Effects of probiotics on atopic dermatitis: a randomised controlled trial

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Key Words: atopic dermatitis, children, probiotics, allergic disease, quality of life.

Running title: Effect of probiotics in young children with atopic dermatitis

Abbreviations

AD: atopic dermatitis
DFIQ: dermatitis family impact questionnaire
IgE: immunoglobulin E
Th1: T helper cell type 1
Th2: T helper cell type 2
SCORAD: severity scoring of atopic dermatitis
RAST: radioallergosorbent test
Abstract

Objective: To investigate the effects of probiotics on moderate or severe atopic dermatitis (AD) in young children (6-18 months of age).

Design: Randomised double blind placebo controlled trial.

Setting: Perth, Western Australia.

Participants: Fifty six children aged 6-18 months with moderate or severe atopic dermatitis, 53 completed the study.

Interventions: Supplementation with probiotic (1x10^9 Lactobacillus fermentum VRI 003 PCC™, [VRI BioMedical]), or equivalent volume of placebo, twice daily for eight weeks. A final assessment at sixteen weeks was performed.

Main outcome measures: Severity and extent of atopic dermatitis at the end of the study, as measured by the SCORAD index.

Results: The reduction in SCORAD index over time was significant in the probiotic group (p=0.03) but not the placebo group. Significantly more children receiving probiotics (n=24, 92%) had a SCORAD index that was better than baseline at week 16 compared with the placebo group (n=17, 63%) (p=0.01). At the completion of the study more children in the probiotic group had mild AD (n=14, 54%) compared to placebo (n=8, 30%).

Conclusion: Supplementation with probiotic Lactobacillus fermentum VRI 003 PCC™ is beneficial in improving the extent and severity of atopic dermatitis in young children with moderate or severe disease.
Introduction

The morbidity and mortality from allergic disorders has dramatically increased over the past half century, such that these are now the most common chronic diseases of childhood in the developed world[1][2]. Atopic dermatitis (AD) is frequently the first manifestation of atopic disease in infancy[3], and causes enormous physical discomfort and demands on family time and resources[4][5]. This has highlighted the need for novel strategies to reduce the burden of disease. The use of probiotic bacterial products has recently been explored as a therapeutic option for AD[6][7][8]. The rationale for this approach is based on the well-recognized effects of bacteria on cellular immune responses. There has been speculation that exposure to these microbial agents in early life could play an important role in maturation of Type 1 T helper cell (Th1) immune responses[9], and inhibit the predisposition for allergic Type 2 T helper cell (Th2) responses and allergic (IgE) antibody production[10]. There is also some evidence that normal gut flora (including probiotics) may have additional immunomodulatory properties[11], and play an essential role in the development of normal immune “tolerance”[12]. There has been speculation that the recent rise in allergic diseases (including AD) may be linked to reduced bacterial encounter with progressively cleaner environments[13][14][15]. Although there is no definitive proof of this, supportive epidemiological evidence[16][17][18] has provided an additional basis for using these bacterial products to treat disease.

There have been several preliminary studies to address the effects of probiotics in AD. Two of these reported a clinical improvement in infants with AD who were either exclusively breast fed[6] or had coexistent cows milk allergy[7], when given a lactobacillus probiotic supplement. A further crossover study demonstrated an improvement in reported symptoms compared to placebo, although this was not associated with a significant improvement in objectively assessed extent and severity[8] as assessed using SCORAD index[19]. Although these studies showed promising results, it is not known what effect probiotics supplementation has on unselected young children with more severe AD. To address this we conducted a randomised, placebo controlled trial to determine the clinical effects of Lactobacillus fermentum supplementation in 6-18 month old children with moderate or severe AD.

Methods

Participants: Fifty six children aged from 6 to 18 months with moderate or severe AD were recruited between April and November 2003 from the general community and outpatient clinics. All children met the Hanafin and Rajka criteria for AD and had a modified SCORAD > 25[20][21]. Children were ineligible for the study if they had prior exposure to probiotics, were currently taking a course of antibiotics, or had other major medical problems.
Protocol: The study design is a randomised double blind placebo controlled trial. To detect a 50% reduction in SCORAD index scores at the 5% significance level with 80% power twentythree children per group are required. We recruited a larger number to allow for an estimated 10% withdrawal rate. A computerised randomisation schedule was prepared by the hospital biostatistician with allocation and dispensing of sachets by the pharmacy department. The probiotic and placebo sachets were matched for size, shape and volume of contents.

