

## BREAST FEEDING AND THE RISK OF BRONCHIAL ASTHMA IN CHILDHOOD: A SYSTEMATIC REVIEW

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### Abstract

**Introduction:** Approximately 339 million children (4.3% of all patients) worldwide suffer from asthma. Multiple studies have demonstrated that exclusive lactation for the first six months of a child's life can reduce the risk and protect against allergies, including asthma, in children. Asthma and allergies are influenced by a number of variables, including breastfeeding. It is suspected that there is a relationship between breastfeeding and the occurrence of asthma.

**Objective:** To determine the relationship between breastfeeding and the occurrence of asthma

**Methods:** This systematic study used PRISMA guidelines, by selecting 238 keyword searches in multiple databases (PubMed, ScienceDirect, and Web of Science) on August 19, 2023. ((breastfeeding) AND (Risk) OR (Relation) OR (influence) AND (Pediatric) OR (Children) AND (Bronchial) AND (Asthma)) are used as keywords. The data obtained is extracted according to the results obtained.

**Results:** There were 5 studies after selection was conducted, each study discussed the relationship between the benefits of breastfeeding on the occurrence of bronchial asthma in childhood. 3 cohort studies, 1 cross sectional, and 1 case series were obtained. The total sample in this study was 13,629. Age range 1 month to 6 years.

**Conclusion:** Studies have shown that exclusive breastfeeding can reduce wheezing episodes and reduce the incidence of bronchial asthma in children up to a certain age. Exclusive breastfeeding can improve immune regulation and protect children from asthma.

**Keyword:** Breastfeeding, Asthma, Pediatric, Relationship

## INTRODUCTION

Based on epidemiological data, it is estimated that approximately 339 million children (4.3% of all patients) worldwide suffer from asthma. This is an important health concern, especially in the health sector. As shown by disability-adjusted life years, asthma is among the leading causes of chronic morbidity in children. The prevalence of asthma in India is estimated to range from 2% to 23%.<sup>1</sup> Multiple factors contribute to asthma. Male gender, low birth weight, preterm birth, low parental socioeconomic status, ethnicity, family history of asthma or atopy, and parental smoking have been identified as risk factors.<sup>2-4</sup>

Asthma is a phenotype that is extremely variable. Asthma is a chronic inflammatory lung illness characterised by recurrent wheezing, shortness of breath, chest tightness, and coughing that vary in intensity and expiratory airflow limitation. Before the age of five, lung function is difficult to evaluate, making it difficult to diagnose asthma in young children.<sup>5-7</sup> Numerous studies have reported this result. According to Dogaru et al., there is an association between breastfeeding and "asthma" in studies of infants younger than two years. Over time, the effect appears to diminish. Consistent with these findings, a prospective population-based study reported a protective association between breastfeeding and asthma at age six, but this association diminished by age ten.<sup>8</sup>

It is believed that a number of factors, including genetic and environmental ones, contribute to the pathophysiology of paediatric asthma. Insufficient evidence suggests that antibiotic use during pregnancy may increase the risk of paediatric asthma. Several other factors, including male gender and a familial history of allergic disorders, have been identified as childhood asthma risk factors for decades. The fact that a family history of allergic disorders is a risk factor may be due to genetic susceptibility, but the environment may also play a role. Hypothesised causes of sex differences in childhood asthma include sex differences in intrauterine gonadal steroid production and disadvantages of males in responding to certain stress factors in utero compared to females.<sup>9</sup>

According to the World Health Organisation (WHO), exclusive breastfeeding is defined as the practise of providing breastmilk exclusively, which includes the use of donor breastmilk, without the addition of solid foods, water, or other beverages. However, the administration of vitamin and mineral supplements or medicinal syrups is permissible. The majority of research papers fail to adequately capture sufficient data to effectively apply the aforementioned criterion, and a significant number of studies neglect to document the complete period of breastfeeding, namely the age at which the infant is weaned.<sup>10</sup>

Multiple studies have demonstrated that exclusive lactation for the first six months of a child's life can reduce the risk and protect against allergies, including asthma, in children. Asthma and allergies are influenced by a number of variables, including breastfeeding. Breast milk is known to contain numerous beneficial nutrients and functions as an affordable, natural source of nutrition for infants from all socioeconomic backgrounds. It not only satisfies the baby's nutritional requirements, but also plays a crucial role in the development of the immune system. It is known that breast milk is high in bioactive compounds that can protect infants from asthma and reduce the incidence of asthma.<sup>11,12</sup> Therefore, a systematic study is needed that further discusses breastfeeding with the childhood asthma.

