FEATURE ARTICLE

CE 1.0 Contact Hour

# Effectiveness of Emollient Therapy in Pediatric Patients With Atopic Dermatitis

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## ABSTRACT

**Background and Purpose:** Atopic dermatitis is a chronic inflammatory skin disease that can develop in early childhood and affects 15%–30% of children. The purposes of this research were to review the literature and critique the evidence to better understand the use of emollient therapy in atopic dermatitis.

**Methods:** A literature review was performed using the databases CINAHL, Cochrane, and MEDLINE and the clinical decision-making resource UptoDate.

**Findings:** Recent specialty research has begun to focus on the multifactorial triggers that predispose a child to develop atopic dermatitis and subsequent burden of sequelae later in life. Evidence is beginning to show that long-term control of atopic conditions is better achieved using primary prevention measures.

**Conclusions:** Emollient therapy is a low-risk primary prevention intervention that has been shown to have a steroid-sparing effect. Effective emollient therapy may also prevent the development of atopic dermatitis in at-risk populations. An algorithm or clinical tool is needed to assist primary care providers in the selection of an emollient, how to apply an emollient when used concurrently with a topical rescue medication, and how to adequately educate parents of the importance of primary prevention in the long-term management of atopic dermatitis.


**Key words:** Ages 0–18, Atopic Dermatitis, Eczema, Emollient

Atopic dermatitis, also known as eczema, is a chronic inflammatory skin disease that often develops in early childhood. This disease affects 15%–30% of children; therefore, it is a common diagnosis seen in pediatric primary care (Weber, Samarin, Babcock, Filbry, & Rippke, 2015). This disease is known for having frequent remissions and exacerbations characterized by erythematous, pruritic lesions.

Atopic dermatitis has a significant impact on healthcare resources and patients' quality of life (Nutten, 2015). Because of this impact, studies have been conducted on the treatment and long-term management of atopic dermatitis. An important treatment goal while caring for these patients is restoration of the defective epidermal skin barrier with long-term topical emollient therapy. The use of emollients in long-term treatment for pediatric patients with atopic dermatitis is an effective tool for preventing flares by repairing the epidermal barrier (Tollefson, Bruckner, & Section on Dermatology, 2014). However, emollient therapy is often underutilized in pediatric primary care because of a lack of clear standards to assist providers in identifying and educating parents on the appropriate selection and use of emollients in atopic dermatitis (Tollefson et al., 2014).

## METHODS

To conduct our literature review, we searched the databases CINAHL, Cochrane, and MEDLINE and the clinical decision-making resource UptoDate for articles that

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would help further our research regarding the topic of the effectiveness of emollient therapy in children with atopic dermatitis. Inclusion criteria required articles containing information regarding atopic dermatitis, emollient therapy, and pediatric populations. Specifically, the keywords used in our search included "atopic dermatitis," "eczema," "emollient," and "ages 0–18." Other search parameters included articles written in English between 2005 and 2015.

Our initial search yielded 102 articles, and after using Melnyk and Fineout-Overhold's (2001) checklist for rapid critical appraisal, we narrowed the articles down by title alone and selected 20 articles to review. Examples of some articles excluded were those that focused on atopic dermatitis managed in adults only, concentrated on a specific brand of emollient, contained other languages, and did not appear to consider the use of emollient therapy. We performed a second rapid critical appraisal of the remaining 20 articles and narrowed down the remaining articles by examining our inclusion criteria and identifying articles that focused on our topic; we ultimately selected 10 articles to review that addressed our clinical question.

## RESULTS

Ten studies met inclusion criteria, and their characteristics are briefly discussed below. In addition to the literature review, clinical practice guidelines from the United Kingdom and the United States were also reviewed and were found to be consistent with the authors' syntheses of the literature. A summary of the results can be further reviewed in Table 1 and is briefly discussed as follows.

### *Description of Studies*

Of the studies reviewed, three were conducted in the United States (Chiang & Eichenfield, 2009; Simpson et al., 2010; Weber et al., 2015), two were conducted in France (Grimalt et al., 2006; Msika et al., 2008), one was conducted in Singapore (Tan et al., 2010), one was conducted in Japan (Horimukai et al., 2014), and one was conducted in Germany (Angelova-Fischer et al., 2014). One study was conducted in both the United States and United Kingdom (Simpson et al., 2014), and another study was conducted in Brazil, Germany, Spain, and the Philippines (Eberlein et al., 2008).