Assignment: The groups were stratified and block randomised according to the following criteria: a) modified SCORAD (25 to 50; 50 and over), b) current topical corticosteroid potency (none; mild or moderate; potent or very potent)[22] and c) age (6 to 12 months; 12 months and over). Participants in the probiotic group received $1 \times 10^9$ *Lactobacillus fermentum* VRI 003 PCC™ [VRI BioMedical] freeze dried powder twice daily for eight weeks. The control group received maltodextran without probiotic twice daily for the same duration. Both were dispensed as stable powder in identical individual 1g sachets, reconstituted by parents with 5-10mL of water and administered orally as a suspension. Compliance was monitored by use of a sachet chart (completed by parents) and sachet counts.

Participant flow and follow-up: Participants were first seen at baseline (week 0) when they were assessed for eligibility, provided parental written informed consent, randomised and commenced intervention (Figure 1). All patients who met eligibility criteria were randomised. Participants had clinical assessments at week 2, week 4, at the end of intervention week 8, and final assessment at week 16. Topical corticosteroid use was continued under the guidance of the patient's own physician. Three participants withdrew from the study within the first four weeks (Figure 1). One child experienced vomiting on day five as part of an inter-current illness and after commencing antibiotic therapy the parents found multiple drug administration difficult and withdrew. Two children (one in each group) withdrew due to refusal of the suspension. Fifty three patients were available for analysis.

Clinical outcomes: A detailed history was obtained at baseline with follow-up questionnaires at each of the other visits. A SCORAD assessment was also performed at each visit by a clinician who was blind to the intervention. The primary outcome measure was change in the severity of AD as assessed by the SCORAD index. Other outcomes included a) change in family quality of life as reported in the Dermatitis Family Impact Questionnaire (DFIQ), b) change in reported topical corticosteroid usage and c) parental impression of the intervention. The SCORAD index[19] is a tool used to assess the severity of AD by combining evaluation of extent, intensity of lesions and subjective symptoms (pruritus and sleep loss). A modified SCORAD is obtained by using only the assessment of extent and intensity, omitting subjective criteria[21]. To ensure consistency, a single investigator performed all SCORAD assessments at week 0, 8 and 16. The DFIQ is a tool to measure the impact of AD on family function[23]. Parents reported topical corticosteroid usage as frequency of use and potency required, prospectively in a diary. A steroid score was calculated from number of applications per week multiplied by potency used. At completion of intervention parents were asked if
their child’s AD was better, worse or unchanged since commencing supplementation. At week 16 they were similarly questioned about the change during the follow-up phase.

**Laboratory measures:** 5-10mL of blood was collected from each participant at baseline. Plasma was frozen and then stored for analysis at completion of the study. Levels of total IgE and RAST were obtained using standardised commercial fluoroimmunoassays (Pharmacia CAPSystem for specific IgE and the Pharmacia ImmunoCAP for total IgE). Antigen specific IgE to food allergen mix (egg white, milk, cod, wheat, peanut and soya bean), grass allergen mix (couch, rye, timothy, meadow, johnson and bahia) and house dust mite, were determined from the baseline plasma sample. Specific IgE greater than 0.35kU/L were considered positive.

**Analysis:** Differences between probiotic and placebo groups were assessed using the chi-squared test for nominal data. The differences in SCORAD index scores from baseline were nonparametric and analysed using Mann Witney U test to compare groups at each time point and Freidman’s one way analysis of variance to compare change over time in each group. Total IgE data was log natural transformed to describe the geometric mean. Statistic analyses were performed using SPSS software (Version 10 and 11 for Macintosh). A p value <0.05 was considered statistically significant for all analyses.

