Systematic Review

Breastfeeding in Decreasing Atopic Dermatitis Incidence in Infants: A Systematic Review

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Abstract

Breastfeeding has been linked to the avoidance of allergies, including atopic dermatitis (AD). Numerous studies have demonstrated that breastfeeding for at least six months can lower the incidence of AD in young children. The purpose of this study is to assess how breastfeeding may reduce the prevalence of atopic dermatitis. We searched and retrieved material from 2019 to 2024 using the PRISMA 2020 recommendations in the following databases: PubMed, CORE, Science Direct, Cochrane and Google Scholar search engine. Relevance was assessed in abstracts and titles. Primary research on breastfeeding as a strategy to reduce the occurrence of atopic dermatitis that was published at least five years ago and that can be translated into English are requirement for inclusion. The Newcastle-Ottawa Scale was used to assess the quality of the evidence. From 1,281 identified articles, 33 studies remained after the initial screening process. Following a thorough assessment of methodological quality, trustworthiness, and relevance, 9 studies were ultimately included in this systematic review. Data from the included studies were then critically analyzed and synthesized to provide a comprehensive overview of the available evidence. The preventive effect of nursing in lowering the incidence of AD in babies is highlighted by this comprehensive study. Compared to partial breastfeeding or formula feeding, exclusive breastfeeding, especially during the first six months of life, seems to reduce the chance of developing AD.

Keywords: Breastfeeding, atopic dermatitis, eczema.

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Introduction

Atopic dermatitis (AD) is a common chronic inflammatory skin disease in childhood, characterized by pruritic, recurrent eczematous lesions resulting from immune dysregulation and skin barrier dysfunction.[1,2] Among early-life exposures, breast-feeding has long been proposed as a potentially modifiable factor influencing the development of AD, yet evidence regarding its protective role remains inconsistent.

Breastfeeding is universally recommended for the first 4–6 months of life to support optimal infant growth and immune development. Several observational studies suggest that exclusive or prolonged breastfeeding may reduce the risk of AD in early childhood, possibly through immune modulation and effects on gut microbiota. However, other studies have reported no significant association, while some indicate an increased risk of AD—particularly with prolonged breastfeeding or in children with a family history of atopy—raising concerns about reverse causality and confounding by genetic predisposition.[3,4]

The development of AD is multifactorial, involv-

ing genetic susceptibility and early-life environmental exposures. Filaggrin (FLG) gene mutations contribute to skin barrier dysfunction, while perinatal factors such as maternal atopy, prenatal eczema, passive smoking, and antibiotic exposure during pregnancy have been associated with increased AD risk.[5] Postnatal factors, including early antibiotic use and infant feeding practices, may further influence immune maturation and disease expression. Although numerous reviews have examined the relationship between breastfeeding and AD, conclusions remain conflicting, with studies reporting protective, neutral, or harmful effects. To clarify these discrepancies and synthesize current evidence, we conducted a systematic review of primary studies evaluating the association between breastfeeding and the risk of atopic dermatitis in children.

Methods

The Preferred Reporting Items standards for both meta-analysis and systematic reviews were adhered to in this review. PRISMA 2020 checklist Supplementary Table 1.

Literature Search

To evaluate the contribution of breastfeeding to reducing the prevalence of atopic dermatitis, we searched the literature extensively using the search engines ProQuest, PubMed, CORE, Science Direct, Cochrane and Google Scholar search engine. From 2019 to 2024, the articles were retrieved. "Breastfeeding" OR "Breast-feeding" OR "Exclusive breastfeeding" OR "Direct breastfeeding" AND "Atopic dermatitis" OR "Eczema" are the search phrases used in PubMed. Only full-text and English-language publications were included in the literature search. We also conducted a thorough search for further potential studies to provide as references. In addition, recent systematic reviews, meta-analyses, and international guidelines including those issued by the World Health Organization (WHO) and the American Academy of Pediatrics (AAP) published within the same period were screened to contextualize current recommendations and identify relevant primary studies.

Study Selection

Primary research, English-language writing, full-text accessibility, and an evaluation of the contribution of breastfeeding to reducing the morbidity of atopic dermatitis are the requirements for inclusion. The following are the exclusion criteria: (1) case report; (2) comments; and (3) editor's letter.

AD and Breastfeeding Definition

AD diagnosis was required to be based on established and validated criteria, including the Hanifin and Rajka criteria, the UK Working Party diagnostic criteria, physician-diagnosed AD, or standardized severity and diagnostic scoring systems such as the Scoring Atopic Dermatitis (SCORAD) index. Studies that did not clearly define the diagnostic criteria for AD were excluded.

