

Contact allergy to sodium sulfite and its relationship to sodium metabisulfite

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Summary

Background. Sulfites are in widespread use as preservatives/antioxidants. There is increasing recognition of allergic contact dermatitis caused by sodium metabisulfite; however, contact allergy to sodium sulfite is less well recognized.

Objectives. We sought to establish the prevalence of positive patch test reactions to sodium sulfite in our patient population and investigate its relationship with sodium metabisulfite.

Methods. Over a 4-month period, 183 patients referred for patch testing were tested with sodium sulfite 1% pet. in addition to sodium metabisulfite 1% pet., which already forms part of our baseline series.

Results. Positive allergic reactions occurred to sodium metabisulfite in 5.5% of the tested patients and to sodium sulfite in 3.8% of the tested patients. Sixty per cent of patients with a positive reaction to sodium metabisulfite were positive to sodium sulfite. Only 1 patient (0.6%) with a negative reaction to sodium metabisulfite showed a positive reaction to sodium sulfite.

Conclusions. This study shows that the majority of patients with positive reactions to sodium metabisulfite are also positive to sodium sulphite. Routinely patch testing with sodium sulfite is probably unnecessary, as most patients with positive reactions will also react to sodium metabisulfite. Clinicians should consider advising patients to avoid sodium sulfite and other sulfites when a positive allergic reaction to sodium metabisulfite occurs.

Key words: allergic contact dermatitis; patch test; sodium metabisulfite; sodium sulfite; sulfites.

Sulfites, comprising sodium sulfite, sodium bisulfite, sodium metabisulfite, and potassium metabisulfite, are used widely in the cosmetic, pharmaceutical, photographic and food industries for their preservative and antioxidant properties. Sulfites are also found in

a variety of foodstuffs, including wines. Intolerance to sulfites is already well recognized, and has been reported to result in asthma, urticaria, rhinoconjunctivitis, and anaphylactic shock (1). Over the past 20 years, there has been increasing awareness of allergic contact dermatitis caused by sodium metabisulfite (CAS 7681-57-4) (2, 3). The prevalence of allergic contact dermatitis caused by sodium sulfite (CAS 7757-83-7) has been less extensively investigated, and its relationship to sodium metabisulfite allergy is unclear. We sought to determine the prevalence of positive patch test reactions to sodium sulfite and its relationship to sodium metabisulfite in our patient population.

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Materials and Methods

The baseline patch test series used in our department already includes sodium metabisulfite (1% pet.; Chemotechnique Diagnostics®, Vellinge, Sweden). Over a 4-month period (April to June 2009), we added sodium sulfite (1% pet.) to our baseline series. Sodium sulfite was prepared and supplied by our hospital pharmacy. Testing was performed with the IQ Ultra® patch-testing system (Chemotechnique Diagnostics®) with 2 days of occlusion and readings at days 2 and 4. Written consent for patch testing was obtained from all patients. Data were also collected on the site affected, a history of atopy, and the age, sex and occupation of individuals. The relevance of positive reactions was determined by the clinician on day 4. Data were retrospectively analysed from our patch-testing database.

Results

One hundred and eighty patients underwent patch testing during this period (128 females; 55 males). There were 10 positive reactions to sodium metabisulfite (5.5%) and seven positive reactions to sodium sulfite (3.8%). Of the 10 patients with positive reactions to sodium metabisulfite, 6 had positive reactions to sodium sulfite (60%), and of the 7 patients with positive reactions to sodium sulfite, 6 (86%) had positive reactions to sodium metabisulfite. Patients with positive patch test reactions to sodium metabisulfite were significantly likely to have positive reactions to sodium sulfite, and vice versa ($p < 0.0001$). Of the 173 patients with negative reactions to sodium metabisulfite only, 1 had a positive reaction to sodium sulfite (0.6%). No particular trends were observed in relation to history of atopy, occupation, age, or sex.

Of the 10 positive reactions to sodium metabisulfite, eight were thought to be relevant. Of those eight, three

were of past relevance and all were thought to be related to previous medicament use (Trimovate® cream). The remaining five reactions were thought to be of possible relevance; four were in patients with oral or perioral symptoms, where exposure to sodium metabisulfite in foods was suspected (Table 1).

Of the seven positive reactions to sodium sulfite, the majority (4) were thought to be cross-reactions with sodium metabisulfite. Of the remaining three, one was of possible relevance in a patient with perioral symptoms, where exposure to food additives was thought to be relevant. Another patient had been exposed to sodium sulfite in a hair dye, and the reaction was thought to be of current relevance (Table 1).