## METHODS

### 1. Eligibility criteria

The following are the inclusion criteria for this study:

- Published in English and accessible in its entirety.
- Article between January 20, 2013 and 2023.
- The studies employed are cohort, cross-sectional, and randomized controlled trials (RCTs).
- The research examines the breast feeding and the risk of bronchial asthma in childhood.

### 2. Guideline

In this investigation, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. As depicted in the flowchart in Figure 1, we included five corresponding studies in our review.

### 3. Search strategy

Following PRISMA guidelines, we independently conducted a search for relevant articles in multiple databases (PubMed, ScienceDirect, and Web of Science) on August 19, 2023. ((breastfeeding) AND (Risk) OR (Relation) OR (influence) AND (Pediatric) OR (Children) AND (Bronchial) AND (Asthma)) are used as keywords. Additionally, manual searches are conducted to obtain articles that satisfy the specified criteria. Discrepancies are resolved through consensus with the third author.

### 4. Data extraction

Based on the author, year, study design, sample size, results, and discussion, data were extracted. Primary outcomes are the factors measured to determine the breast feeding and the risk of bronchial asthma in childhood.

## RESULT

### Study characteristics

In this systematic review, we found a total of five studies, with three types of cohort studies and one case report and cross sectional study. A total of 13.629 cases were involved in the study. With an age range from 1 month to six years. Studies come from various countries including Canada, China, Indonesia, and Taiwan. With a range of research years, from 2017-

2022. All studies addressed the relationship between breastfeeding and asthma bronchial in childhood. Detail of study in Table 1.

**Breastfeeding and asthma bronchial in childhood.**

Of the five studies, all discussed that breastfeeding has an association with a decrease in bronchial asthma patients in childhood. Patients with asthma were shown to decrease in the breastfeeding group compared to the group using formula. There is one study, namely Rachma, et al., which states that breastfeeding has nothing to do with the risk of childhood asthma.