### *Study Designs*

Nine of the 10 articles were randomized controlled trials. The remaining article was a pilot cohort study that was eventually developed into a randomized controlled trial. Eight of the 10 articles were Level II evidence for clinical application, whereas 2 of the 10 articles were Level IV evidence for clinical application. Levels of evidence are defined in Table 2 (Melnyk & Fineout-Overhold, 2001). Participants ranged from neonates to older adults, with most participants being children. The inclusion criteria were expanded to consider studies whose samples included adults and children because very few studies were limited to a pediatric population only. All efforts were made to consider only data on pediatric patients. A variety of measurement tools were utilized to assess initial atopic dermatitis severity as well as severity after emollient therapy use. Some of these measurement tools included physicians' reports, patient questionnaires, Scoring Atopic Dermatitis scores, and atopic dermatitis severity indexes. Application of emollient use varied among studies; however, at least regular daily application was implemented.

### *Primary Prevention*

Of the 10 studies, four articles evaluated the use of emollients as a primary prevention in high-risk neonates. Results concluded that the consistent use of emollients was safe and efficient and reduced the development of atopic dermatitis in neonates at a high risk. The remaining six articles evaluated the steroid-sparing effect of emollients. Results concluded that the consistent use of emollients reduced the use of corticosteroids and reduced the number of flares; however, Tan et al. (2010) did not show statistical significance in their results.

Simpson et al.'s (2010) study started 20 neonates at a high risk for developing atopic dermatitis on emollient therapy within the first week of life. Parents were instructed to apply Cetaphil cream daily to the child's entire body immediately after bathing. Of the pilot group, 15% developed atopic dermatitis. The goal of the study was to consider the role of defective skin barriers and that correcting the skin barrier defects from birth may help in preventing atopic dermatitis. The pilot study results showed sufficient statistical significance to warrant a larger study.

Simpson et al.'s (2014) 6-month-long international study looked at 124 neonates at a high risk for developing atopic dermatitis from 3 weeks to 6 months old. Subjects were started on a full-body emollient therapy at least daily compared with the control group that did not receive any emollient therapy. Parents of subjects receiving emollient therapy were given the choice of three different emollients. It was found that the daily use of any of the three emollient therapies reduced the risk of developing atopic dermatitis by 50%. This study was the first randomized controlled trial showing that the use of daily full-body emollient therapy from birth can prevent atopic dermatitis.

The Chiang and Eichenfield (2009) study also looked at the use of emollients in preventing the development of atopic dermatitis in infants. The study enrolled 10 infants, five with atopic dermatitis and five without atopic dermatitis. Results showed that emollient application alone provided the greatest average hydration benefit for patients with atopic dermatitis and reduced the risk of developing atopic dermatitis.

Horimukai et al. (2014) evaluated whether skin barrier protection with a moisturizer during the neonatal period could prevent the development of atopic dermatitis of 118 neonates within the first 32 weeks of life. The study

## TABLE 1. Summary of Studies

| Authors | Study Design | Level | Population | Measurement Tool | Outcomes |
|---|---|---|---|---|---|
| Angelova-Fischer, Neufang, Jung, Fischer, and Zillikens (2014) | RCT | II | Aged 12–65 years with AD | SCORAD, TEWL, hydration, reduction of *S. aureus* | Stand-alone application of emollient was an efficient and safe approach for mild to moderately severe AD flares. |
| Chiang and Eichenfield (2009) | RCT | II | 10 pediatric patients: five with AD and five without AD | Cumulative incidence of AD at 32 weeks old and serum levels of allergen-specific IgE | Emollient application alone provided the greatest average hydration benefit for patients with AD. |
| Eberlein, Eicke, Reinhardt, and Ring (2008) | RCT | IV | Aged 2–70 years with mild to moderate AD | Physicians' reports and patient questionnaires | Substantial relief of symptoms and reduced CT use were seen in patients with AD after regular use of an emollient. |
| Grimalt, Mengeaud, Cambazard, and Study Investigators' Group (2006) | RCT | II | Infants with severe AD | SCORAD, IDQOL, and Dermatitis Family Impact Scores | Amount of moderate- and high-potency CT used in 6 weeks decreased by 7.5% and 42% in the emollient group; SCORAD, infants' QOL, and parents' QOL improved. |
| Horimukai et al. (2014) | RCT | II | Neonates at a high risk for AD | Number of dxs of AD by 32 weeks old and IgE antibody | About 32% fewer neonates who received the moisturizer had AD by Week 32 than control subjects; did not show a statistically significant effect of emollient on allergic sensitization based on the level of IgE antibody. |
| Msika et al. (2008) | RCT | II | Aged 4–48 months with moderate AD | SCORAD, IDQOL | Twice-daily application of emollient combined with CT QOD resulted in better SCORAD with IDQOL scores than with CT therapy alone; with emollient therapy, a 50%–75% reduction in CT use was seen. |
| Simpson, Berry, Brown, and Hanifin (2010) | Cohort | IV | Neonates at a high risk of AD | TEWL | Three of 20 subjects developed AD; this pilot study found emollients to be a good prevention strategy and a safe approach to AD tx. |
| Simpson et al. (2014) | RCT | II | Neonates at a high risk of AD | Number of physician-diagnosed AD at 24 weeks old | 43% reduction of AD in the control group and 22% in the emollient group with a relative risk reduction of 50%. |
| Tan, Suresh, Tey, Chiam, and Goon (2010) | RCT | II | Aged 12–40 years with mild to moderate AD | SCORAD | The addition of emollient therapy had some overall benefit to patients with AD with a great mean reduction in SCORAD scores; however, no significance was shown. |
| Weber et al. (2015) | RCT | II | Aged 3 months to 12 years | AD Severity Index (ADSI) | Tx significantly improved ADSI scores in the control group at weeks 2 and 4. |