Discussion

Allergic contact dermatitis caused by sodium metabisulfite is increasingly being recognized. There have been two previous larger patient series reporting positive patch test reactions to sodium metabisulfite in 4.1% (2) and 1.7% (3) of those tested. In our series of patients, positive patch test reactions to sodium metabisulfite were seen in 5.5%. Allergic contact dermatitis caused by sodium sulfite is perhaps less well recognized. In our series of patients, we found positive reactions in 3.8% of patients tested. In a previous series of 1762 patients, positive reactions to sodium sulfite were seen in 1.4% (4).

In one previous study, all patients with positive patch test reactions to sodium metabisulfite were also patch-tested with sodium sulfite (1% pet.), sodium bisulfite (1% pet.), and potassium metabisulfite (1% pet.) (3). Only 2/50 (4%) had positive reactions to sodium sulfite, whereas all had positive reactions to sodium bisulfite and potassium metabisulfite. In our series, the majority (60%) of patients with positive patch test reactions to sodium metabisulfite

Table 1. Patients with positive patch test reactions to sodium sulfite (SS) and sodium metabisulfite (SMB)

Age (years)	Sex	Site	SMB	Relevance	Comment	SS	Relevance	Comment
25	M	Lips	+ / + +	?R	?Food preservative	?+ / +	?R	?Food preservative
45	M	Generalized	- / + +	NR	—	- / ? +	NR	—
33	M	Hands	?+ / + +	PR	Medicament	- / +	XR	—
23	F	Perioral	- / +	?R	?Food preservative	- / —	—	—
42	F	Perioral	+ / +	?R	?Food preservative	- / —	—	—
36	M	Lips	- / +	?R	?Food preservative	- / —	—	—
13	F	Face	- / +	NR	—	- / —	—	—
51	F	Hands	- / +	?R	Medicament	- / +	XR	—
92	F	Legs	+ / +	PR	Medicament	- / +	XR	—
62	M	Legs	- / +	PR	Medicament	- / +	XR	—
34	M	Scalp	- / —	—	—	+ / + +	CR	Hair dye

CR, current relevance; F, female; M, male; NR, not relevant; PR, past relevance; ?R, possible relevance; XR, cross-reaction.

First/second readings according to International Contact Dermatitis Research Group criteria.

were also positive when patch tested with sodium sulfite. Only one patient with a negative reaction to sodium metabisulfite was positive to sodium sulfite (0.6%).

Investigators have previously had difficulty in attaching any relevance to positive reactions to sodium metabisulfite and sodium sulfite (2, 4). In two previously reported series, only 12/503 and 33/712 positive reactions to sodium metabisulfite were considered to be relevant. Relevant positive reactions were usually in relation to occupational exposure (3) or topically applied medicaments (2). A recent case report described a patient with allergic contact dermatitis caused by a face cream who had positive reactions to sodium metabisulfite (1% pet.) and sodium sulfite (5% pet.). The authors speculated that the positive reaction to sodium metabisulfite might represent a cross-reaction with sodium sulfite (5). In our patients, we had similar difficulty in establishing the relevance of positive patch test reactions to sodium metabisulfite and sodium sulfite. Although 8/10 positive reactions to sodium metabisulfite were thought to be relevant, three were of past relevance only, and none were of current relevance. Among patients with positive reactions to sodium metabisulfite and oral/perioral symptoms, exposure to sodium metabisulfite as a food additive was considered to be of possible relevance in 4. Owing to the retrospective nature of this study, we were unable to determine whether symptoms resolved with avoidance

measures. The majority of positive reactions to sodium sulfite were felt to represent cross-reactions with sodium metabisulfite.

In contrast to previous studies, we found that the majority of patients with positive patch test reactions to sodium metabisulfite were also positive to sodium sulfite. Sodium sulfite, sodium metabisulfite, and sodium bisulfite, when dissolved in water, exist in pH-dependent equilibrium with each other (1). The buffering capacity of skin would result in a similar mixture of sodium sulfite, sodium metabisulfite, and sodium bisulfite, whichever compound is applied. Our clinical findings therefore confirm what might be expected on that basis.

We do not feel that routinely patch testing with sodium sulfite is necessary, as the majority of patients positive to sodium sulfite will also have positive patch test reactions to sodium metabisulfite. However, consideration should be given to advising patients to avoid other sulfites and metabisulfites when a positive allergic reaction to sodium metabisulfite occurs and when considering relevance. It is important to note that sodium sulfite is found in a variety of cosmetics and personal care products, including moisturisers, sunscreens, skin-lightening products, and anti-ageing products (6). The numbers of patients in our series are relatively small, so we feel that these results merit further investigation in larger numbers of patients.

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