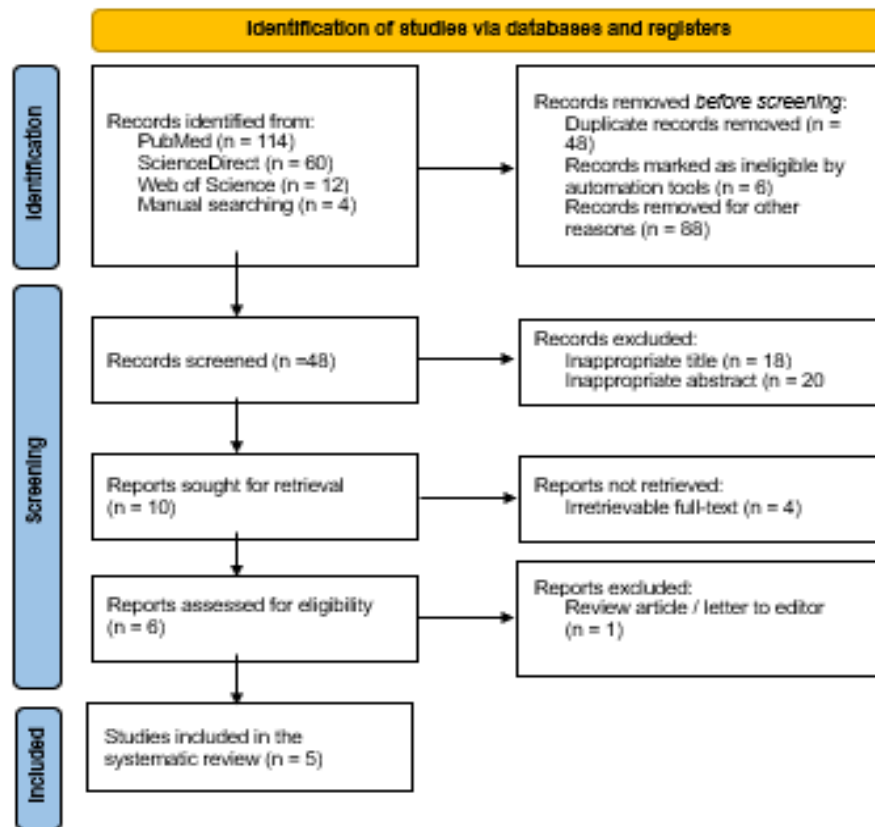


Figure 1. PRISMA Flowchart Diagram

Table 1. Characteristic Studies

No	Author	Study Design	Sample size	Age	Results	Discussion
1.	Azad, et al., 2017 <sup>13</sup>	Cohort	2773	3,6, 12 months	<ul style="list-style-type: none"> <li>At least 46% of women breastfed their infants for 12 months, and 21% of neonates experienced wheeze. Independent of maternal smoking, education, and other risk factors, breastfeeding was inversely linked with baby wheeze in asthmatic mothers (OR 0.52; 95% CI 0.35–0.75 for 12 versus 6 months nursing). Exclusive breastfeeding reduced wheeze by 62% (OR 0.38; 95% CI 0.20–0.71) and partial breastfeeding coupled with complementary foods by 37% (aRR 0.63; 95% CI 0.43–0.93) at 6 months. When formula was added, breastfeeding's protective effect was not statistically significant (OR 0.89; 95% CI 0.50–1.3). The relationships were not significant without maternal asthma (p-value for interaction = 0.0).</li> </ul>	Breastfeeding appears to offer protection against wheezing for infants born to asthmatic mothers.
2	Huo, et al., 2018 <sup>9</sup>	Case control	Case 634 Control 864	3-12 years	<ul style="list-style-type: none"> <li>Childhood asthma was reported (aOR: 1.7, 95% CI: 1.0–2.9), especially in males (OR: 2.2, 95% CI: 1.1–4.4) and children with a family history of allergic illnesses (OR: 3.1, 95% CI: 1.2–8.4). This connection did not occur in exclusively breastfed infants in the first six months (OR 0.9, 95% CI 0.4–2.1).</li> </ul>	Additionally, breastfeeding reduced the risk of asthma in males and children with a family history of allergic diseases.

No	Author	Study Design	Sample size	Age	Results	Discussion
3	Rachma, et al., 2021 <sup>14</sup>	Cross sectional study	62	0-5 years old	<ul style="list-style-type: none"> <li>There was no significant correlation between duration of exclusive breastfeeding and asthma attack frequency (rs = -0.227, p = 0.076).</li> </ul>	This study suggested that these contradictory findings could be the result of differences in study population, adjustments to confounding variables, and additional analysis of breast milk composition.
4	Chen, et al., 2022 <sup>15</sup>	Cohort study	6000	3-6 years old	<ul style="list-style-type: none"> <li>Children who consumed BMF exclusively for 4 to 6 months had a reduced risk of developing asthma (OR, 0.69; 95% CI, 0.48-0.98)</li> </ul>	In preschool-aged children, exclusive lactation, particularly for 4 to 6 months, is associated with a reduced risk of asthma. In older adolescents, the protective effect appeared to be diminished.
5	Klopp, et al., <sup>16</sup> 2017	Cohort study	3296	3 years	<ul style="list-style-type: none"> <li>This study demonstrated the effectiveness of infant nutrition methods other than breastfeeding.</li> <li>Breastfeeding directly is associated with an increased risk of developing asthma at age 3 years. Compared to infants who received only direct lactation, those who received expressed breastmilk had a 43% higher likelihood of being diagnosed with asthma at age 3, while those who received only formula milk had a 79% higher likelihood.</li> </ul>	Compared to formula nutrition, direct breastfeeding appears to offer the highest level of protection, while expressed breast milk may offer a level of protection somewhere in between.

