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Six Food Diet for Childhood Atopic Dermatitis

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Sixty-three children with severe atopic dermatitis aged 0.4 to 14.8 years, were treated with a diet eliminating all but six foods for a 6-week period. Nine (14%) abandoned the diet before 6 weeks had elapsed. Twenty-one (33%) completed the diet but did not benefit. Thirty-three (52%) patients obtained ≥20% improvement in the disease severity score at 6 weeks, and for these patients, foods were reintroduced singly at weekly intervals. The outcome at 12 months was the same for the group who responded to the diet, the group who failed to respond, and the group who failed to comply, because of the tendency for dermatitis to improve markedly in all three groups. Although dietary elimination of this type may be associated with immediate improvement, the long term outcome appears to be unaffected by dietary success or failure.

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Although there is good evidence implicating food intolerance in some children with atopic dermatitis (1), it is difficult to predict the outcome of dietary avoidance in an individual subject. Skin prick tests and RAST tests are not helpful because of the high rate of false positive (2) and false-negative (3) results. Neither test can indicate which patient will respond to a diet, or which foods should be eliminated (4, 5). The lack of predictive tests has led to the use of empirical diets in which a number of foods are avoided for a defined period of time (e.g. 6 weeks) (5). The failure of simple diets (e.g. egg and milk avoidance) has led to more rigorous forms of food elimination. Most notably this comprises a very restricted diet in which all but 4 to 6 food items are avoided (6–9), sometimes described as an oligoantigenic or few-food diet. The present study describes the treatment and follow-up of 63 children with atopic dermatitis who received a diet at home in which all but six foods were eliminated for a period of six weeks.

MATERIALS AND METHODS

Patients

Between 1981 and 1989, 600 children with atopic dermatitis, all fulfilling the diagnostic criteria of Hanifin & Rajka (10), were seen at the University Department of Child Health at Booth Hall Children's Hospital. Of these 600 patients, 63 (10.5%) were selected for a 'few-food' diet, either because of extensive (> 30% skin surface area) skin involvement poorly responsive to conventional therapy (emollients, topical steroids, antibiotics, nocturnal sedating H1 histamine antagonists) or because of a clear history of food intolerance. Those with a history of food intolerance were already avoiding the foods concerned.

Methods

The proportion of the skin surface area affected by dermatitis (defined as patches of erythema, vesicles and crusts) and the degree of erythema (graded as mild = 1, moderate = 2, severe 3) were recorded when the diet was commenced, 6 weeks later, and at follow-up visits. The surface area and the erythema score were multiplied to give a combined disease severity score. Topical corticosteroids were classified according to the British National Formulary (11) as category IV (mildly potent), category III (moderately potent), category II (potent) or category I (very potent).

The six-food diet comprising items which only rarely provoke adverse reactions, consisted of lamb, potato, rice, rice krispies, carrot and pear, and was given for 6 weeks. No other foods were permitted, and only water was allowed as a drink. Where there was a history of intolerance to or dislike of one of these six foods, then one of a small number of alternative foods (see Table I) was given instead. Twenty patients were given Pregestimil (Bristol-Myers Pharmaceuticals, Ickenham, Uxbridge, England), a casein hydrolysate milk formula. All diets were supervised by a paediatric dietitian (R. H. J. S.). Changes in topical or other treatment were avoided at the commencement of the diet, and parents were asked to continue with the same treatment for the 6-week trial period. Nevertheless, either the parents or the general practitioner did sometimes modify the treatment, because of marked improvement or deterioration, and such changes were recorded.

After 6 weeks, each patient was reviewed. In the event of failure, defined as a less than 20% improvement in the disease severity score, the diet was discontinued. Those patients who were avoiding a small number of foods prior to the study continued to avoid these foods if the six-food diet was abandoned. If there was 20% or greater improvement in the disease severity score, then the diet was continued, and foods were reintroduced singly. Each new food was given daily for 7 days by open challenge at home, in quantities of 50 to 200 g two to four times daily. The criteria

Table I. *Foods used in 63 'few-food' diets.*

Food	No. of diets
Potato	59
Lamb	58
Rice	54
Carrot	42
Rice krispies[a]	40
Pear	31
Apple	20
Pregestimil	20
Parsnip	11
Corn (Maize)	10
Brussels sprouts	10
Cauliflower	7
Corn flakes[b]	7
Cabbage	3
Swede	2
Pea	2
Beef	1
Chicken	1
Leek	1
Rabbit	1

[a] Only used when rice in diet.
[b] Only used when corn in diet.

for a positive challenge were: 1) a sustained deterioration of dermatitis (increased scratching and visible worsening of eczematous skin lesions, lasting more than 24 h), or other adverse reaction (e.g. angioedema or asthma) during exposure to the food; and 2) a return to the pre-challenge state after the food was withdrawn. If the second criterion was not met, the challenge was not classified as positive or negative, the food was avoided, and a repeat challenge was performed at a later date.