**Ethics:** The Princess Margaret Hospital for Children Ethics Committee approved the trial.

**Results**

**Baseline clinical characteristics of participants:** Fifty six (56) children were recruited into the trial, 30 males and 26 females. There was no significant difference between the probiotic and placebo group in any of the baseline characteristics displayed in **Table 1.** The majority of participants (n=49; 88%) were using topical corticosteroids, 54% of participants had been exposed to antibiotics in the past, and half were regularly consuming yogurt at the commencement of the study. The majority (95%) of children had been breastfed and 38% were still being breastfed. Fifty three participants (95%) had at least one parent with a history of allergy (asthma, allergic rhinitis or AD). Only three (5%)-children had doctor-diagnosed asthma, although 13 (23%) were reported by parents to have had at least one episode of wheeze. Clinical food allergy was common, with 16 (29%) of cases having had a reported immediate-type allergic reaction to food. Total IgE was elevated in 43 (77%), RAST testing for specific IgE to food mix was positive in 40 (71%) and to house dust mite allergen positive in 12 (21%). No children had elevated specific IgE to grass mix.
Table 1 Baseline clinical characteristics of study participants, comparisons between placebo and probiotic groups.

<table>
<thead>
<tr>
<th></th>
<th>Probiotic</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=28</td>
<td>n=28</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14 (50)</td>
<td>16 (57)</td>
</tr>
<tr>
<td>Female</td>
<td>14 (50)</td>
<td>12 (43)</td>
</tr>
<tr>
<td>Age (months) mean (SD)</td>
<td>11.5 (4.2)</td>
<td>10.3 (3.23)</td>
</tr>
<tr>
<td>SCORAD index mean (SD)</td>
<td>40.8 (6.8)</td>
<td>44.0 (10.4)</td>
</tr>
<tr>
<td>Modified SCORAD mean (SD)</td>
<td>32.0 (5.2)</td>
<td>34.4 (8.5)</td>
</tr>
<tr>
<td>Severity of AD†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>26 (93)</td>
<td>21 (75)</td>
</tr>
<tr>
<td>Severe</td>
<td>2 (7)</td>
<td>7 (25)</td>
</tr>
<tr>
<td>DFIQ score mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3 (11)</td>
<td>4 (14)</td>
</tr>
<tr>
<td>Mild</td>
<td>11 (40)</td>
<td>10 (36)</td>
</tr>
<tr>
<td>Moderate</td>
<td>4 (14)</td>
<td>5 (18)</td>
</tr>
<tr>
<td>Potent</td>
<td>10 (36)</td>
<td>9 (32)</td>
</tr>
<tr>
<td>Total IgE mean (SD)</td>
<td>31.8 (4.3)</td>
<td>35.7 (5.95)</td>
</tr>
<tr>
<td>RAST to food mix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevated</td>
<td>20 (71)</td>
<td>20 (71)</td>
</tr>
<tr>
<td>Negative</td>
<td>8 (29)</td>
<td>8 (29)</td>
</tr>
<tr>
<td>Parental allergy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27 (96)</td>
<td>26 (93)</td>
</tr>
<tr>
<td>No</td>
<td>1 (4)</td>
<td>2 (7)</td>
</tr>
<tr>
<td>Regularly eat yoghurt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16 (57)</td>
<td>12 (43)</td>
</tr>
<tr>
<td>No</td>
<td>12 (43)</td>
<td>16 (57)</td>
</tr>
<tr>
<td>Exposure to daycare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (18)</td>
<td>7 (25)</td>
</tr>
<tr>
<td>No</td>
<td>23 (82)</td>
<td>21 (75)</td>
</tr>
</tbody>
</table>

Values shown are the numbers (percentages) of participants in each group.

There were no significant differences between the groups.

† Severity of AD defined according to SCORAD index: mild <25, moderate 25 to <50, severe >50.[19] [21]

Compliance: Compliance, as reported by parents, was good with 94% of doses administered and no difference between the groups (p=0.87).