**DISCUSSION**

According to previous studies, exclusive lactation for up to six months decreased wheezing episodes by 62%. A cohort study also found that breastfeeding is associated with a lower incidence of wheezing in infants under 5 years of age. In contrast, other studies suggest that in risk-adjusted populations, breastfeeding has little effect on the onset of asthma. Experts from around the world recommend exclusive breastfeeding for the first six months of a baby's life, beginning within the first few hours of existence. Exclusive breastfeeding refers to breastfeeding infants without supplementing them with complementary nutrients or formula. Numerous investigations have investigated the relationship between breastfeeding and asthma. However, little is known about the correlation between duration of breastfeeding and asthma severity in children.<sup>17</sup>

Modulating the gut microbiota as a result of lactation has been shown to have protective effects, which can aid in the programming of an infant's immune system. There may be a correlation between gender and family history and the effect of lactation on the incidence of childhood allergies. Breastfeeding can promote the proliferation of microorganisms that are beneficial to the body's health system by creating the ideal intestinal environment.<sup>18</sup>

According to a study, breastfed infants have more Bifidobacteria in their guts than formula-fed infants. Oligosaccharides have been identified as essential factors in breast milk that stimulate the activation of Bifidobacteria by acting as metabolic substrates. In comparison to formula-fed infants, breastfed infants exhibited a significant increase in Lactobacillus species. Lactobacillus salivarius appears to ameliorate asthma symptoms by modulating the ratio of Th1/Th2.

The microbes that colonise breast milk can also originate from the epidermis of the mother's areola, the baby's mouth, and the mother's intestines. Studies on animals suggest that bacteria labelled in the mother's intestines may be present in her breast milk. Even though the number of maternal gut microorganisms that migrate to breast milk (103/cc breast milk) is relatively low, these bacteria play a crucial role in intestinal colonisation, which promotes immune development. Normal colonising bacteria, for instance, are able to ferment complex carbohydrates and produce short-chain fatty acids, such as butyrate, as well as activate immunological molecules and protect immune function. Second, breast milk can promote and secrete pathogen-fighting defensin, lysozyme, lactoferrin, IgA polymers, TLR-2 and 4 soluble, CD14, and MD2. Thirdly, breast milk functions as a transporter that transfers airborne antigens from the mother to the newborn, inducing immune tolerance and protecting the child from allergies and allergic asthma.

The results showed that exclusive breastfeeding can improve immune regulation and protect children from asthma, particularly among those exposed to antibiotics before birth.<sup>19</sup> In addition, breast milk contains immune factors, such as IgA antibodies, which protect against a variety of infant health problems, including necrotizing enterocolitis, overweight

and obesity, diabetes, infections, and allergic diseases, and reduce the risk of developing diseases later in life. Global breastfeeding recommendations have been supported by rising data for 30 years. Epidemiological studies, epigenetics, stem cell research, and the "developmental origin of health and disease" theories support breast milk as the best for infants.<sup>20</sup>

Several additional studies support the idea that breastfeeding protects infants from developing asthma, and it has been hypothesised that specific breast milk components are responsible for this effect. Milk contains a variety of protective factors, including bioactive enzymes, hormones, growth factors, cytokines, and immunological agents. These findings augment and stimulate the development of the host's immune system, suggesting that the bioactive components of breast milk play a significant role in neonatal development and that lactation may influence the aetiology of asthma through biologically plausible mechanisms. Breastfeeding has been associated with protection against early respiratory infections, and this protection may mediate the association between breastfeeding and early-onset asthma.

Breastfeeding can provide a direct line of defence against infectious agents, compensating for the newborn's immature immune system's inability to combat infection. It is unclear, however, which components of this complex biological fluid may have a potential protective effect.<sup>20</sup> Breastfeeding can provide a direct line of defence against infectious agents, directly compensating for the immaturity of the infant's immune system as it relates to its ability to combat infection. However, it is unclear which components of this complex biological fluid might have a protective effect.<sup>20</sup>

## CONCLUSION

Studies have shown that exclusive breastfeeding can reduce wheezing episodes and reduce the incidence of bronchial asthma in children up to a certain age. Exclusive breastfeeding can improve immune regulation and protect children from asthma.

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