Breastfeeding exposure was defined as any form of breastfeeding, including exclusive, predominant, or partial breastfeeding. The timing of breastfeeding initiation was explicitly defined as the onset of breastfeeding within the first hours or days after birth. Duration of breastfeeding was categorized according to study definitions, commonly including <3 months, 3–6 months, and >6 months. Studies referring to "nursing practices" were included only if breastfeeding initiation, duration, or exclusivity were clearly specified.

Data Extraction

The sixth author settled their disagreements after the other five writers separately gathered more information regarding the featured study. The following were the extracted data: (4) Subjects; (5) Methods; (6) Outcome; (7) Results; (2) research design; (3) Country of research origin; (1) First author name and publication year.

Type of Outcome Measures

The incidence and prevalence of AD in babies were the main outcome measures evaluated in this systematic review. Among the outcomes were the length of time and exclusivity of breastfeeding, the diagnosis of AD using clinical criteria or established scoring systems, and the comparison of AD rates among infants who were exclusively breastfed, partly breastfed, and formula-fed. The date of

the start of nursing practices and the intensity of atopic dermatitis symptoms were secondary out-comes.

Quality Assessment

The Newcastle-Ottawa Scale was used by five independent reviewers to evaluate the bias risk in cohort and case-control studies. The NOS used eight subscale questions to evaluate result reporting, comparability, and participant selection. The total of the subscale questions will be used to get the maximum score of 9 in cohort studies (score 0-3: very high risk of bias; score 4-6: high risk of bias; score 7-9: good quality). Discussion will be used to settle any disputes.

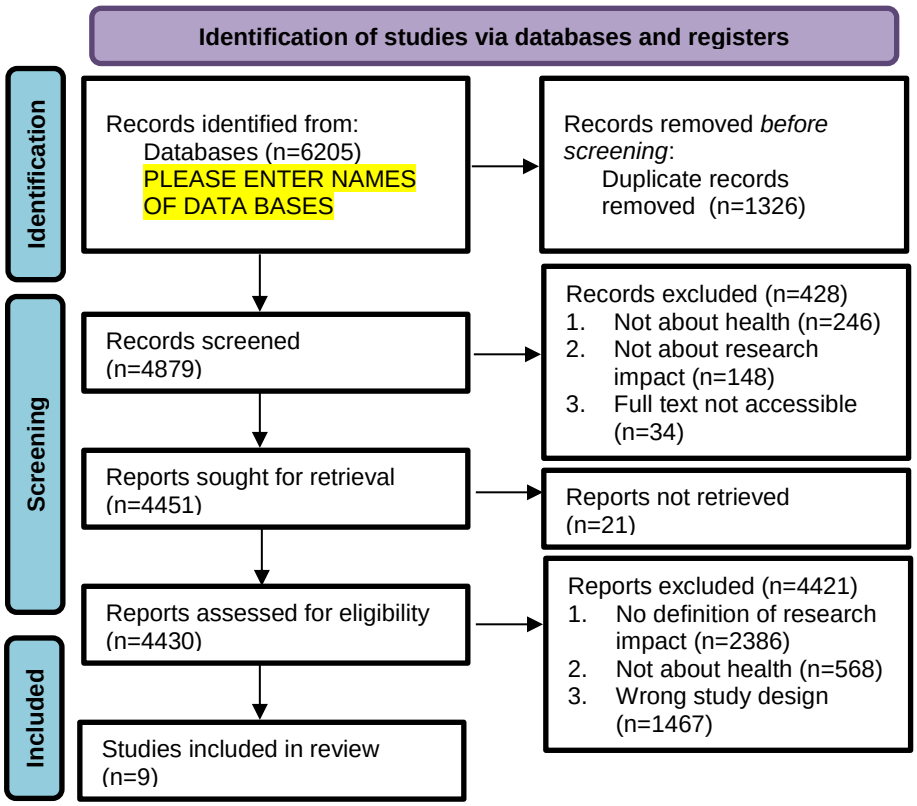

Figure 1: *PRISMA 2020 Flowchart.*

Results

A total of 9 papers were included in this analysis based on 6205 screening title abstracts (Table 1). Research by Wang (2020) sought to examine the connection between AD and vitamin A and D levels in breast milk. Knowing this is crucial since the immune system is impacted by vitamins A and D. In the AD group, ObjSCO-RAD was 20.54 ± 1.73 (shown as mean ± SEM). Compared to the control group, the AD group's BM 25-(OH) D3 levels were considerably lower (1.72 ± 0.30 and 3.95 ± 0.64 ng/mL, respectively; P = 0.001). There was a negative correlation (P = 0.003) between 25-(OH) D3 levels and objSCORAD. Using multiple regression to control for age, gender, parental atopy history, and 25-(OH) D3 levels, objSCORAD in infancy was the only predictor substantially linked to persistent AD (P = 0.003).[8]