RESULTS

The median age of the patients was 2.9 years (range 0.4 to 14.8), and 32 (51%) were girls. Forty-six patients (73%) had a history of intolerance to a median of three foods (range 1 to 8), usually manifested as urticaria/angio-edema (in 36) or exacerbation of dermatitis (in 31). Forty-eight (76%) had previously tried other less stringent types of dietary restriction. The median disease severity score at the start of the diet was 60 (range 5 to 240).

Compliance

Of the 63 patients who started the diet, 9 (14%) abandoned it before 6 weeks had elapsed. In 4 cases the family were unable to cope with the diet, in 3 the parents felt that the child was no better and therefore discontinued the diet, and two families were advised to stop the diet by doctors at other hospitals during hospitalization, because of intercurrent illness.

Fifty-four patients (86% of those who started the diet) completed the 6-week period of few food diet. In these patients there was a significant improvement in the disease severity score from a pre-diet median of 60 (20 – 240) to 40 (4 – 270), $p < 0.001$ (Wilcoxon matched pairs signed rank test).

Table II. *Progress of disease severity, treatment and diet in patients who improved on diet*

Time ...	Pre-diet	6 weeks	6 months	1 year
No. of patients	33	33	32	24
Disease severity score				
Median	70	20	10[a]	15
Range	20–240	4–180	0–140	0–180
Topical corticosteroid treatment				
None	6 (18%)	7 (21%)	7 (22%)	6 (25%)
Category IV	21 (64%)	23 (21%)	21 (66%)	13 (54%)
Category III+	5 (15%)	3 (9%)	4 (12%)	5 (21%)
Diet score*				
Median	2	7	6	5
Range	1–4	7	2–7	1–7

* Diet Score:
1 Normal – no exclusions
2 Excludes 1 or 2 foods
3 Excludes 3 to 5 foods
4 Excludes 6 to 10 foods
5 Excludes >10 to 19 foods
6 Includes 10 to 19 foods
7 Includes <10 foods

[a] Compared with the 6-week score, $p = 0.02$ *(Wilcoxon matched pairs signed rank test).*

Table III. *Follow-up results of all patients*

	Pre-diet	6 weeks	6 months	1 year
Number attending follow-up				
Diet success	33	33	32	24
Diet failure	21	21	20	15
N. C.	9	7	6	4
Median disease severity score				
Diet success	70	20	10	15
Diet failure	60	60	16	16
N. C.	50	36	10	17
Percent of patients receiving any topical steroid				
Diet success	82	79	78	75
Diet failure	95	76	90	80
N. C.	100	86	100	100
Percent of patients on category III or stronger topical steroid				
Diet success	15	9	12	21
Diet failure	24	5	20	13
N. C.	33	29	50	75

N. C. = Patients who did not comply with diet.

Diet failure

Of the 54 patients who completed 6 weeks of diet, 21 (39%) showed little or no improvement, with a combined severity score of between 0.9 and 1.5 times the pre-diet score. There was no significant difference in age, pre-diet severity score, previous history of food intolerance, or previous dietary restrictions between the patients who did and did not respond to the diet. Six of the 21 diet failure patients, despite a lack of response to the diet, had adverse reactions to between one and four foods in the year following the trial of diet.

Diet success

Thirty-three patients (52% of those who started) showed a >20% decrease in the disease severity score (see Table II). There was a further improvement between 6 weeks and 6 months.

On reintroduction of foods over the following year, 24/33 (73%) patients had adverse reactions to between one and eight foods (median 2.5), a total of 82 positive challenges. Nine patients (27% of those who improved on the diet) had no reaction to foods reintroduced over the following year. Five patients who improved on the diet were nevertheless able to reintroduce, without adverse effect, all of the foods which had been withdrawn.

Follow-up at one year

Forty-three out of 63 (68%) patients were followed up for 12 months or more. Regardless of the response to treatment, at one year the final outcome was very similar (Table III).