Effects of probiotics on the extent and severity of atopic dermatitis: The difference in SCORAD index from baseline at each time is presented in Table 2, with greater improvement in the probiotic group compared to the placebo group. Firstly the reduction in SCORAD index over time was significant in the probiotic group, but not in the placebo group (p=0.03 and p=0.83 respectively, using Friedman’s analysis of variance). Secondly this change was manifest in a difference between the two groups that approached the conventional level of statistical significance at week 16 (p=0.06) as shown in figure 2a. The same pattern was apparent for the components of SCORAD index as indicated in Table 2. To see if these effects were also apparent within individuals a further analysis was undertaken. Week 16 SCORAD index scores were
categorized as better than baseline versus worse than baseline for each group (individual data in **figure 2b**). Using a chi-square test of independence on the frequencies the probiotic group was significantly more likely than placebo to be better than baseline at the end of the study (n=24; 92% and n=17; 63%, respectively; p=0.01). Finally, more children in the probiotic group had mild AD at the end of the study (n=14, 54%) compared with the placebo group (n=8, 30%), although this did not reach statistical significance using Fisher’s exact test (p=0.066) **figure 2c**.

| Table 2 Effect of probiotic treatment on the clinical severity of atopic dermatitis |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
|                                 | Week 2           | Week 4           | Week 8           | Week 16          |
| Probiotic                       |                  |                  |                  |                  |
| Change in SCORAD index†         | -8.25 (-13.8 to 0.5) | -6.2 (-14.2 to -3.6) | -18.2 (-22.1 to -2.4) | -17 (-24.6 to -9.8) |
| Change in Extent‡                | -4.5 (-12.25 to 3.25) | -8.5 (-12.25 to 4) | -14 (-16.8 to -5.25) | -16 (-22 to -6.75) |
| Change in Intensity             | -1 (-2 to 0)     | -1 (-2 to -0.25) | -2 (-3.8 to -1)   | -3 (-4 to 0)     |
| Change in Subjective score      | -2.4 (-5.9 to 1) | -1 (-6.8 to 2.9) | -4 (-8 to -0.9)   | -4 (-6.75 to -2) |
| Placebo                         |                  |                  |                  |                  |
| Change in SCORAD index          | -4.2 (-12.6 to 2.25) | -3.9 (-17.4 to -0.3) | -10.2 (-23 to 3.6) | -12 (-20 to 5)   |
| Change in Extent                | -5.25 (-16.2 to -0.5) | -6.75 (-15.4 to 1.6) | -9 (-22.6 to 5.8) | -11 (-23.1 to -3.2) |
| Change in Intensity             | -1 (-2 to 0)     | -1 (-2 to 0)     | -1 (-3.3 to 2)    | -1 (-3 to 2)     |
| Change in Subjective score      | -1.25 (-4.75 to 2.3) | 0 (-6 to 2.4)    | -1.4 (-6.6 to 1.6) | -2.25 (-6 to 0.6) |

Values are presented as median (25th percentile to 75th percentile).

\*\* Change is the change in score from baseline.

\*\* Significant change over time (p=0.03†, p<0.001‡ Friedman’s analysis of variance)

**Effect of probiotics on parental perceptions:** The median difference in DFIQ scores at end of intervention and at follow-up is presented for each group in **Table 3**. There was an improvement in the quality of life score over time in both groups. In response to questioning about whether their child’s AD, was better, worse or unchanged during intervention, and during the follow-up period, parental perceptions of severity were similar for both groups (**Table 3**). Overall, 62% of parents in the probiotic group and 73% in the placebo group reported they would continue the supplement their child was on after conclusion of the trial.

**Effect of probiotics on medications:** The amount of topical corticosteroid applied was derived from the potency and number of applications reported per week. The difference from baseline at each time point is shown in **Table 3**. The change in topical corticosteroid use over time was not significant in either group (probiotic group p=0.2, placebo p=0.6). The correlations between change in corticosteroid use and change in SCORAD index in each group were small. Twenty one (40%) children received antibiotics during the trial, with similar numbers in both groups.
Effects of probiotics on other clinical symptoms: Significantly less children in the probiotic group had lower respiratory tract infections as reported by parents, compared to the placebo group (12/26, 46% and 20/27, 74% respectively; p=0.04). There were no significant differences between the groups in number of children having episodes of vomiting, diarrhoea, gastroenteritis, fever, wheezing, coughing, or ear infections. No specific adverse events were recorded, as previously described one child experienced vomiting of concern to the parent.

