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Six Children With Allergic Contact Dermatitis to Methylisothiazolinone in Wet Wipes (Baby Wipes)

Mary Wu Chang and Radhika Nakrani

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Six Children With Allergic Contact Dermatitis to Methylisothiazolinone in Wet Wipes (Baby Wipes)

abstract

Methylchloroisothiazolinone/methylisothiazolinone (MCI/MI) is a combination preservative used in personal care and household products and is a common cause of allergic contact dermatitis (ACD). Recently, MI alone, without MCI, has been increasingly used in consumer products in attempts to minimize allergic reactions. Wet wipes are extensively tested and traditionally believed to be innocuous. MI in wet wipes (“baby wipes”) has not been previously reported to cause ACD in children in the United States. Only 1 previous report of ACD in a child in Belgium has been recently reported. We report 6 children with chronic, perianal/buttock, and facial eczematous dermatitis, refractory to multiple topical and oral antibiotics and corticosteroids. All tested positive to MCI/MI on patch testing. None wore diapers. All patients had been using wet wipes containing MI (without MCI) to affected areas. Discontinuation of wipes resulted in rapid and complete resolution. This is the first report of pediatric ACD to MI in wet wipes in the United States, and the largest series to date. ACD to MI in wet wipes is frequently misdiagnosed as eczema, impetigo, or psoriasis. Wet wipes are increasingly marketed in personal care products for all ages, and MI exposure and sensitization will likely increase. Dermatitis of the perianal, buttock, facial, and hand areas with a history of wet wipe use should raise suspicion of ACD to MI and prompt appropriate patch testing. Rapid resolution occurs after the allergen exposure is eliminated. All isothiazolinones should be avoided in personal care and household products for these patients. *Pediatrics* 2014;133:e434–e438

AUTHORS: Mary Wu Chang, MD^a and Radhika Nakrani, BS^b

^aDepartments of Dermatology and Pediatrics, and ^bMedical Student, University of Connecticut School of Medicine, Farmington, Connecticut

KEY WORDS

contact dermatitis, diaper dermatitis, methylisothiazolinone, wipes, patch testing, eczema, perioral dermatitis

ABBREVIATIONS

ACD—allergic contact dermatitis

MCI—methylchloroisothiazolinone

MI—methylisothiazolinone

T.R.U.E. Test—Thin-layer Rapid Use Epicutaneous Patch Test

Dr Chang diagnosed, photographed, and treated the patients; conceptualized this case series; supervised data collection and analysis; drafted the initial manuscript; and reviewed and revised the manuscript; Ms Nakrani conceptualized this case series, performed literature review, collected and analyzed data, drafted the initial manuscript, and reviewed and revised the manuscript; and both authors approved the final manuscript as submitted.

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Address correspondence to Mary Wu Chang, MD, Departments of Dermatology and Pediatrics, University of Connecticut School of Medicine, 65 Memorial Rd, Ste 450, West Hartford, CT 06107.

E-mail: mary.chang@pedsderm.com

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Methylchloroisothiazolinone/methylisothiazolinone (MCI/MI) in a 3:1 combination (trade name Kathon™ CG, Dow Chemical Company, Newark, DE) was first introduced as a preservative in the United States in the 1980s and is a known cause of allergic contact dermatitis (ACD).¹ As rates of contact allergy increased, regulations were placed to restrict concentrations of MCI/MI used in cosmetics and household products. Recently, MI alone, believed to be a weaker sensitizer than MCI, has been released for preservative use; however, its permitted concentration has increased by more than 25 times: from 3.7 ppm to 100 ppm. In 2010, 6 cases of perianal dermatitis in adults, caused by the use of MI-containing moist toilet paper in Belgium were among the first published nonoccupational cases related to MI-only exposure.² Only 1 pediatric case of ACD to MI in wipes has been previously reported, from Belgium.³ MI has been named as the 2013 American Contact Dermatitis Society Contact Allergen of the Year to raise awareness of this allergen.¹

“Baby wipes” are extensively tested and traditionally used in infants with minimal adverse events, and MI alone has not been reported to cause ACD in children in the United States. However, we report herein 6 children with chronic, recalcitrant perianal and/or facial dermatitis, ultimately diagnosed with ACD to MI in wet wipes (or “baby wipes”). None wore diapers. All cases were confirmed by patch test, and all dermatitis resolved within days once the offending wipes were discontinued.