According to the Enquiring About Tolerance (EAT) randomized controlled trial (ISRCTN 14254740 in 1303 healthy 3-month-old infants who were exclusively breastfed, when participants were not directly consuming cow's milk, 25% of families reported two or more non-IgE CMA symptoms for mild-moderate symptoms and 1.4% for severe symptoms each month between 3 and 12 months of age. At three months, this number peaked at 38% with ≥2 mild-moderate symptoms and 4.3% with ≥2 severe symptoms. Over the course of this time, 74% of participants reported having at least two mild-to-moderate symptoms, while 9% reported having at least two severe symptoms. The percentage of children with ≥2 symptoms at six months did not appear to differ between those who drank cow's milk (29.5% mild-moderate, 1.8% severe) and those who did not (35.3% mild-moderate, 2.2% severe). Additionally, there was no difference in the mean monthly reporting of ≥2 symptoms between those who had mild-moderate eczema at baseline (15.8%, 1.1% severe) and those who did not (16.7%, 1.3% severe).[9]

According to research by Ahmadipour et al, on sixty newborns whose beginning of symptoms occurred between three and twenty days ago, the infants' mean weight and age at the time of initial examination were 3292.71 ± 367.93 g and 73.34 ± 1.00 days, respectively. The groups did not differ

Table 1: *Breastfeeding in Decreasing Incidence of Atopic Dermatitis.*

No	Authors	Study Design	Subject	Parameters	Result	Limitation
1.	Wang, et al, (2020).[8]	Prospective observational cohort study.	Included are 90 children aged two to four months who were exclusively breastfed, 45 of whom were controls and 45 of whom had been diagnosed with AD by a clinician based on the objective SCORing Atopic Dermatitis (objSCO-RAD) index. Infants with serious illnesses, such as cancer, autoimmune diseases, primary immunodeficiency disorders, or congenital	Food frequency questionnaire (six categories, 51 items) → No variation in nutritional consumption. Analysis of retinol and 25-(OH) D3 levels in breast milk => Samples kept at -80C prior to extraction and liquid chromatography analysis.	Vitamin A: Normal control and AD babies are same. Vitamin D: By restoring normal Th-1 and Th-2 cytokines in AD patients, higher vitamin D intake lessens the severity of AD. Vitamin D supplementation → lessens the severity of AD → required since breast milk has low amounts of vitamin D (e.g., sun exposure).	Small sample size. Blood sample collection was difficult, and no serum vitamin D level was found. Vitamin D supplementation → lessens the severity of AD → required since breast milk has low amounts of vitamin D (e.g., sun exposure).
2.	Vincent, et al, (2022).[9]	Randomized controlled trial.	Between the ages of 13 and 17, 1303 exclusively breastfed three-month-olds are randomly assigned to one of two groups: the Standard Introduct-ion Group (SIG) or the Early Introduction Group (EIG). SIG = exclusive breastfeeding; EIG = introduction of six allergic foods, including cow's milk, in addition to breastfeeding.	IgE-mediated and mild-to-moderate non-IgE and severe CMA were examined. Centered on symptoms and indicators, physical examination, and clinical history. Survey → Distributed monthly until the 12-month mark (the 3-month and 12-month surveys matched clinic visits) → examined by a primary care physician, a pediatric allergist consultant, and a core medical trainee.	In months four, five, and six, the frequency of symptoms was higher in EIG than in SIG. From 3 to 12 months, the average monthly report of symptoms connected to milk was 2.2%. At six months, the percentage of SIG babies who consumed and did not drink cow's milk formula was 29.5% for consumers and 35.3% for non-consumers. Two or more severe symptoms and two or more mild-to-moderate symptoms are present in those who are not directly fed cow's milk.	Not stated.
3.	Ahmadip our et al, (2020).[10]	Prospective cohort study	Included were sixty healthy babies with proctocolitis based on their examination and clinical findings. Based on the kind of feeding, they were split into three groups: group 1 recei-	For two consecutive days, the sample was taken at the same time from the first bowel movement each day. We measured stool WBC (cells/ml), stool RBC (cells/ml), and stool Calprotectin (µg/g).	The three groups' mean levels of stool inflammatory markers, including calprotectin (200.43 ± 147.62), WBC (10.78 ± 5.99), and RBC (7.47 ± 4.32), were assessed; however,	Low number of specimens The three groups' nonhomologous patient counts some parents' mistakes in following dietary restrictions and failing to follow up with their children over an extended period of time.