Discussion

This is the first study to show a benefit of probiotics in children with moderately severe atopic dermatitis, and provides further evidence for a role of probiotics in the management of this condition. Although the children in our study were recruited from the general community, they had more severe disease compared to the two previously reported smaller preliminary studies[6][7]. One study included children with mild disease

Table 3 Effects of probiotics on secondary outcomes

<table>
<thead>
<tr>
<th>Effect on Quality of Life</th>
<th>Week 8</th>
<th>Week 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in DFIQ*</td>
<td>Probiotic</td>
<td>-2 (-5 to -0.7)</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>-2 (-6 to 2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect on parental perception of AD</th>
<th>Better</th>
<th>No change</th>
<th>Worse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported change during intervention*</td>
<td>Probiotic</td>
<td>16 (61)</td>
<td>8 (31)</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>16 (59)</td>
<td>8 (30)</td>
</tr>
<tr>
<td>Reported change after ceasing supplementation*</td>
<td>Probiotic</td>
<td>13 (50)</td>
<td>5 (19)</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>10 (38)</td>
<td>4 (15)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parents would continue supplementation*</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probiotic</td>
<td>16 (62)</td>
<td>10 (38)</td>
</tr>
<tr>
<td>Placebo</td>
<td>19 (73)</td>
<td>7 (27)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect on medication use</th>
<th>Week2</th>
<th>Week 4</th>
<th>Week 8</th>
<th>Week 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in topical corticosteroid use*†</td>
<td>Probiotic</td>
<td>0 (-4 to 0.7)</td>
<td>0 (-6.5 to 3.7)</td>
<td>0.25 (-6.7 to 7)</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>0 (-4 to 0)</td>
<td>0 (-6 to 0)</td>
<td>-1 (-8 to 0.7)</td>
</tr>
</tbody>
</table>

| Number of children consuming antibiotics* | Probiotic | 3 (11) | 1 (4) | 4 (15) | 6 (23) |
|                                          | Placebo | 2 (7) | 3 (11) | 7 (26) | 6 (22) |

*Values are presented as median (25th percentile to 75th percentile). Change in DFIQ and topical corticosteroid use is the difference from baseline.

**DFIQ: Dermatitis family impact questionnaire.**

*Values are frequency (percentage).

†Corticosteroid use calculated from number of applications per week multiplied by potency.
(median SCORAD of 16 at inclusion) and observed complete resolution in all participants at 6 months, although this occurred more rapidly in the group receiving probiotics (*Lactobacillus* GG or *Bifidobacterium lactis*)[6]. The previous studies also included younger infants (mean age of 4.6 months[6], age range 2-15 months[7]) who were more likely to have milder more transient forms of the disease. In the present study we demonstrated that slightly older children (mean age 11.5 months) with more severe dermatitis (mean SCORAD of 41) were significantly more likely (92%) to show an improvement in the extent and severity of their lesions after receiving *Lactobacillus fermentum* VRI 003 PCC™ [VRI BioMedical].

There was a distinct, although non-significant, reduction in the SCORAD index in both groups during the first two weeks of the study. This may be due to improved compliance with previously prescribed treatment regimes, and highlights the need for a two week “lead in” period in future studies before supplementation is commenced. An improvement in the placebo group at the end of the study also reflects the natural tendency for atopic dermatitis to improve in this age group. As severity is a major determinant of prognosis[24] the patients in this study were more likely to experience persistent disease. The effects of potential confounding factors (age, severity of AD, strength of topical corticosteroids) were controlled by stratified randomisation. Despite this there was a small non-significant difference in SCORAD index between the groups at commencement of the study. However, the magnitude of the change, consistency and number of children who improved all indicate that the findings are a clinically significant effect. The benefit of probiotics was not affected by age, severity, strength of topical corticosteroids, antibiotic or yoghurt consumption. The findings suggest that *L fermentum* supplementation may accelerate the natural tendency for AD to improve in young children with more severe disease.