CASE REPORT

Case 1

A previously healthy 8-year-old girl presented to dermatology with a 6-week history of eczematous, excoriated, crusted, and weeping plaques on the cheeks and around the mouth (Fig 1A). Previously diagnosed with impetiginized eczema, she received numerous oral

(amoxicillin/clavulanate, cephalexin, cefdinir) and topical (neomycin/polymixin/gramicidin, mupirocin 2%, retapamulin 1%) antibiotics, and topical steroids (hydrocortisone 2.5%, triamcinolone 0.1%) from primary care providers. ACD was suspected, the parent was instructed to discontinue all topical medications and cleansers, and a short course of topical triamcinolone acetonide 0.1% ointment was prescribed. The facial rash improved, but over the next several months it recurred, along with erythematous, eczematous scaly plaques with excoriation in the perianal/buttock area. Questioning revealed the use of wet wipes after toileting, as well as use for facial cleansing. The mother was advised to discontinue using wipes, and cleanse with plain water. At follow-up, the rash had persisted at both sites. On questioning, it was revealed that the mother did not discontinue wet wipes, deciding instead

to try switching brands. Patch testing revealed a ++ reaction to MCI/MI (Thin-layer Rapid Use Epicutaneous Patch Test [T.R.U.E. Test]). The patient had been using Cottonelle and Huggies wipes (both manufactured by Kimberly-Clark Corporation, Neenah, WI); these were noted to contain MI, without MCI. After discontinuing all use of wipes, the patient's rash completely and rapidly resolved, and did not recur (Fig 1B).

Other Cases

An additional 5 children were diagnosed with ACD to MI in wet wipes, after presenting with chronic erythematous, eczematous, and pruritic patches and plaques in the perianal/buttock and sometimes perioral regions. All were confirmed on patch testing, all had been using wipes containing MI (without MCI) in the affected areas, and all had rapid resolution after discontinuing the wipes.



FIGURE 1

Case 1, 8-year-old girl. A, On presentation, chronic, erythematous, eczematous patches and plaques with crusting and fissuring around mouth are noted. B, Rapid resolution occurred after discontinuation of offending wipes.

These 6 cases presented over a 22-month period (March 2011 to January 2013) and are summarized in Table 1.

For all patients, epicutaneous patch testing was performed using T.R.U.E. Test. Patches were placed and secured with medical tape and worn for 48 hours. Patches were removed at 48 hours, then patch reading was performed by a pediatric dermatologist (M.W.C.) on day 3, 72 hours after application. Results were noted per International Contact Dermatitis Research Group nomenclature: +/- (doubtful reaction; erythema), + (weak positive reaction; erythema, discrete papule), ++ (strong positive reaction; erythema, papule, discrete vesicle), +++ (extreme positive reaction; erythema, papule, bullae). Contact allergy was confirmed with + or ++ results noted in all 6 patients (see Table 1).

DISCUSSION

Several cases have been reported in the literature of adults developing contact allergy to wet wipes ("moist toilet paper") confirmed on patch testing.^{2,4-7} Interestingly, children have rarely been identified as having dermatitis caused by wet wipes. Only 2 cases of children developing contact dermatitis from wet wipes containing MCI/MI have been reported,^{8,9} and only 1 reported pediatric case of ACD to wipes containing MI was retrospectively diagnosed after

she was found to be allergic to MI released from her freshly painted bedroom.⁵

Although MI is replacing MCI/MI, no pediatric cases of contact allergy have yet been reported in the United States, where MI (without MCI) has been identified as the allergen. We present 6 cases of ACD in children from the use of wet wipes containing MI as a preservative. The brands were Cottonelle and Huggies wipes. These wipes are commonly found in US retail stores, and an informal survey of stores in our area revealed approximately half of all wet wipes currently on shelves contain MI. The marketing and use of wipes for personal hygiene has been a growing trend. With ease of use and perception of a "cleaner" outcome, more parents are reaching for these products, and we expect that an increased incidence of contact dermatitis to these products will occur. In addition to affected children, ACD should be considered in caretakers with hand dermatitis who have contact with wet wipes.⁶