			ved just breast milk, group 2 received only formula, and group 3 had a combination of both. The following problems are excluded: coagulation disorders, meckle's diverticulum, analfissure, infection, necrotizing enterocolitis, intussusception, volvulus, hirschsprung's disease, etc.	The following characteristics were also examined: cigarette exposure, eczema, parental allergy, and sibling allergy.	they were not statistically significant. 33 had a history of neonatal eczema, with the group that was exclusively breastfed having the greatest number (17 babies). After the mother's diet was restricted, 30 babies—28 in the breastfed group and 2 in the combined feed group—were able to halt their rectal bleeding. The amount of calprotectin in the breastfed babies at each of the three phases (A, B, and C) did not differ significantly. Compared to the group responding to the extensive hydrolyzed formula, the babies who reacted to the amino acid-based formula performed better.	
4.	Marrs, et al, (2021).[11]	Nested cohort study	In a dietary randomized controlled experiment (Enquiring About Tolerance research), 1303 children between the ages of 12 and 17 weeks who were exclusively breastfed were included. -Fecal samples were taken at baseline, and after six and twelve months, additional samples of chosen patients and controls were taken to examine the changes in their gut flora. -Stool samples were taken from 288 enrolled participants; 428 samples in total were sequenced (of the 288 subjects who provided baseline samples, 218 participants only provided baseline samples, and a subset of 70 individuals pro-	The ImmunoCap (Phadia) assays were used to evaluate the food-specific IgE levels to each of the six allergenic foods (boiled hen's egg, peanut, cow's milk [yogurt], wheat, white fish, and sesame) at enrollment and at ages 1 and 3 years in both groups (cutoff ≥0.35 kU/L to determine food sensitization). Using the UK diagnostic criteria-based photographic procedure of the International Study of Asthma and Allergies in Childhood Phase Two, all babies were evaluated for atopic dermatitis (AD) during their enrollment visits at three and twelve months of age. The SCORing Atopic Dermatitis index was used to calculate the severity of AD.	The gut microbiota of 288 baseline samples taken from exclusively breastfed infants at three months of age formed three different clusters: those that were high in Bifidobacterium, Bacteroides, and Escherichia/Shigella. At three months, a lower diversity of gut microbiota is linked to cesarean delivery. Early solid food introduction to newborns raises the relative abundances of Escherichia/Shigella and Prevotella while also hastening the development of microbiota diversity. Twelve individuals with egg allergies (one also having a peanut allergy), one	An even earlier characterization of microbial development would have been possible if the gut microbiota had been evaluated when the child was three months old.

			vided samples from 3, 6, and 12 months).	Online questionnaires asking about antibiotic use, pet ownership, relationship size, and manner of birth were filled out by parents.	milk allergy, one codfish allergy, and thirteen with AD (SCORing Atopic Dermatitis index more than 15 at either three or twelve months) made up a subgroup (n=70) of the cases. On assessment at ages 3 and 12, the occurrence of atopic dermatitis was linked to an increased relative abundance of Clostridium sensu stricto at 3 months.	
5.	Fikri et al, (2019).[12]	Cohort, 2 × 2 factorial, randomized, nontreatment controlled trial study	Lactating women who took part in the previous study (Katsushika study) in Tokyo provided BM samples. A total of 269 1-month breast milk samples and 258 colostrum samples were examined. (n = 549) Mothers' BM samples were taken three to five days and one month after giving birth.	Following the manufacturer's instructions, a commercial human sCD14 ELISA kit was used to quantify the concentration of sCD14 in the aqueous phase of BM samples twice. At nine months of age, infants were evaluated for AD by a doctor, and the Japanese Dermatological Association's standards were used to assess whether AD was present or not. Method of feeding up to 4 months → Mothers' questionnaires at 6 months of age.	Low sCD14 levels in 1-month BM were observed to be mildly linked with sensitization to egg white at 9 months in non-AD babies (p = 0.01) and strongly associated with the development of AD at 9 months (p = 0.001). According to the findings, sCD14 in BM may function as a buffer against the development of later allergy disorders and/or allergen sensitivity.	The study's results were established at 9 months old to lessen the influence of factors other than breastfeeding. Longer follow-up is necessary to examine the long-term effects of sCD14 in BM. This study did not investigate the role of sCD14 in BM in the development of AD in the high-risk group, which might be important for tailored prevention.
6.	Troesch et al, (2019).[13]	Single center, randomized, double-blind, parallel-group, controlled clinical trial	360 newborns under 28 days old were included in the Department of Neonatology, "Dr Dragisa Misıović-Dedinje" Clinical Hospital Center, Serbia delivered between 37 and 41 weeks of gestation, weighing between 2500 and 4500 g at birth, and healthy from singleton pregnancies.	Blood samples (folate status, hematology chemistry, hematology profile) and anthropometric information (weight, length, and head circumference) were acquired. A fixed and vertical headboard was used to measure length, head circumference was measured with non-stretchable insertion tape, and body weight was measured using a calibrated digital scale.	There was no difference in folate status between the intervention and control groups. Head circumference, body weight, and length do not significantly differ.	The absence of trustworthy data on energy consumption from nutritional sources other than study formulas.
7.	Lachover-Roth,	Single-center, prospective	Term and near-term babies that were	A preliminary questionnaire on demo-	Up to the age of two months, 1073	The fact that study groups were assigned based on par-

