

BRIEF REPORT

Pediatric Dermatology 1–2, 2012

SYSTEMIC CONTACT DERMATITIS – KIDS AND KETCHUP

Abstract: Systemic manifestations of allergic contact dermatitis due to consumption of foods containing balsam of Peru (*Myroxylon pereirae*)-associated chemicals have recently been reported in children. We present seven children with widespread, recalcitrant dermatitis who experienced 60–80% clearance after initiating a diet low in balsam of Peru, specifically the tomato product ketchup. Furthermore, because we have observed a high prevalence of ketchup in our pediatric patients' diets, we recommend consideration of moderate consumption of this product in patients with recalcitrant widespread dermatitis.

Balsam of Peru (BOP) is a gum resin extracted from the *Myroxylon pereirae* tree, native to El Salvador. The extract has been used for medicinal purposes dating back to the Incan empire (~15th century), when it was used for fevers, colds, coughs, bronchitis, and skin infections. The Aztecs in Mexico, also in approximately the 15th century, cultivated the tree in their royal gardens and made compresses with the mashed leaves to speed the healing of wounds. In the 1500s, the Spanish clergy used it as a highly prized sacramental ointment and began exporting it to Europe from the port of Callao in Peru, dubbing it balsam of Peru (BOP) (1).

The BOP extract is a complex substance acquired by wounding and tapping a mature tree. It is composed of a

wide number of volatile oils and resins, such as cinnamein, a combination of cinnamic acid, benzoyl cinnamate, benzoyl benzoate, benzoic acid, vanillin, and nerolidol, which conveys an aroma of vanilla and cinnamon (1). A significant number of cross-reactions can occur with certain food sources that naturally contain similar chemicals, such as orange peel, clove, and tomatoes (2) (Table 1).

Moreover, in the 1700s, Maine seamen returning from Mexico and the Spanish West Indies introduced a new, exotic fruit, the tomato, to New Englanders, and the tomato ketchup we know today was created. By the second half of the 1800s, ketchup became commercially available, with sales exceeding \$400 million annually during the mid-1990s (3).

CASE SERIES

Seven patients with widespread, recalcitrant dermatitis were evaluated for an allergic contact dermatitis component. All patients were noted to have a significant ketchup intake (at least three times a week, some daily). Patients 3–6 were diagnosed with atopic dermatitis according to the Hanifin and Rajka criteria (4) before referral to our clinic. Patch testing was performed according to the International Contact Dermatitis Research Group Protocol on five of the seven children, with results listed in Table 2. A diet low in BOP, with

TABLE 1. Balsam of Peru diet (Top Food Avoidance List)²

Tomatoes and tomato-containing products
(ketchup, red pizza sauce, spaghetti sauce, chili)
Spices (cinnamon, cloves, vanilla)
Peels of citrus fruits
Chocolate
Cola and spiced sodas

TABLE 2. Patients with Significant Improvement with Ketchup Avoidance

Patient	Age (years)	Sex	AD	Patch test results	Food avoidance and triggers	Improvement with avoidance, %
1	3	Male	No	BOP 2 + Cinnamic alcohol 1 +	Soda† and ketchup	80
2	4	Male	No	No patch test	Pizza (red sauce) and ketchup	80
3	4	Male	Yes	No patch test	Ketchup, tomato sauce	70
4	5	Female	Yes	BOP 1 +	Chocolate milk and ketchup	80
5	8	Male	Yes	BOP 1 +	Ketchup	80
6	7	Female	Yes	Cinnamic aldehyde 1 + Colophony 1 +	Ketchup	60
7	11	Male	No	BOP 2 + Cinnamic alcohol 1 + Sodium benzoate 1 +	Baked beans,* soda,† and ketchup	80

*Contains tomato sauce and sodium benzoate.

†Contains artificial flavors and sodium benzoate.

BOP, balsam of Peru; AD, atopic dermatitis.

DOI: 10.1111/j.1525-1470.2011.01702.x

specific dietary intervention directed at individual main dietary sources, was suggested for all seven patients and was instrumental in achieving 60–80% clearance in all (Table 2).

DISCUSSION

Allergic contact dermatitis to BOP has been reported in children in association with fragranced products and more recently, systemic activation after consumption of foods naturally high in BOP-associated chemicals (5). The close relationship between tomatoes and BOP has been previously identified, specifically in that they both contain cinnamic alcohol (2). Our patients demonstrated allergic reactions that were stimulated systemically by components of the BOP diet, specifically ketchup. Because we have observed a high prevalence of ketchup in our pediatric patients' diets, we recommend giving consideration to moderate consumption of this product in patients with recalcitrant widespread dermatitis.

REFERENCES

1. Hjorth N. Eczematous allergy to balsams, allied perfumes and flavouring agents, with special reference to

- balsam of Peru. *Acta Derm Venereol* 1961;41(Suppl 46):1–216.
2. Salam TN, Fowler JF Jr. Balsam-related systemic contact dermatitis. *J Am Acad Dermatol* 2001;45:377–381.
3. How Products Are Made, Volume 2: Ketchup. (2001), <http://www.madehow.com/Volume-2/Ketchup.html>. Accessed on August 2, 2011.
4. Brenninkmeijer EE, Schram ME, Leeflang MM et al. Diagnostic criteria for atopic dermatitis: a systematic review. *Br J Dermatol* 2008;158:754–765.
5. Matiz C, Jacob SE. Systemic contact dermatitis in children: how an avoidance diet can make a difference. *Pediatr Dermatol* 2011;28:368–374.

ELISE M. HERRO, M.D.
SHARON E. JACOB, M.D.
Division of Dermatology, Rady Children's Hospital
and University of California, San Diego, San Diego,
California

Address correspondence to Sharon E. Jacob, M.D., Associate Professor of Clinical Dermatology, Contact Dermatitis Clinic Rady Children's Hospital, 8010 Frost St., Suite 602, San Diego, CA 92123, or e-mail: sjacob@contactderm.net.