

## Original article

## Breastfeeding and risk of atopic dermatitis up to the age 42 months: a birth cohort study in Japan

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## ABSTRACT

**Purpose:** The purpose of this study was to investigate the association between breastfeeding and atopic dermatitis (AD) up to the age 42 months.**Methods:** Data from a nationally representative population-based birth cohort study in Japan were used ( $N = 38,757$ ). Feeding pattern and breastfeeding duration were investigated via questionnaires when infants were aged 6 months. Physician-diagnosed AD during the previous 1 year was ascertained via questionnaires when the children were aged 18, 30, and 42 months. The associations between feeding patterns or breastfeeding duration and physician-diagnosed AD from the age 6 to 42 months, categorized by AD status (no history of AD, episodic AD, and persistent AD), were analyzed using ordered logistic regression adjusted for covariates.**Results:** Breastfeeding was positively associated with AD, with dose-response association ( $P$  for trend  $< .001$ ). Exclusively breastfed infants were 1.26 times more likely to have AD (95% confidence interval, 1.12–1.41) than infants fed formula alone. Furthermore, children with a longer breastfeeding duration were also significantly more likely to have AD ( $P$  for trend  $< .001$ ).**Conclusions:** Breastfeeding is associated with an increased risk of AD up to the age 42 months. Further study is needed to elucidate the mechanism underlying the association between breastfeeding and AD.

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## Introduction

Atopic dermatitis (AD) is one of the most common chronic skin disorders among infants and young children, which is characterized by itchy skin with eczematous changes [1]. The association between breastfeeding and AD has been studied for more than 70 years [2], but the results have been controversial. Although some epidemiology studies including meta-analysis [3] showed that breastfeeding had a protective effect on AD [4–6], other studies suggested that breastfeeding increased the risk of AD [7–9] or that there was no relationship [10–12]. These differences may stem from differences in study design, the definitions of exposure and outcome, sample size, or adjustment for confounders [13–15]. Kramer [14] proposed 12 criteria to assess study designs addressing the relationship between breastfeeding and atopic disease. Those

criteria included nonreliance on prolonged maternal recall, strict diagnostic criteria, severity of outcome, assessment of effect in children at high risk, and adequate statistical power. No studies have completely fulfilled these standards thus far [16]. Furthermore, the location of the study may be relevant. Studies in Finland, Denmark, New Zealand, or Japan—countries in which people eat relatively large quantities of fish—showed a positive association between breastfeeding and AD using a prospective study design [8–10,17], suggesting that the contents of the breast milk may be associated with the risk of AD.

The Longitudinal Survey of Babies in the 21st century is a nationwide large birth cohort study implemented by the Ministry of Health, Labour, and Welfare in Japan. It investigated feeding patterns and breastfeeding duration for infants at the age 6 months, and physician-diagnosed AD during the previous 1 year was queried for children at the age 18, 30, and 42 months. Using the data, the association between breastfeeding and AD can be investigated by adopting a prospective design with sufficient statistical power. The purpose of the present study was, therefore, to investigate the association between breastfeeding and the duration of breastfeeding on the development of AD in young children from the age 6 to 42 months in Japan.

**Author contribution:** Dr J.I. analyzed the data and wrote the first draft. Dr T.F. conceived the study design, acquired data, and finalized the manuscript.

**Conflict of interest statement:** The authors have no conflicts of interest to disclose.

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## Methods

### Study sample

The data used for this study were taken from the Longitudinal Survey of Babies in the 21st century conducted by the Japanese Ministry of Health, Labour, and Welfare from 2001 to 2004. The study sample included all infants born in Japan during the periods of January 10–17, 2001, and July 10–17, 2001 using the birth record list ( $N = 53,575$ ). Questionnaires were mailed to all subjects when the infants were aged 6 months. The subjects were considered to have agreed to participate in the study if they returned the questionnaire to the Ministry. The total number of respondents was 47,015 (response rate, 87.8%). The second and the third questionnaires were mailed in 2002 and 2003 to all subjects who participated in the first survey when the children were aged 18 and 30 months, during which 43,925 and 42,812 subjects responded, respectively (response rates, 93.4% and 91.1%, respectively, of those responding to the first survey). The fourth questionnaires were mailed in 2004 to all subjects who participated in the second or the third survey ( $N = 45,072$ ) when the children were aged 42 months and 41,559 subjects responded (92.2% of those responding to the second or third survey). Because this study focused on breastfeeding and AD up to the age 42 months, subjects without record of breastfeeding status ( $n = 308$ ) and those who did not answer the question about AD in every survey ( $n = 1,720$ ) were excluded. We further excluded multiple births ( $n = 832$ ). Therefore, the final

sample size for this study was 38,757 (Fig. 1). Because the study was based on an anonymous public use data set with no identifiable information on the survey questionnaire, this study has been exempted from ethical review.