	et al, (2022).[14]	interventional study. Newborns were prospectively recruited shortly before birth and divided into 2 groups according to parental feeding preference for the first 2 months of life: exclusive breastfeeding (EBF) or at least 1 meal of CMF (with or without breastfeeding) daily. Infants were followed up monthly until the age of 12 months.	delivered after 36 plus 0 weeks of pregnancy, had a birth weight that was adequate for their gestational age, and had no known congenital defects were eligible. Parents who spoke the local language well and belonged to various ethnic groups were asked to take part.	graphic information and family history of atopic illnesses (food allergies, atopic dermatitis, asthma, and allergic rhinitis) was filled out by parents.	(53.86%) of the 1992 babies who took part in the research were in the EBF group. 0.85% (n=17) of the patients had IgE-mediated CMA; all were in the EBF group. IgE-mediated CMA was 1.58% prevalent in this group, compared to 0 in the other groups (relative risk, 29.98; P<.001).	ental choices rather than randomization was a significant disadvantage of this research. For ethical considerations, randomization in research involving newborn feeding is tricky. Implementing initial randomization and deciding for the moms whether or not to breastfeed is unethical.
8.	Boutsikou et al, (2023).[15]	Randomized controlled trial	650 healthy term infants who were at high risk of developing allergies (i.e., had a family history of allergies, such as past or current asthma, allergic rhinitis/conjunctivitis, AD, or food allergies in at least one parent or sibling) and who also had differences in growth outcomes during the first six months of life were included in the study. Allocation: 220 children were exclusively breastfed, 331 newborns were randomly assigned to one of the two research formula groups, and 99 infants left before being assigned to any group. Infants who participated were either randomly assigned to one of the two intervention formulae (a) a pHF or (b)	Every two months, the infants were monitored. A questionnaire measuring the existence of CMPA and AD signs or symptoms was used, and infants were clinically checked during visits. Additionally, the CoMiSS and SCORAD tools were finished. In formula-fed newborns, CMPA was characterized as an open positive oral food challenge (OFC) accompanied with AD (as described below), allergic urticarial rash, and/or gastrointestinal symptoms. By removing cow's milk protein (CMP) from the mother's diet for seven to fourteen days (depending on when the symptoms went away) and then reintroducing CMP into the mother's diet, CMPA in EBF was verified.	In the presence of a positive family history of AD, the incidence of AD was considerably greater in the EBF group than in the pHF group after 6 months of intervention (95%-CI: 0.09, 0.93, RR: 0.29, p = 0.007), while these differences did not exist in the SF group. While there were no differences between the EBF and SF groups, there was a tendency (p = 0.086) toward a reduced incidence of CMPA in the pHF group as compared to the EBF group. Infants with an estimated breast milk intake above the median daily milk consumption (>278 mL/day) had a lower incidence of CMPA in the pHF group (p < 0.001).	First, there might not be enough infants in the end analysis to provide definitive findings. In this regard, while the pHF group had a lower incidence of CMPA than the SF group, the differences were not statistically significant. An equation that calculates the predicted breastmilk intake per kilogram of body weight (BW) is used to estimate breastmilk consumption according to the infant's age.

