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Salicylate elimination diets in children: is food restriction supported by the evidence?

When a food is identified as causing allergic symptoms, that food will usually be removed from the diet. However, inappropriate use of extensive food elimination can be harmful. Salicylate elimination or “low salicylate” diets — which remove foods deemed to contain natural salicylates — can be particularly restrictive, especially as they are often implemented with restriction of other foods such as those containing amines, glutamates, synthetic food additives, gluten and dairy. These diets appear to be commonly used in New South Wales, but to our knowledge are not widely used outside of the state or in other countries. We discuss our own experiences with children who were referred for care to the allergy clinics of three public hospitals, and who had previously used these diets, and review the evidence for using low salicylate diets in treating a variety of disease indications.

For which conditions are low salicylate diets prescribed in Sydney?

We sought to identify the indications for which salicylate elimination is prescribed in Sydney by conducting a retrospective case note review of children attending the allergy clinics of the two main children's hospitals, Sydney Children's Hospital and the Children's Hospital at Westmead, as well as a major regional allergy clinic at Campbelltown Hospital, between 1 January 2003 and 31 December 2011. We confirmed any missing details through a single telephone conversation between an immunologist or allergist and the child's carer. Approval for the study was obtained from the South Eastern Sydney Local Health District, Human Research Ethics Committee – Northern Sector.

We identified 74 children who had at some point in their lives been on a low natural salicylate diet. The most common indication for initiation of the diet, reported by the patient's carer, was eczema in 34/74, followed by a behavioural abnormality (eg, attention deficit hyperactivity disorder [ADHD] or unsettled infant behaviour) in 17/74 and gastrointestinal disturbances (eg, abdominal pain or gastro-oesophageal reflux disease) in 12/74 (Box).

What is the evidence supporting the role of low salicylate diets for these indications?

We reviewed the literature using MEDLINE and PubMed, combining search terms “salicylate”, “elimination diet” or “exclusion diet” with “food allergy”, “food intolerance”, “eczema”, “atopic dermatitis”, “chronic urticaria”, “ADHD”, “behaviour” or “gastrointestinal”. We found no evidence in the peer-reviewed literature to suggest a role

Summary

- A review of case notes from our Sydney-based paediatric allergy services, between 1 January 2003 and 31 December 2011, identified 74 children who had been prescribed diets that eliminated foods containing natural salicylates before attending our clinics.
- The most common indications for starting the diets were eczema (34/74) and behavioural disturbances (17/74) including attention deficit hyperactivity disorder (ADHD).
- We could find no peer-reviewed evidence to support the efficacy of salicylate elimination diets in managing these diseases.
- We do not prescribe these diets, and in a survey of European and North American food allergy experts, only 1/23 respondents used a similar diet for eczema, with none of the respondents using salicylate elimination to treat ADHD.
- A high proportion (31/66) of children suffered adverse outcomes, including nutritional deficiencies and food aversion, with four children developing eating disorders. We could find no published evidence to support the safety of these diets in children.
- While this uncontrolled study does not prove a causal relationship between salicylate elimination diets and harm, the frequency of adverse events appears high, and in the absence of evidence of safety or efficacy, we cannot recommend the use of these diets in children.

for salicylates in any of the diseases for which the diet is prescribed.

In the absence of an overt type I hypersensitivity clinical response, food is an uncommon precipitant of eczema. A 2008 Cochrane review concluded that, with the exception of egg exclusion in patients who have positive specific IgE antibodies to egg, there is little evidence to support restriction of tolerated foods in eczema.¹

On the other hand, there is good evidence that food exclusion can ameliorate the hyperkinesia symptoms of ADHD, with numerous studies showing a benefit for broad-based food exclusion diets.² However, a recent randomised controlled trial suggests that much of this effect is caused by artificial food additives, and we were unable to identify any peer-reviewed evidence that natural salicylates can cause hyperactive behaviour.³ One published letter referred to challenge with salicylates precipitating behavioural symptoms, however the authors did not stipulate whether the challenge substance was natural salicylate or acetylsalicylic acid (aspirin)⁴ — aspirin being known to cause significant symptoms when natural salicylates have no effect.⁵

Finally, while foods are well known to cause a variety of gastrointestinal symptoms, from coeliac disease to irritable

bowel syndrome, there is no good peer-reviewed evidence that natural salicylates cause any gastrointestinal symptoms.

Do salicylate elimination diets cause harm?

Although food elimination diets used to treat allergy have been associated with side effects including micronutrient deficiency,⁶⁻⁸ protein or energy malnutrition,⁹ eating disorders,¹⁰ food aversion,¹¹ and the development of allergic reactions including fatal anaphylaxis to the excluded food on reintroduction,^{12,13} we were unable to identify any evidence regarding the safety or otherwise of salicylate elimination diets in children. This is of concern given that many of the patients attending our clinics had started the diets at a young age (median, 24 months; range, 6 weeks to 15 years), and continued for an extended period (>1 year in 30/61 children).

Among our patients, where details were available, we identified a high occurrence of possible adverse outcomes among children who had been on low salicylate diets, with 31 out of 66 children suffering one or more possible adverse events. Symptoms and problems experienced included weight loss or failure to thrive in 13/66 children, eating disorders (including three cases of anorexia nervosa) in 4/66, specific nutrient deficiency in 2/66 (one case of vitamin C deficiency, one case of protein, iron and zinc deficiency), food aversion in 6/66, alopecia in 2/66 and unplanned weaning in 3/66. Four out of 13 mothers who went on the diet to benefit their breastfeeding infant suffered significant weight loss, which they perceived as problematic.