### Feeding pattern and breastfeeding duration

Information regarding feeding pattern and breastfeeding duration was obtained in the first survey. Participants were asked about the duration of breastfeeding and formula feeding for the past 6 months. If the mother answered that she had not given any formula, she was included in the category of “exclusive breastfeeding.” If she answered that she had given only colostrum or had not given any breast milk, she was included in the category of “formula only.” Finally, if the mother answered that she had given both breast milk and formula, she was included in the category of “partial breastfeeding.” Thus, we categorized the feeding pattern during the first 6 months of life as “formula only,” “partial breastfeeding,” or “exclusive breastfeeding.” All infants were also categorized into four groups according to the duration of breastfeeding: never, 1–2, 3–5, or 6+ months.

### Atopic dermatitis

Information regarding doctor-diagnosed AD was obtained in the second, third, and fourth survey using the following question: “Has your child seen a doctor for AD or eczema treatment in the last

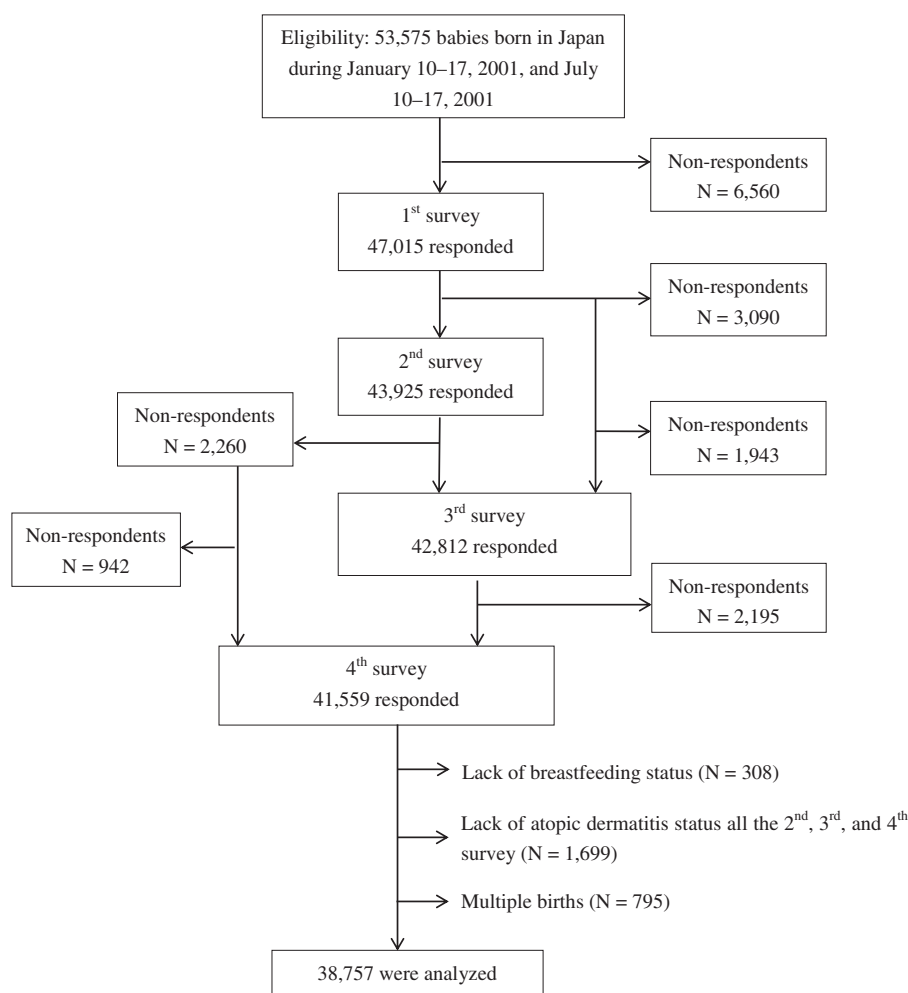


Fig. 1. Flow chart of study participants.

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