

Short Communication

Detection of formaldehyde in moistened baby toilet tissues

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Formaldehyde is a ubiquitous and potent sensitizer. Formaldehyde-sensitive patients may have long-lasting hand eczema (1). Contact dermatitis from formaldehyde is often chronic, probably because it is so difficult to avoid exposure to formaldehyde-containing products. An investigation in Denmark showed that 1/3 of all cosmetic products contained formaldehyde or formaldehyde-releasing preservatives (2). Formaldehyde can also be found in many household products. In recent years, the use of moistened baby toilet tissues has greatly increased.

Patient and Methods

Our investigation was instigated by the case of a 32-year-old woman with hand eczema, who was allergic to both formaldehyde and moistened baby toilet tissue.

The acetylacetone method for qualitative determination of formaldehyde and high-performance liquid chromatography (HPLC) for quantitative assessment were used to test in parallel 10 brands of commercial moistened baby toilet tissue popular in Switzerland. With the acetylacetone method, formaldehyde reacts with acetylacetone in the presence of ammonia to form a yellow derivative: 3,5-diacetyl-1,4-dihydrolutidine. Both methods have previously been described in (3).

Table 1. Formaldehyde detection in 10 commercial brands of moistened baby toilet tissues, using the acetylacetone method and HPLC

Samples	HPLC (ppm)	Acetylacetone
A	112	yellow
B	149	yellow
C	209	yellow
D	48	yellow
E	25	yellow
F	17	yellow
G	58	yellow
H	84	yellow
I	25	yellow
J	18	yellow

Results

With the acetylacetone method, the distinct yellow coloration signalling the presence of acetylacetone-formaldehyde derivatives was clearly observed in all of the 10 samples. The quantitative results obtained with the various samples tested are given in Table 1. Formaldehyde was detected in the 10 popular brands of moistened baby toilet tissue at concentrations varying from 18 to 209 ppm as assessed by HPLC.

Discussion

With both methods, the presence of formaldehyde in all moistened baby toilet tissues popular in Switzerland was confirmed. In all samples, the amount detected was lower than the limit for declaration of free formaldehyde in cosmetics, which is 500 ppm in the EU. There is, however, little data on the eliciting threshold in formaldehyde-sensitive patients.

In their clinical investigations in allergic adults, Jordan et al. (4) applied 1-week continuous closed patch tests with graded dilutions and observed a response down to 30 ppm formaldehyde. More recently, Flyvholm et al. (5) observed in adults that the threshold concentration for a 2-day occluded patch test was 250 ppm. In their study, no positive reaction was seen to non-occluded patch test or ROAT with a cosmetic product containing 300 ppm free formaldehyde in a 1-week trial. These authors observed, however, a papular reaction pattern in some formaldehyde-sensitive individuals, suggesting a weak allergic reaction to formaldehyde that might evolve into frank dermatitis on prolonged exposure.

Although it is still uncertain whether the formaldehyde levels identified in these products may lead to sensitization, moistened baby toilet tissues should be avoided by individuals allergic to formaldehyde. Furthermore, it remains unknown whether babies might have a lower threshold level for sensitization than adults.

References

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