			an SF, or they received EBF.	According to the pediatrician's clinical diagnosis of AD and the scores obtained from the SCORAD and Co-MiSS instruments (total objective score > 1 and Skin Symptoms on Atopic Eczema > 1, respectively),		
9.	Kouwenhoven et al, (2020).[16]	Double-blind, randomized controlled trial	Formula-fed children were randomized to receive either the mLP infant formula, which has a protein concentration of 1.7 g/100 kcal, or the control (CTRL) baby formula, which has a protein content of 2.1 g/100 kcal. The study was carried out at two locations: Amsterdam UMC and Dr. Von Hauner Children's hospital. Infants that were breastfed served as a reference group. Eligible newborns were < 45 days old at enrollment, with a normal birth weight (between the 3rd and 97th percentiles) and a gestational age of around 37 weeks. Exclusion criteria included congenital disease or deformity, existing or past diseases, infections, interventions, and being a member of a multiple birth. Infants who needed a specific diet other than regular cow milk were also excluded.	During the initial visit, the parents received diaries and study materials. Parents self-reported their height and weight. Visits to the study were planned at 17 weeks (visit 2) and 6 months (visit 3). Anthropometry and body composition measures were taken during these visits by qualified research staff following established procedures. After around three hours of fasting, a venous blood sample was taken from a hand vein on the second visit. A baby scale was used to measure weight with an accuracy of 0.5 g. A flexible measuring board was used to measure length.	The mLP and CTRL formula groups gained the same amount of weight from baseline to the age of 17 weeks (27.9 and 28.8 g/d, respectively; difference: -0.86 g/d 90% CI: -2.36, 0.36 g/d). There were no variations in adverse events, body composition, or other growth metrics.	Free amino acids made up 30% of both the mLP and CTRL formulas. This is because the proper composition of necessary amino acids for the mLP formula could not be provided by intact protein. More than half of the infants in the formula groups had breast milk for a while, and the newborns were around a month old when they were recruited. It's uncertain how these initial weeks will affect the results.

significantly in terms of gender or delivery style. Forty-seven newborns' parents had a history of allergies, with the highest frequency in group one, and thirty-three infants had a history of eczema. 50% of babies had a stop in rectal bleeding once the mother's allergy feeding was stopped (15 in stage A, 8 in stage B, and 7 in stage C). Hence, during the initial stage of blood in the stool, there is no need to utilize amino acids or highly hydrolyzed formula right away; probably the main course of action should be to cease the mother's allergic feeding.[10] A higher abundance of Clostri-

dium sensu stricto was linked to atopic dermatitis, and some gut microbiota traits in breastfed babies at three months of age were linked to cesarean birth. Breastfeeding and the random introduction of allergenic solid meals at three months of age were linked to distinct gut microbial community maturational patterns. The gut microbiota of 288 exclusively breastfed children at 3 months of age was extremely diverse, forming three separate clusters: those that were rich in Bifidobacterium, Bacteroides, and Escherichia/Shigella. The primary differentiator was the manner of administration. The presence of atopic dermatitis during exams at 3 and 12 months of age was linked to an increase in the relative abundance of Clostridium sensu stricto at that age. The first year of life was marked by an inflow of adult-specific bacteria and a shift to a Bacteroides-rich community in a subset of patients and controls with longitudinal sampling (n = 70). Compared to babies who were advised to be solely breastfed, the introduction of allergenic meals resulted in notable increases in Shannon diversity and the presence of certain microbes, such as genera from the Prevotellaceae and Proteobacteria (e.g., Escherichia/Shigella).[11]

The development of AD and sensitization to food and airborne allergens at 9 months of age in babies who were exclusively or nearly exclusively breastfed until 4 months of age were examined by Fikri et al, in connection to sCD14 in colostrum and 1-month breast milk. The effectiveness of emollients and synbiotics in avoiding AD and food allergies in infants during the first year of life was investigated in a 2 × 2 factorial, randomized, controlled trial without assigned therapy in Tokyo. Breast milk samples were taken from nursing women who were taking part in the study. According to the findings, the AD group's 1-month BM sCD14 levels were noticeably lower than those of the non-AD group. In children without AD, egg white sensitivity had an inverse relationship with 1-month BM sCD14, but generally, 1-month BM sCD14 levels were not linked to allergen sensitization. The findings imply that BM sCD14 could have a role in early-life atopic symptoms.[12]