AD = atopic dermatitis; CT = corticosteroid; dxs = diagnoses; QOD = every other day; QOL = quality of life; TEWL, Transpidermal Water Loss; tx = treatment; RCT = randomized controlled trial; SCORAD = Scoring Atopic Dermatitis.

**TABLE 2. Levels of Evidence**

| | | |
|---|---|---|
| Level I | Systematic reviews | Collects and analyzes data from multiple existing randomized controlled trials. |
| Level II | Randomized controlled trials | Subjects randomly assigned into a control group and an intervention group. |
| Level III | Controlled cohort studies | Prospective studies with a control group; quasi-experimental. |
| Level IV | Uncontrolled cohort studies | Prospective studies without a control group. |
| Level V | Case studies and case series | Retrospective studies, qualitative or descriptive studies. |
| Level VI | Expert opinions | Opinions or reports by expert panels. |

concluded that the daily use of emollients significantly reduced the risk of developing atopic dermatitis.

### *Steroid-Sparing Effects*

Grimalt et al. (2006) conducted a 6-week study that evaluated the effect of an oat-enriched emollient treatment in reducing the need for moderate- to high-potency topical corticosteroid use in 137 infants with moderate to severe atopic dermatitis. The results revealed that emollient treatment significantly reduced the need for use of high-potency topical corticosteroids in infants with atopic dermatitis; however, emollient use did not significantly reduce the need for moderate-potency topical corticosteroid use.

Weber et al. (2015) enrolled 43 subjects, aged 3 months to 12 years, to study the effectiveness of emollients in reducing the cumulative use of corticosteroids. Participants were split into the control group, which did not use any emollient therapy, and the intervention group, which used emollients. Results showed a statistical significance between the control and intervention groups. The control group flared earlier and more often than those using emollients in the intervention group. The use of an emollient significantly reduced the incidence of flares and symptom severity.

The Msika et al. (2008) study considered the steroid-sparing effect of emollient therapy in 86 children with moderate atopic dermatitis. An emollient targeted at repairing lipids within the epidermal layer was used as an adjunctive treatment. Applying a corticosteroid every other day with an emollient was found to be equally as effective as daily corticosteroid application. Emollient application twice daily provided a major corticosteroid-sparing effect.

Eberlein et al. (2008) conducted an international, non-controlled cohort study involving 2,456 children and adults with mild to moderate atopic dermatitis. The study examined the steroid-sparing effect of twice-daily use of emollient therapy. Both populations saw a reduction in the need for corticosteroids; however, higher efficacy rates were seen in the pediatric population.

Tan et al. (2010) studied teenagers and adults with mild to moderate atopic dermatitis. The study examined the use of a typical emollient against the use of an antimicrobial emollient. Results showed a reduction of corticosteroid use and decreased severity of symptoms with the use of the antimicrobial emollient; however, there was no statistical significance seen between the groups after the study's conclusion.

Angelova-Fischer et al. (2014) studied 18 volunteers, aged 12 to 65 years, with mild to moderately severe atopic dermatitis on the arms. Participants were randomized to receive a hydrocortisone 1% cream or an emollient for 1 week. Emollients were found to have significant benefits for patients including reduction of itching and severity. Emollient use was also found to reduce *Staphylococcus aureus* colonization while increasing skin hydration.