While we acknowledge that our cohort has an inherent selection bias and that without a control group it is not possible to attribute the reported events to the diet, we are concerned that all adverse events were reported to have occurred after initiation of the diet.

Also, beyond the possible adverse events noted in our patients, we are additionally concerned about the use of broad-based empirical food elimination in early life, with increasing evidence suggesting that food elimination at this time predisposes to the development of food allergy to the excluded foods, particularly among children with eczema, which was the largest group identified here.^{14,15}

Who prescribes salicylate elimination diets?

Among those patients where details were available, 47/69 were prescribed the diet through medical allergy services, with general paediatricians 7/69 and dietitians 7/69 prescribing less frequently, while 8/69 parents obtained the diet from friends or from the internet. We do not prescribe the diets in our practice.

In order to assess whether the diet was more widely used elsewhere, we surveyed overseas allergists. An online survey of members of the editorial boards of major European and North American allergy journals produced 23/125 responses, with none of the responding experts employing the diet for ADHD, and only 1/23 using a form of salicylate exclusion for eczema.

Does the available research support a role for natural salicylates in any disease causation?

As discussed above, there is no peer-reviewed evidence to support the use of low salicylate diets in treating eczema, behavioural symptoms or gastrointestinal symptoms.

One disease where the role of natural salicylates has been studied in more detail is aspirin-sensitive asthma, where doses of natural salicylic acid 10 times higher than the aspirin dose have no effect.⁵ The lack of importance of natural salicylates in this disease is well established in clinical practice, as reflected by the evidence-based clinical decision support website, *UpToDate* (<http://www.uptodate.com/home>), which states that “dietary salicylates do not cause symptoms in NSAID [non-steroidal anti-inflammatory drug] sensitive patients”.¹⁶

A second disease where low salicylate diets have been trialled is chronic idiopathic urticaria (CIU); however, while there is some evidence that synthetic food additives may play a role in a small proportion of adult CIU cases,¹⁷ the peer-reviewed evidence that salicylates play any role in this disease is largely limited to studies that used aspirin as the challenge substance.¹⁸ On the other hand, there are several reasons to question the idea that salicylate-containing foods play any role in CIU. First is the recent discovery that half of childhood CIU is autoimmune in nature, resulting from autoantibodies against the high-affinity IgE receptor.¹⁹ Second, evidence suggests that those few foods said to contain salicylates that may precipitate CIU (eg, tomatoes, wine, herbs) probably do so not because of their salicylate content, but because they contain volatile aromatic chemicals (eg, alcohol, ketones and aldehydes).²⁰ Third, there is evidence that the foods removed in low salicylate diets may not actually contain significant levels of salicylates, with one group suggesting that many “high salicylate foods” contain no aspirin and only tiny amounts of natural salicylates.²¹

Finally, it is important to discuss local research on salicylate intolerance performed in the early-to-mid 1980s. Most of that work focused on CIU, with a lesser focus on a number of other symptom complexes.^{4,22-24} The research involved placing patients on diets that removed foods containing salicylates, using food challenge to identify which constituents were responsible for any perceived improvement.^{22,24} However, teasing out which component of these broad-based elimination diets were responsible for any perceived benefit is difficult, given that the diets removed many food constituents, including those now known to cause symptoms, such as artificial food additives,^{3,17,25} and because the challenge substance was commonly aspirin,^{22,24} although sodium salicylate was said to have been used in some work.²² Moreover, most of the clinical data appeared in a non-peer-reviewed format,²² or with incomplete methodological details in review format in peer-reviewed journals.^{4,23} These non-peer-reviewed findings of disease associations of natural salicylates have not been reproduced by other investigators, and a recent British textbook of food hypersensitivity concluded “there are no effective diagnostic tests for salicylate intolerance, and no studies showing the efficacy of dietary exclusion”.²⁶

Characteristics of 74 children prescribed salicylate elimination diets

Characteristic	No. of children/ total*
Age at initiation of diet	
Infancy (1 year or less)	26/67
Early childhood (1–3 years)	22/67
Childhood (4–10 years)	10/67
Adolescence (11–18 years)	9/67
Duration of diet	
< 1 month	5/61
1 month to 6 months	17/61
> 6 months to 1 year	9/61
> 1 year	30/61
Indication for diet	
Eczema	34/74
Behaviour (including ADHD)	17/4
Gastrointestinal complaints	12/74
Failure to thrive	4/74
Acute allergic reaction	3/74
Anaphylactoid reaction	2/74
Urinary urgency	1/74
Headache	1/74
Adverse events	
Failure to thrive or weight loss	13/66
Food aversion	6/66
Eating disorder	4/66†
Infant weaned early	3/66
Alopecia	2/66
Nutrient deficiency	2/66
Constipation	1/66
Total children with adverse events	31/66
Breastfeeding mothers with complications of diet	4/13
Prescribed by	
Medical allergy clinics	47/69
Dietitian	7/69
Paediatrician	7/69
Friend or internet	8/69

ADHD = attention deficit hyperactivity disorder. * Varying denominators reflect the completeness of available data. † Including three cases of anorexia nervosa. ◆

Can salicylate elimination diets be recommended for use in children?

The use of low salicylate diets in children is not supported by current evidence or by expert opinion. There is also no evidence that these diets are safe, in particular for infants and their breastfeeding mothers, and for those at risk of developing eating disorders. While our retrospective case note review is insufficient to prove any risk associated with the diets, it is concerning that harm may occur when children and adolescents are placed on such restrictive diets, particularly if they stay on them for long periods.

We would invite any proponents and prescribers of the diet to produce evidence of the efficacy and safety for the

disorders in which they consider such a restrictive diet is indicated. Pending such evidence, we cannot recommend the use of salicylate elimination diets.

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