MI is a common cause of ACD but is likely underrecognized. Recent reviews on diaper dermatitis discuss ACD but fail to mention MI as a contact allergen.^{10,11} Of the formulations registered with the Food and Drug Administration, MI is one of the top preservatives found in personal care products, with frequency of

use increasing from 5.07% in 2007 to 6.54% in 2010.¹²

In our cases, ACD was misdiagnosed for 1 to 12 months by primary care providers. Patients were diagnosed with diaper dermatitis (see Fig 2), impetigo, eczema and atopic dermatitis, and psoriasis, and were unsuccessfully treated with a multitude of medications, including topical and oral antibiotics, and topical and oral corticosteroids. All dermatitis rapidly and fully resolved on discontinuation of the wipes. One patient in this series (patient 3) also suffered from chronic retroauricular dermatitis, which resolved after the parent identified a shampoo containing MI and discontinued its use.

Although T.R.U.E. Test detected contact allergy to MI in our 6 cases, it is important to note that identifying MI contact sensitization may require specialized MI patches. Commonly used investigator-loaded patch testing contains 100 ppm of MCI/MI mixture, which consists of only 25 ppm of MI, and can be inadequate to detect allergy to MI alone, missing 33% to 60% of cases.¹ Some authors have suggested using a concentration of 200 ppm or more, especially when it is not possible to obtain MI alone.² The manufacturer-loaded T.R.U.E. Test, with a concentration of 4 $\mu\text{g}/\text{cm}^2$ of MCI/MI mixture and only 0.8 μg of MI per patch, has a high

TABLE 1 Characteristics of Patients With ACD to MI in Wet Wipes (Baby Wipes)

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Age, y	8	6	4	4	4	3
Gender	Girl	Boy	Girl	Girl	Boy	Girl
Location	Perioral, perianal	Perioral, perianal	Anogenital	Perianal	Perianal	Perianal, trunk, extremities
Previous treatment	OA, TA, TCS	TCS	OA, TCS, TL	TCS	AF, OA, TCS, OCS	AF, TA, TCS
History of eczema	No	Yes	No	No	No	Yes
Patch test results on day 3 (T.R.U.E. Test)	++ MCI/MI	+MCI/MI	++ MCI/MI	++ MCI/MI +Cobalt	++ MCI/MI	+ MCI/MI + Nickel + Lanolin
Duration of symptoms before diagnosis	11 mo	12 mo	2 mo	1 mo	5 mo	6 mo
Brand of wipes used	Cottonelle	Huggies	Cottonelle	Cottonelle	Cottonelle	Cottonelle

Six children using wipes containing MI had positive patch test results and rapid resolution on discontinuation of offending wipes. Patch test interpretation (International Contact Dermatitis Research Group scoring): +/- (erythema), + (erythema + papule), ++ (erythema + papule + small vesicles), +++ (erythema + papule + bullae). AF, topical antifungal; OA, oral antibiotics; OCS, oral corticosteroids; TA, topical antibiotics; TCS, topical corticosteroids; TL, topical tacrolimus.

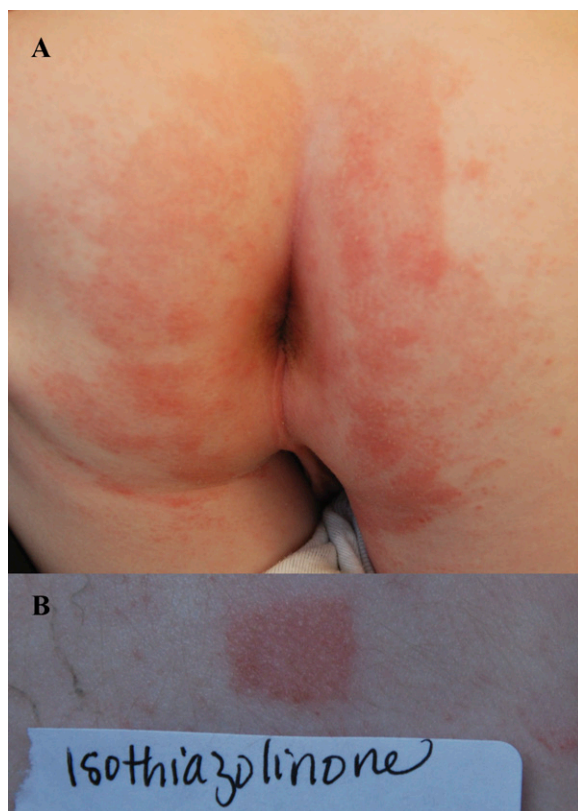


FIGURE 2

Case 2, 6-year-old boy. A, Chronic, recurrent erythematous, eczematous patches and plaques on the perianal region. B, Patch test result displaying positive reaction to MCI/MI on day 3.

concordance rate of positive results with the 100 ppm investigator-loaded tests and thus a similar phenomenon of suboptimal detection may occur.