## DISCUSSION

Medical management of atopic dermatitis in primary care has largely been focused on the use of rescue medications to reduce the severity and length of eczematous flares. Recent specialty research has begun to focus on the multifactorial triggers that predispose a child to develop atopic dermatitis and the subsequent burden of sequelae later in life. Evidence is beginning to show that long-term control of atopic conditions like allergic rhinitis, asthma, and atopic dermatitis is better achieved using primary prevention measures (Nutten, 2015; Voegeli, 2011).

After reviewing all the articles included in our research of emollient use in pediatric atopic dermatitis, the major limitations seen in the considered studies included small sample sizes, failure to identify specific emollients, variable lengths of studies, and studies conducted in differing locations and climates.

### *Small Sample Size*

Many studies reviewed were found to have a small sample size, making it difficult to create a standard of care for the treatment of atopic dermatitis due to the inability to generalize the findings to any specific population. Other limitations of small sample sizes can include a false-positive result and an exaggerated significance of correlations. Studies found to have a small sample size in our research were as follows: Angelova-Fischer et al. (2014), Chiang and Eichenfield (2009), Simpson et al. (2010, 2014), and Weber et al. (2015). Future studies should consider studying a larger sample size to further generalize results and develop standard of care guidelines.

### Type of Emollient

Although the importance of emollient therapy in the long-term management of atopic dermatitis was discussed at length, many of the studies failed to identify the type of emollient used. The following studies identified at least one specific emollient or ingredient used during their research: Chiang and Eichenfield (2009), Simpson et al. (2010, 2014), and Msika et al. (2008). However, the remaining studies failed to identify a specific brand of emollient used or any active ingredients in vehicle emollients, namely, ointments, creams, and ceramides. Without a consensus recommendation, providers may be hesitant to recommend long-term emollient therapy, especially for pediatric patients. Therefore, more studies are needed comparing the divergent active ingredients that specifically target epidermal barrier repair or hydration.

### Length of Studies

The average length of study observed from the reviewed literature was 6 weeks. Simpson et al. (2010, 2014) and Weber et al. (2015) conducted longer studies that ranged from 6 to 24 months. The Horimukai et al. (2014) research question specifically addressed the impact of primary prevention at 32 weeks; therefore, the length of study was appropriate. The remaining studies were conducted over 6 weeks or less: Angelova-Fischer et al. (2014), Chiang and Eichenfield (2009), Grimalt et al. (2006), Eberlein et al. (2008), Msika et al. (2008), and Tan et al. (2010). Length of study is an important factor to consider in the management of atopic dermatitis because the condition is characterized by ongoing flares and remissions. Future studies should be a minimum of 3 months to fully appreciate the dynamic disease progression of atopic dermatitis.

### Locations of Studies

Seasons and certain climates have different effects on atopic dermatitis. The locations and seasons in which certain studies were performed were considered an important finding. Temperature extremes are a common trigger in atopic dermatitis flares as well as a barrier to long-term disease management; therefore, we took season and climate conditions into consideration and found that the following studies had climate or seasonal differences that affected the study: Chiang and Eichenfield (2009), Eberlein et al. (2008), and Simpson et al. (2014). The Chiang and Eichenfield (2009) study was conducted from April to June in the United States. The Eberlein et al. (2008) study was conducted in Brazil, Germany, Spain, and the Philippines from November to April. The Simpson et al. (2014) study was conducted in 1 calendar year in both the United States and United Kingdom. Future studies should recognize the different effects that climate and season changes have on atopic dermatitis and conduct studies accordingly.

## CONCLUSION

Atopic dermatitis is a chronic, inflammatory skin disorder that is characterized by persistent exacerbations of xerosis, pruritus, excoriation, and lichenification of cutaneous surfaces (Voegeli, 2011). One in five children worldwide experiences atopic dermatitis with increasing prevalence in developing countries (Nutten, 2015). Emollient therapy is an effective primary prevention intervention that has been shown to have a steroid-sparing effect as well as possibly to prevent the development of atopic dermatitis in at-risk populations. The articles included in the literature review recommend the daily use of emollients for all children with atopic dermatitis, regardless of severity of atopic dermatitis or presence of eczematous flares. However, the recommendations are vague and fail to consider the practical application of such standards in nonspecialty settings. An algorithm or clinical tool is needed to assist primary care providers in the selection of an emollient, how to apply an emollient when used concurrently with a topical rescue medication, and how to adequately educate parents of the importance of primary prevention in the long-term management of atopic dermatitis in their children. ■

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