In a randomized, double-blind, parallel, controlled experiment, Troesch et al, examined the development and tolerance of term babies given formula that included equimolar dosages of either folic acid (10.0 µg/100 ml, n = 120, control group) or L-5-methyltetrahydrofolate (10.4 µg/100 ml, n = 120, intervention group). The main result, weight increase, was the same for both groups (95% CI -2.11; 1.68 g/day). Accordingly, at visit 4, the absolute weight corrected for sex and birth weight showed only a slight variation (95% CI -235; 135g). Gains in head circumference and increased caloric intake were not equivalent, while gains in recumbent length were. Red blood cell folate levels were greater (intervention: 907.0 ±192.8 nmol/L, control: 839.4 ±142.4 nmol/L, p = 0.0095) and plasma levels of unmetabolized folate were lower (intervention: 0.73 nmol/L, control: 1.15 nmol/L, p<0.0001) in infants fed formula containing L-5-methyltetrahydrofolate. Both baby formula and follow-on formula can contain L-5-methyltetrahydrofolate, and there are no known negative side effects.[13]

1073 (53.86%) of the 1992 babies who took part in the Lachover-Roth research et al, were exclusively breastfed until they were two months old. All of the individuals in the exclusive breastfeeding group (n = 17) had an IgE-mediated CMA confirmation rate of 0.85%. Compared to 0 in the other groups, the frequency of IgE-mediated CMA in this group was 1.58% (relative risk, 29.98; P <.001).[14] A post hoc analysis showed that the exclusive breastfeeding per protocol group had a prevalence of IgE-mediated CMA of 0.7%, whereas breastfed infants exposed to trace levels of CMF during the first two months of life had a frequency of 3.27%. Atopic background in the family had no effect on the outcomes. Consequently, it can be said that early and ongoing exposure to CMF from infancy may help avoid the development of IgE-mediated CMA and ought to be promoted. Contact should be regular, though, as sporadic contact raises the risk of IgE-mediated CMA and should be avoided.

Within the first six months of intervention, among infants with a family history of atopic dermatitis, 6.5% of infants fed partially hydrolyzed formula and 22.7% of infants fed exclusively breast milk (p = 0.007) developed atopic dermatitis, according to a study done in Bulgaria, Cyprus, and Greece,

Table 2: *Risk of Bias of for Cohort and Case Control Studies.*

Study	Selection				Compar-ability	Outcome		Total Score
	Representativeness of the exposed cohort	Selection of the non-exposed Controls	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of	Comparability of Cohorts on the Basis of the Design or Analysis	Assessment of outcome	Was follow-up long enough for outcomes to occur?	
Marrs, et al, (2021)	2	1	1	1	1	1	1	9
Fikri, et al, (2019)	1	1	1	1	2	1	0	8
Lachover-Roth, et al, (2022)	2	2	1	1	2	1	1	10

Interpretation: 0: not mentioned 1: mentioned but with incomplete data 2: mentioned with complete data. Total score: 7-9: low risk of bias 4-6: moderate risk of bias 5-3: high risk of bias 0-2: very high risk of bias

Table 3: *Risk of Bias for Intervention Studies.*

	Bias arising from the randomization process	Bias due to deviations from intended	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result
Troesch et al, (2019)	+	+	+	+	-
Boutsikou et al, (2023)	+	-	+	-	+
Kouwenhoven et al, (2020)	+	+	+	+	+

on 551 high-risk infants with three feeding regimens (exclusive breastfeeding partially hydrolyzed formula, or standard formula with intact proteins either exclusively or as a supplement to breast milk).[15-16] The aforementioned groups did not vary in terms of growth as measured by weight gain. While there was no correlation between the various feeding schedules in each group and cow's milk protein allergy, the incidence was much lower in babies fed partly hydrolyzed formula when high breast milk intake was taken into account ($p < 0.001$). According to these findings, some partially hydrolyzed formulas could be a better alternative to breast milk than regular intact protein formulas for high-risk infants in order to lower the prevalence of atopic dermatitis.

Risk of Bias

Selection, comparability, and outcome domains were used to assess the included studies' methodological quality. Although there was some doubt as to whether the result of interest was absent at the beginning of the investigation, Marrs et al, (2021) received a total score of 9, indicating excellent representativeness of the exposed population and satisfactory ascertainment of exposure and outcome. Fikri et al, (2019) received a total score of

8, with follow-up length and cohort representativeness receiving somewhat lower ratings. With the highest overall score of 10, Lachover-Roth et al, (2022) demonstrated exceptional performance in every area, including cohort comparability and adequate follow-up.