DISCUSSION

The regimen described here represents about the most restrictive diet possible without hospital admission. In the 54/63 (86%) who completed the 6-week diet, there was a small but statistically significant improvement in the disease severity score from a pre-diet median of 60 (20 – 240) to 40 (4 – 270). However, in those who were followed up for 12 months, the median disease severity score was almost the same regardless of whether the patient had responded to the diet (24 patients, median score 15), had not responded to the diet (15 patients, median score 16) or had failed to complete the diet (4 patients, median score 17). There was no significant difference in age, pre-diet severity score, previous history of food intolerance, or previous dietary restrictions between the patients who did and those who did not respond to the diet. It is possible that those who continued to attend for follow-up for 12 months were the more refractory cases, and this may explain the apparent small increase in the proportion using stronger steroids at 12 months (see Table III).

The lack of tests to predict the outcome of dietary elimination constitutes a major therapeutic obstacle (4, 5, 9, 12). One approach, favoured mainly in north America, has been to base exclusion diets on the results of skin prick testing to a battery of foods and immediate (within 4 h) erythematous reactions to double-blind food challenges (1). Scanty follow-up data suggested that patients with positive food challenges who were treated with dietary elimination fared better than those in whom no offending food was identified or eliminated (1). This approach, which takes no account of delayed reactions to foods (13–15), conflicts with the data of Atherton et al. (16), Hill et al. (3, 17) and others (12) which have shown no correlation between skin testing, immediate reactions, and outcome of diet. Delayed reactions to foods are less amenable to study, and have never been the subject of double-blind validation. However, late reactions to inhalants are well recognized in asthma (18), and this condition has provided another model of late reaction, that of enhanced

bronchial reactivity after food ingestion (19). This type of mechanism, which would clearly confound simple double-blind challenges, has never been sought in atopic dermatitis.

It would have been desirable to employ a control group, but it is difficult to see how a convincing but dummy regimen could be devised, and it is not surprising that no such study has ever been performed. The lack of a control group means that it is not possible to assess how much improvement was due to antigen avoidance and how much was due to a placebo effect. Another problem which bedevils all studies of atopic dermatitis is the lack of an objective method for assessing disease severity. We attempted to use limb movement meters (20) to monitor scratching activity, but found that their use was associated with enhanced skin damage, children using them as an additional implement with which to scratch. Instead we used a disease severity score, based on the surface area of affected skin and the degree of inflammation, and which has been shown to be correlated more closely with biochemical markers of inflammation (such as the serum orosomucoid concentration) than a measure of the surface area alone (21).

Even if double-blind challenges could have been used to validate observed reactions to foods, these would not have indicated what proportion of therapeutic benefit was due to food avoidance or placebo effect. The standard north American technique of double-blind challenges (1) which employs a single provocation with a small amount of encapsulated food, differs greatly from the real life situation of continued or repeated exposure to larger quantities of foods, and is inapplicable where delayed reactions are being sought (17).

Previous studies of few food diets have been less clearly defined. Hammar (14) used a diet of approximately twelve foods to treat successfully 124 children with dermatitis and found that 15 subsequently deteriorated on open challenge with cow's milk or cereals. However, as the diet was combined with hospital admission and increased topical corticosteroid therapy, its value is impossible to assess. Juto et al. (7) treated 21 eczematous infants with a six-food diet. Twenty improved, and 12 had positive open challenges with cow's milk, leading to the conclusion that in this age group such a diet was of great value. Van Asperen et al. (8) used a diet of approximately twenty foods, and of the 13 children with dermatitis who completed the diet, only 5 (38%) improved. Hathaway & Warner (6), using varying types of few food diets, reported benefit in 30 (91%) who had failed to respond to a milk- and egg-free diet. Lastly, Pike et al. (9) noted improvement in 24 (36%) of their 66 children treated with various types of few-food diet.

Although it is clear from this study and others (1, 2, 14) that ingestion of certain foods can exacerbate atopic dermatitis in certain patients, in the present study the results of follow-up at one year suggest that any benefit of this type of dietary manipulation is short-lived, because of the tendency for all patients to improve regardless of treatment. It makes sense to avoid a small number of foods where there is a clear history of reactions (e.g. severe erythema and itching, angioedema, anaphylaxis), but few-food diets are difficult, and best confined to severe cases where any short term benefit may justify the cooperation and close dietetic supervision required.

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