Finally, the North American Contact Dermatitis Group estimates the prevalence of sensitization to MCI/MI as

determined by patch testing to be 2.5%.¹³ This may be an underestimate, as MI was not tested as an independent allergen, and the standard 100 ppm MCI/MI preparation may have been inadequate to detect MI contact allergy in some individuals.

CONCLUSIONS

The current trend toward the use of wipes in personal hygiene products is not without consequence. Contact allergy to MI and other preservatives in wet wipes or baby wipes can result in significant eczematous dermatitis, which is often misdiagnosed as atopic dermatitis, impetigo, diaper dermatitis, or psoriasis. As wet wipes are being increasingly marketed as personal care products for all ages, MI exposure and contact sensitization will likely increase. Dermatitis of the perianal, facial, and hand areas with a history of wet wipe use should raise suspicion of ACD to MI and prompt appropriate patch testing. Although our 6 patients tested positive with standard patch tests with MCI/MI, which contain a low concentration of MI, specialized patch tests with higher concentrations of MI may be needed to elicit a response in some patients. It is also possible to patch test the wipe “as is” if MI is not available. Parents should be instructed to read labels and avoid all isothiazolinones in personal care and household and environmental products. Resolution is usually prompt when the offending wipe and allergen are avoided.

REFERENCES

1. Castaneda-Tardana MP, Zug KA. Methylisothiazolinone. *Dermatitis*. 2013;24(1):2–6
2. Garcia-Gavin J, Vansina S, Kerre S, Naert A, Goossens A. Methylisothiazolinone, an emerging allergen in cosmetics? *Contact Dermatitis*. 2010;63(2):96–101
3. Aerts O, Cattaert N, Lambert J, Goossens A. Airborne and systemic dermatitis, mimicking atopic dermatitis, caused by methylisothiazolinone in a young child. *Contact Dermatitis*. 2013;68(4):250–251
4. Fields KS, Nelson T, Powell D. Contact dermatitis caused by baby wipes. *J Am Acad Dermatol*. 2006;54(suppl 5):S230–S232
5. Gardner KH, Davis MDP, Richardson DM, Pittelkow MR. The hazards of moist toilet paper: allergy to the preservative methylchloroisothiazolinone/methylisothiazolinone. *Arch Dermatol*. 2010;146(8):886–890
6. Guin JD, Kincannon J, Church FL. Baby-wipe dermatitis: preservative-induced hand eczema in parents and persons using moist towelettes. *Am J Contact Dermat*. 2001;12(4):189–192
7. Minet A, Eggers S, Willocx D, Bourlond A, Lachapelle JM. Allergic contact dermatitis from Kathon CG in moist toilet paper. *Contact Dermat*. 1989;21(2):107–108
8. Tosti A, Voudouris S, Pazzaglia M. Contact sensitization to 5-chloro-2-methylisothiazolin-3-one and 2-methyl-4-isothiazolin-3-one in children. *Contact Dermatitis*. 2003;49(4):215–216
9. Kazandjieva J, Gerđovska M, Darlenski R. Contact dermatitis in a child from methylchloroisothiazolinone and methylisothiazolinone in moist wipes [published online ahead of print July 2, 2012]. *Pediatr Dermatol*. doi:10.1111/j.1525-1470.2012.01804.x
10. Ravanfar P, Wallace JS, Pace NC. Diaper dermatitis: a review and update. *Curr Opin Pediatr*. 2012;24(4):472–479

11. Smith WJ, Jacob SE. The role of allergic contact dermatitis in diaper dermatitis. *Pediatr Dermatol.* 2009;26(3):369–370
12. Steinberg DC. Frequency of preservative use. *Cosmetics & Toiletries.* 2010;125(11):46–51
13. Warshaw EM, Belsito DV, Taylor JS, et al. North American Contact Dermatitis Group patch test results: 2009 to 2010. *Dermatitis.* 2013;24(2):50–59

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