Five domains were used to assess the likelihood of bias in randomized experiments. Concerns were raised about selective reporting of findings, however Troesch et al, (2019) showed little risk of bias in the majority of areas, including the randomization procedure, departures from intended treatments, missing outcome data, and outcome assessment. Boutsikou et al, (2023) expressed concerns about deviations from targeted treatments and outcome assessment, but they also demonstrated a minimal risk of bias in the randomization procedure and managing missing data. On the other hand, Kouwenhoven et al, (2020) demonstrated good methodological quality with little risk of bias across all evaluated areas. Although several studies had biases in outcome assessment and selective reporting, overall, the randomized trials that were included were of high quality.

Discussion

The direct comparison of breastfeeding and atopic dermatitis throughout the available research, including subjects, important findings, and limitations, was emphasized in this systematic review. We assessed the studies' quality using a risk of bias evaluation in order to improve the quality of the systematic review. Breastfeeding may reduce atopic dermatitis morbidity, according to the included research.

AD exhibits considerable geographic variation in prevalence both within Asia and in Indonesia. In Asia, epidemiological studies have reported 1-year prevalence of doctor-diagnosed AD ranging approximately from 1.2% to 22.6% in children, depending on country and age group, with several Asian populations showing higher percentages in early childhood.[13,14] Data from global burden estimates indicate that the total number of individuals affected by AD in Asia reached approximately 68.1 million in 2021, with the regional burden remaining stable in recent decades. In Indonesia, the prevalence of AD among children is reported to be relatively high: registry and observational data suggest prevalence estimates ranging from 10–20% in children and 1–3% in adults, with some pediatric dermatology reports indicating up to 23.7% of skin disease burden attributed to AD in pediatric populations.[15,16] National survey data (RISKESDAS) estimate that overall dermatitis including AD affects around 6.8% of the Indonesian population, with regional variation observed across provinces. These patterns underscore both the substantial burden of AD in Indonesian children and the broader variation seen across Asian settings.

Human breast milk contains commensal bacteria, bioactive chemicals, and essential nutrients that promote immunological development in infancy, inhibit pathogen adhesion, and encourage the colonization of the gut by beneficial microorganisms.[17] Breast milk contains a variety of active immunological components, including as cytokines, inflammatory mediators, signaling molecules, and soluble receptors, which may offer protection against allergy conditions like asthma and atopic eczema.[18] The European Academy of Allergy and Clinical Immunology and the American Academy of Allergy, Asthma & Immunology advised exclusive breastfeeding for at least four and up to six months following delivery as the primary preventive measure against allergic disorders.[19] Numerous research have examined the connection between allergies and nursing. The outcomes, however, are contradictory.[20] In addition to lowering the infant's chance of developing chronic conditions including chron disease, diabetes, obesity, irritable bowel syndrome, and allergies, breastfeeding also shields the child from respiratory tract infections, necrotizing enterocolitis, and GIT infections.[18-20]

Since nursing isn't always practical, demand for infant milk formula will persist even though human breast milk is still the recommended feeding regimen for newborns since it offers full nutrients.[21] Due to developments in the study of breast milk, bioactive substances like bifidogenic human milk oligosaccharides (HMOs), lactoferrin, which is crucial for the development of the gastrointesti-

nal tract and the brain, and choline, which is also necessary for the development of the infant's brain, have been added to infant formulas.[22] There are a variety of formula choices available, including soy-based, goat-milk, cow-milk, and specialty formulas.[23] Hydrolyzed formula does not appear to prevent atopic illness, even in infants and children at high risk for allergies.[24] In contrast, the 2008 study found mild evidence that hydrolyzed formulas either avoided or postponed atopic dermatitis in infants who were formula-fed or not breastfed exclusively for three to four months.[24-28]

Despite demonstrating the promise of breastfeeding in atopic dermatitis, this study has some limitations. Small sample sizes and a lack of long-term follow-up may have an effect on the findings of some studies. More large-scale randomized controlled trials and a meta-analysis are needed to provide a standardized approach to managing atopic dermatitis while nursing.

Conclusion

The preventive effect of breastfeeding in lowering the incidence of baby atopic dermatitis (AD) is highlighted in this comprehensive study. Compared to partial breastfeeding or formula feeding, exclusive breastfeeding, especially during the first six months of life, seems to reduce the chance of developing AD. The data generally supports breastfeeding as a healthy, easily available, and natural preventative intervention against early-life atopic disorders, even if the strength of the protective effect varies among research.

To further understand the connection between breastfeeding habits and the incidence of atopic dermatitis, future studies should incorporate standardized diagnostic criteria, longer follow-up times, and assessment of genetic and environmental factors.

Conflict of Interest

The authors declared no conflict of interest.

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Authors Contributions

All authors contribute equally to this research.

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