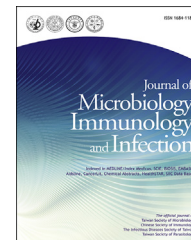


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Original Article

# The influence of breastfeeding in breast-fed infants with atopic dermatitis

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## KEYWORDS

Atopic dermatitis;  
Breastfeeding;  
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whey formula;  
PO-SCORAD

**Abstract** *Background:* The aim of this study was to evaluate whether breastfeeding should be discontinued for exclusively breast-fed infants with atopic dermatitis (AD).

*Methods:* Eighty-seven exclusively breast-fed infants with AD were enrolled in a prospective observational study. The infants were divided into 3 groups: breastfeeding only (BM group), partial breastfeeding and partial partially hydrolyzed whey formula (pHF-W) (Partial group) and pHF-W only (DC group). The extent and severity of AD were evaluated with the Patient-Oriented SCORing Atopic Dermatitis (PO-SCORAD) index at enrollment and 3 and 6 months later. *Results:* There were no significant differences in parental atopy history, PO-SCORAD scores, and medication scores at baseline. At month 3 and 6, the PO-SCORAD scores were significantly decreased in all groups. PO-SCORAD scores at month 3 and 6 and at the last time point when topical corticosteroids were given were significantly different among the groups. Stepwise multiple linear regression analysis showed that baseline PO-SCORAD scores and stopping breastfeeding were significantly associated with month 3 PO-SCORAD scores ( $p < 0.001$ ), after adjusting for sex, age, baseline medication scores, partial breastfeeding and parental atopy history. In addition to baseline PO-SCORAD scores and stopping breastfeeding, partial breastfeeding was significantly associated with month 6 PO-SCORAD scores. Long-term follow-up showed that only stopping breastfeeding was significantly associated with the last time point when topical corticosteroids were given ( $p = 0.014$ ).

*Conclusion:* For exclusively breast-fed infants with AD, discontinuing breastfeeding and shifting to pHF-W might help to improve symptoms and shorten the duration of AD regardless of sex, age and parental atopy history.

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## Introduction

The impact of breastfeeding on the development of atopic diseases such as atopic dermatitis (AD), asthma, or allergic rhinitis has been thoroughly investigated. Although the protective effect of breastfeeding against development of AD<sup>1–3</sup> and cow's milk allergy during childhood is well accepted,<sup>1</sup> the subject remains controversial.<sup>4–10</sup> A prospective study in Japan showed that both exclusive breastfeeding for more than 4 months and partial breastfeeding for more than 6 months were associated with an increased risk of AD among infants with no parental history of allergic disorders.<sup>5</sup> Two cohort studies in Taiwan also showed that prolonged breastfeeding increased the risk of AD in children at 18 months of age.<sup>7</sup> A meta-analysis of prospective cohort studies performed in 2008 found insufficient evidence that exclusive breastfeeding for at least 3 months is protective against AD, even in children with a positive family history of atopy.<sup>11</sup> These conflicting results are likely due to confounding effects from differences in genetic background, health literacy, socioeconomic status, and other maternal health behaviors.

Since the preventative role of breastfeeding in the development of AD is in doubt, should we encourage breastfeeding in infants with AD? To date, there is no consensus on breastfeeding for infants with progressive AD during the period of exclusive breastfeeding, even if they are receiving standard treatment for AD such as topical corticosteroids and emollients. As early as 1999, an observational study of 100 infants suggested that symptoms of AD significantly improved after cessation of breastfeeding.<sup>12</sup> However, this study lacked a control group, so the results couldn't confirm whether the improvement in symptoms was due to cessation of breastfeeding or to the natural course of the disease.

Therefore, we designed a study to clarify whether breast-fed infants with AD should continue exclusive breastfeeding. To determine this, we evaluated the difference in severity of AD at three time points, enrollment and 3 and 6 months after study entry, among infants who remained on breastfeeding, those who were switched to a partially hydrolyzed whey formula (pHF-W) partially and those who discontinued breastfeeding and received pHF-W only.

## Methods

Infants with physician-diagnosed AD being exclusively breast-fed were enrolled in a study at the National Taiwan University Hospital (NTUH) from February 2009 to September 2012. The diagnosis of AD was based on the criteria established by Hanifin and Rajka, and included the following major features: a family history of AD, the presence of pruritus, typical morphology and distribution of lesions, and chronic or relapsing skin lesions.<sup>13,14</sup> Infants with major diseases such as cardiovascular anomalies, pulmonary dysfunction, or neurological deficits, for example, were excluded from the study. The study was approved by the Ethics Committee of NTUH and informed consent was obtained from all participants and their guardians. All the basic characteristics such as sex, age,

parental atopy history, onset age of AD, and maternal intake of probiotics during breast feeding period were obtained at enrollment. The atopy history included ever asthma, allergic rhinitis and/or atopic dermatitis in baby's mother or father. Parental atopy history was positive when atopy history was noted in either one or two parents.

Exclusive breastfeeding was defined when the infant was being given only breast milk, without the addition of infant formula and/or cow's milk. Patients were divided into 3 groups according to their milk intake on parent's will: (1) infants exclusively fed by breastfeeding (BM group); (2) infants receiving partial breastfeeding and partial pHF-W (Partial group); and (3) infants no longer being breastfed and exclusively receiving pHF-W (DC group). Infants in the Partial and DC groups received the same pHF-W (NAN H.A.<sup>®</sup> 1 or 2, Nestlé Ltd., Frankfurt, Germany). Solid food was introduced beginning at 6 months of age in all groups, except in few patients who were enrolled after they were 6 months of age. These infants had been started on solid food since enrollment. All parents were asked to delay introducing allergenic foods such as egg white and shellfish until their child was 10–12 months of age.

The severity of atopic dermatitis was assessed with the Patient-Oriented SCORing Atopic Dermatitis (PO-SCORAD) index,<sup>15</sup> a self-assessment score that allows parents to comprehensively evaluate the actual course of AD. The extent and severity of AD evaluated by PO-SCORAD scores were obtained at enrollment and 3 and 6 months later. Standard treatments for AD, including topical corticosteroids, antihistamines, topical antibiotics, emollients, and even systemic corticosteroids, were prescribed with titration during the study period. The dosage of systemic corticosteroids (oral prednisolone) is 1 mg/kg/day for 3 days in severe patients. All the medications were reviewed from the patient's medical chart. The medication score was defined as the monthly prescribed topical corticosteroids (tubes; fluticasone propionate, 5 g/tube) plus 5 times oral corticosteroids (bottles; prednisolone sodium [phosphate], 1 mg/mL, 60 mL/bottle).

## Statistical analysis

We compared the sex, parental atopy history, and maternal intake of probiotics among the 3 groups using the Pearson's Chi square test. We compared the PO-SCORAD scores at baseline, month 3 and 6, the medication scores, and the mean ages among the 3 groups using the Kruskal–Wallis test. The changes in PO-SCORAD scores between different time points, representing improvement in severity of symptoms, were compared using the Wilcoxon signed-rank test. Stepwise multiple linear regression analysis was used to determine whether the outcomes (PO-SCORAD scores at month 3 and 6, and the last time point when topical corticosteroids were given) were associated with feeding type, after adjusting for factors including age, sex, baseline medication scores, baseline PO-SCORAD scores, and parental atopy history. The differences of proportion of patients using topical corticosteroids were analyzed by the Kaplan–Meier method using a log-rank test. A *p* value < 0.05 was considered significant. A *p* value < 0.1 and ≥ 0.05 was considered as a trend. All statistical analyses

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