of specific allergens are key to adequate management and care.[1] Although previous studies have investigated the presence of numerous contact allergens in cleansing products,[2] limited research on the contact allergens of specific formulations of cleansing products currently exists. We aim to identify the difference between the number and types of contact allergens found in bar soaps versus liquid body washes.

We examined the top 50 bar soaps and body washes listed on Amazon.com, sorting by "relevance" and filtering by "avg. customer review 4 stars and up" on October 6, 2016. Ingredient lists were almost entirely obtained from Amazon.com, but a few were collected from Target.com, Walgreens.com, and specific product Web sites. Allergens were selected from the American Contact Dermatitis Society core allergen series,[3] with the expertise of a coauthor. χ^2 and Fisher exact tests were used to compare allergens in bar soaps versus body washes.

Liquid body washes had far more preservative and surfactant allergens compared with bar soaps ($P < 0.001$, Table 1). No differences in fragrances existed between bar soaps and body washes.

Of the preservatives studied, methylisothiazolinone, quaternium-15, sodium benzoate, methylchloroisothiazolinone/methylisothiazolinone, DMDM hydantoin, phenoxyethanol, and iodopropynyl butylcarbamate were particularly prevalent in body washes compared with bar soaps. Of the surfactants studied, cocamidopropyl betaine and alkyl glucosides were ubiquitous in body washes and rarely seen in bar soaps. Polyethylene glycol was found in 38% of body washes but only in 8% of bar soaps (Table 1).

A number of the most common contact allergens identified by the American Contact Dermatitis Society have been identified in soaps and cleansers[3]; however, studies investigating these allergens in bar soaps and body washes are limited. Our study revealed a significantly higher number of preservative and surfactant allergens in body washes versus bar soaps.

In recent years, bar soap sales have fallen by 2.2% despite a 2.7% rise in overall bath and shower product sales. Consumers younger than 65 years are primarily responsible. For example, only one third of consumers aged 25 to 34 years are willing to wash their face with bar soap compared with 60% of those older than 65 years.[4] Potential explanations for this include the perceived inconvenience of storing bar soaps and the perceived uncleanliness of using them. However, in a study of 16 participants who washed their hands with bar soaps inoculated with gram-negative bacteria, none of the participants had detectable levels of bacterium on their hands after washing.[5]

Limitations include an inability to specify fragrances in all products because product labels are not required to report specific fragrance compounds. Second, ingredients obtained from retailers such as Amazon.com may be subject to error, although we limited this risk by cross-checking ingredient lists found on other Web sites.

Because ACD often creates a treatment challenge, health care providers will benefit from an improved understanding of potential ingredients in products commonly associated with the condition. The use of bar soaps instead of body washes may alleviate symptoms and improve quality of life in some patients with ACD.

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TABLE 1. Allergens in Body Washes Versus Bar Soaps in Top 50 Amazon.com Products, in Order of Frequency of Allergens in Body Washes

Type of Allergen	Allergen	No. Body Washes With Allergen (N = 50)	No. Bar Soaps With Allergen (N = 50)	*P* (χ^2 Test)
Preservative	Methylisothiazolinone	19	0	<0.001
	Quaternium-15	16	0	<0.001
	Sodium benzoate	15	0	<0.001
	Methylchloroisothiazolinone/methylisothiazolinone	12	0	<0.001
	DMDM hydantoin	10	0	<0.001
	Phenoxyethanol	9	0	0.002
	Iodopropynyl butylcarbamate	5	0	0.02
	Diazolidinyl urea	1	0	0.32
	Paraben	1	0	0.32
	Imidazolidinyl urea	0	0	—
	2-Bromo-2-nitropropane-1,3-diol (bronopol)	0	0	—
	Methyldibromo glutaronitrile	0	0	—
	Benzalkonium chloride	0	0	—
Surfactant	Cocamidopropyl betaine	26	7	<0.001
	Decyl glucoside	6	0	0.01
	Coco glucoside	4	0	0.05
	Sodium lauryl sulfate	3	0	0.08
	Glyceryl glucoside	3	0	0.08
	Lauryl glucoside	3	0	0.08
	Caprylyl/capryl glucoside	2	0	0.15
	Cocamide diethanolamine	1	0	0.32
	Oleamidopropyl amine	0	0	—
	Amidoamine	0	0	—
Fragrance	Any fragrance	48	47	0.65
Metal	Titanium dioxide	4	27	<0.001
Miscellaneous	Propylene glycol or dipropylene glycol	17	13	0.38
	Tocopherol (vitamin E)	7	8	0.78
	Polyethylene glycol	19	4	0.0004
	Sorbitol	1	4	0.17
	Benzyl alcohol	6	3	0.29
	Tea tree (Melaleuca)	1	1	1
	Propolis (bee glue, cera alba)	0	1	0.31
	Polysorbate 80	0	1	0.31
	Lanolin	2	1	0.56

Summary

Type of Allergen	No. Body Washes With ≥1 Type of Allergen (N = 50)	No. Bar Soaps With ≥1 Type of Allergen (N = 50)	*P* (χ^2 Test)
Preservative	44	0	<0.001
Surfactant	34	7	<0.001
Fragrance*	48	47	0.65
Other†	37	35	0.66

None of the following antibiotic ingredients were found in any of the bar soaps or body washes studied: chlorhexidine, chloroxylenol, and triclosan. Triclocarban was found in 2 bar soaps but was excluded from analyses because a recent ruling by the Food and Drug Administration has banned its use in products, effective as of September 6, 2017.

*Fragrances include Balsam of Peru, cinnamic aldehyde (cinnamaldehyde), ylang-ylang, jasmine, lavender, citronellol, eugenol, hexyl cinnamal, linalool, jojoba, limonene, amyl cinnamal, *Mentha piperita*, and rosemary.

†Metals and miscellaneous.