This is also the first study to show persisting benefits 2 months after the supplementation was ceased. Possible mechanisms of this sustained effect may relate to persistent changes in faecal flora and/or persistent immunological effects. This will be the subject of ongoing studies using samples collected from this cohort. The potential mechanisms of action of probiotics are not well understood, but are believed to be mediated by immunological effects initiated in the gastrointestinal mucosa (reviewed by[25]). Animals raised in germ free conditions show profound immune dysregulation,[12] suggesting that gut micro-organisms are essential for normal immune development and oral tolerance. As such there has been growing speculation that normal human immune development may have been affected by alterations in colonic flora and progressively “cleaner” environments. If the beneficial effects of probiotics on atopic dermatitis are also associated with effects on developing immune responses, it is also possible that they could modify (or even prevent) allergic responses to aeroallergens and the expression of persistent airways disease. These issues need to be addressed in future studies. Although the significance of reduced number of lower respiratory tract infections reported by parents in children receiving probiotics is not clear, it is possible that this could indicate other effects on immune competence. Children with AD are also at increased risk (up to 80%) of developing persistent respiratory tract disease (allergic rhinitis and asthma)[3], which may also be modified by early use of probiotics.
In summary, this study provides evidence that oral *Lactobacillus fermentum* VRI 003 PCC™ may improve the severity of AD in young children and that these effects persist after cessation of supplementation. Further studies are needed to investigate the effects on underlying immune responses and the potential long term benefits on AD and the subsequent development of associated more persistent forms of allergic disease (such as asthma and allergic rhinitis) and aeroallergen sensitization.

**Acknowledgements**

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**Competing interests**

There are no competing interests. All authors are independent of VRI BioMedical.

**Ethics Approval**

The Princess Margaret Hospital for Children Ethics Committee granted approval for this trial.

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Table and figure legends

Table 1
Baseline clinical characteristics of study participants, comparisons between placebo and probiotic groups
Values shown are the numbers (percentages) of participants in each group. There were no significant differences between the groups.
Severity of AD defined according to SCORAD index: mild <25, moderate 25 to <50, severe over 50.[19][21]

Table 2
Effect of probiotic treatment on the clinical severity of atopic dermatitis
Values are presented as median (25th percentile to 75th percentile).
Change is the change in score from baseline.
†‡Significant change over time (p=0.03†, p<0.001‡ Friedman’s analysis of variance)

Table 3
Effects of probiotics on secondary outcomes
*Values are presented as median (25th percentile to 75th percentile).
Change in DFIQ and topical corticosteroid use is the difference from baseline.
DFIQ: Dermatitis family impact questionnaire.
#Values are frequency (percentage).
†Corticosteroid use calculated from number of applications per week multiplied by potency

Figure 1
Consort statement: progress of participants through the trial.

Figure 2
Change in extent and severity of atopic dermatitis during the study.
The a) differences in SCORAD index from baseline (box plot) are shown for the probiotic L fermentum group (dark boxes) and the placebo group (white boxes) at each follow-up visit. b) Baseline and follow-up (week 16) SCORAD index scores are shown for each participant in the placebo and probiotic group. The c) proportion of children in the mild, moderate and severe categories of AD at baseline, end of supplementation (week 8) and at follow-up are presented for the placebo and probiotic groups.
What is already known on this topic

1. Atopic dermatitis (AD) is a common debilitating disease that has been increasing in prevalence in the Western world.
2. AD frequently the first manifestation of atopic disease.
3. Probiotics may improve mild AD in young infants.

What this study adds

1. This is the first study to show a benefit of probiotics in under 2 year olds with moderately severe AD.
2. These effects were apparent two months after the supplementation was ceased. These observations provide further evidence for a role of probiotics in the management of this condition.

References


Assessed for eligibility (n = 98)

Excluded (n = 42)
- Did not meet inclusion criteria (n = 42)
- Reasons: Too mild (n = 40), Previous probiotic use (n = 2)

Randomised and received supplement (n = 56)

Probiotic
Allocated and received probiotic (n = 28)

Follow-up at week 16
- Discontinued intervention (n = 2)
- Reason: not tolerated

Analysed at week 16 (n = 26)

Placebo
Allocated and received placebo (n = 28)

Follow-up at week 16
- Discontinued intervention (n = 1)
- Reason: not tolerated

Analysed at week 16 (n = 27)
Probiotic Placebo

Week 8 Week 2 Week 4 Week 16

a) Change in SCORAD index from baseline (week 0)

Week 16 Week 0

SCORAD index score

Week 0 Week 16

b) SCORAD index score

Severe (> 50)
Moderate (25 - 50)
Mild (<25)

Week 16 Week 0

c) Percentage in each category

Severe (≥ 50)
Moderate (25 - 50)
Mild (<25)
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