

# Risk of Dental Caries and Breastfeeding: A Systematic Review and Meta-analysis

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## Abstract

**Background:** The association between tooth decay, an excessive-sugar weight-reduction plan, and negative oral hygiene is properly established within the literature. But, while assessing the affiliation among breastfeeding and caries sickness, studies show extra debatable consequences. Some researchers have suggested that tooth decay is the best unfavorable outcome related to breastfeeding in children older than one year 6–eight, at the same time as others contend that it is a protective factor towards caries. **Aim:** This work aims to determine the effect of sufficient breastfeeding and the risk of dental caries in infants. **Materials and Methods:** A systematic search was performed over different medical databases to identify Dentistry studies, which studied the outcome of the sufficiently breastfed group versus the Less sufficiently breastfed group of breastfed infants. Using the meta-analysis process, either with fixed or random-effects models, we conducted a meta-analysis on the incidence of dental caries in more than 6-months breastfeeding (as a primary main outcome). **Results:** Five studies were identified involving 4388 infants, with 2717 infants in the sufficiently breastfed group, and 1671 infants in the Less sufficiently breastfed group. The meta-analysis process revealed a highly significant decrease in the incidence of dental caries in the sufficiently breastfed group compared to the Less sufficiently breastfed group, in breastfed infants ( $p < 0.001$ ). **Conclusion:** To conclude, the prevalence of dental caries was very low. Frequent consumption of factory-made bottle-feeding was associated with higher odds of developing dental caries. Breastfeeding and breastfeeding at night had a protective effect on dental caries.

**Keywords:** Dental caries; Breastfeeding

## Introduction

Dental caries is the most not unusual chronic disorder of youth and a public health assignment. Caries can affect both physical and psychosocial aspects of an infant nicely-being, resulting in pain, poor dietary status, behavioral troubles, and bad getting to know. The pathogenesis of dental caries includes common intake of carbohydrates that may be metabolized using cariogenic bacteria, insufficient oral hygiene to get rid of or disrupt cariogenic biofilms or plaque, and inadequate exposure to fluoride. <sup>[1]</sup>

The evidence regarding infant feeding as a risk aspect for dental caries is inconsistent. Dental caries chance is associated with the carbohydrate content material of breast milk or components at the side of elements which decide the period of contact between breast milk or formula and the erupted dentition (i.e., frequency of feeding, and feeding practices which bring about the pooling of breast milk or formula around the tooth surfaces, inclusive of feeding infants to sleep). The vital determinant of caries chance, however, is the age of colonization and levels of cariogenic microorganisms (e.g., *Streptococcus mutans*) in

an infant's mouth. Earlier and denser oral colonization through cariogenic bacteria is associated with expanded caries threat. Breast milk, in assessment to the formulation, consists of breast-specific Lactobacilli and materials, inclusive of human casein and secretory IgA, which inhibit the increase and adhesion of cariogenic bacteria, particularly oral Streptococci. <sup>[2]</sup>

The association between tooth decay, an excessive-sugar weight-reduction plan, and negative oral hygiene is properly established within the literature. But, while assessing the affiliation among breastfeeding and caries sickness, studies show extra debatable consequences. Some researchers have suggested that tooth decay is the best unfavorable outcome related to breastfeeding in children older than one year 6–eight, at the same time as others contend that it is a protective factor towards caries. <sup>[3]</sup>

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This work aims to determine the effect of sufficient breastfeeding and the risk of dental caries in infants.

## Literature Review

Our review came following the (PRISMA) statement guidelines.<sup>[4]</sup>

### Study eligibility

The included studies should be in English, a journal published article, and a human study describing breastfed infants. The excluded studies were non-English or animal studies.

### Study identification

Basic searching was done over the PubMed, Cochrane library, and Google scholar using the following keywords: Dental caries, Breastfeeding.

### Data extraction and synthesis

RCTs, clinical trials, and comparative studies, which studied the outcome of the sufficiently breastfed group versus Less sufficiently breastfed group of breastfed infants, will be reviewed. Outcome measures included the incidence of dental caries in more than 6-months breastfeeding (as a primary main outcome).

### Study selection

We found 140 records, 90 excluded because of the title; 50 articles are searched for eligibility by full-text review; 27 articles cannot be accessed; 11 studies were reviews and case reports; 7 were not describing functional outcome leaving 5 studies that met all inclusion criteria.

### Statistical methodology

Pooled odds ratios (OR), with 95% confidence intervals (CI) assessed, using a statistical package (MedCalc, Belgium). The meta-analysis process was established via I<sup>2</sup>-statistics (either the fixed-effects model or the random-effects model), according to the Q test for heterogeneity.

## Results

The included studies were published between 2000 and 2020 [Table 1]. Regarding infants' characteristics, the total number of infants in all the included studies was 4388 infants, with 2717 infants in the sufficiently breastfed group, and 1671 infants in the Less sufficiently breastfed group [Table 1].

The median follow-up time was (37.5 months) [Table 1].<sup>[5-9]</sup>

A meta-analysis study was done on 5 studies that described and compared the 2 different groups of infants; with an overall number of infants (N=4388) [Table 2].

Each outcome was measured by:

Odds Ratio (OR)

- **For the incidence of dental caries in breastfed infants.**

Concerning the primary outcome measure,

We found 5 studies that reported the incidence of dental caries in breastfed infants.

The fixed-effects model showed overall OR = 0.7 (95% CI = 0.588 to 0.839).

Using the fixed-effects model, the meta-analysis process revealed a highly significant decrease in the incidence of dental caries in the Sufficiently breastfed group compared to the Less sufficiently breastfed group, in breastfed infants ( $p < 0.001$ ) [Figures 1 and 2].

## Discussion

This work aims to determine the effect of sufficient breastfeeding and the risk of dental caries in an infant.

Our studies were published between 2000 and 2020. Regarding infants' characteristics, the total number of infants in all the included studies was 4388 infants, with 2717 infants in the sufficiently breastfed group, and 1671 infants in the Less sufficiently breastfed group.

**Table 1: Infants and study characteristics.**

S. No	Authors	Number of infants			Follow-up time (months)
		Total	Sufficiently breastfed group	Less sufficiently breastfed group	
1	Du et al., <sup>[5]</sup>	426	392	34	47
2	Slabšinskienė et al., <sup>[6]</sup>	950	131	819	36
3	Tanaka & Miyake, <sup>[7]</sup>	2056	1640	416	17
4	Nobile et al., <sup>[8]</sup>	487	242	245	71
5	Piwat et al., <sup>[9]</sup>	469	312	157	37.5

#Studies arranged via publication year.

**Table 2: Summary of outcome measures in all studies.**

S. No	Authors	Primary outcome	
		Incidence of dental caries	
		Sufficiently breastfed group	Less sufficiently breastfed group
1	Du et al., <sup>[5]</sup>	136	17
2	Slabšinskienė et al., <sup>[6]</sup>	119	356
3	Tanaka & Miyake, <sup>[7]</sup>	340	85
4	Nobile et al., <sup>[8]</sup>	42	50
5	Piwat et al., <sup>[9]</sup>	254	130

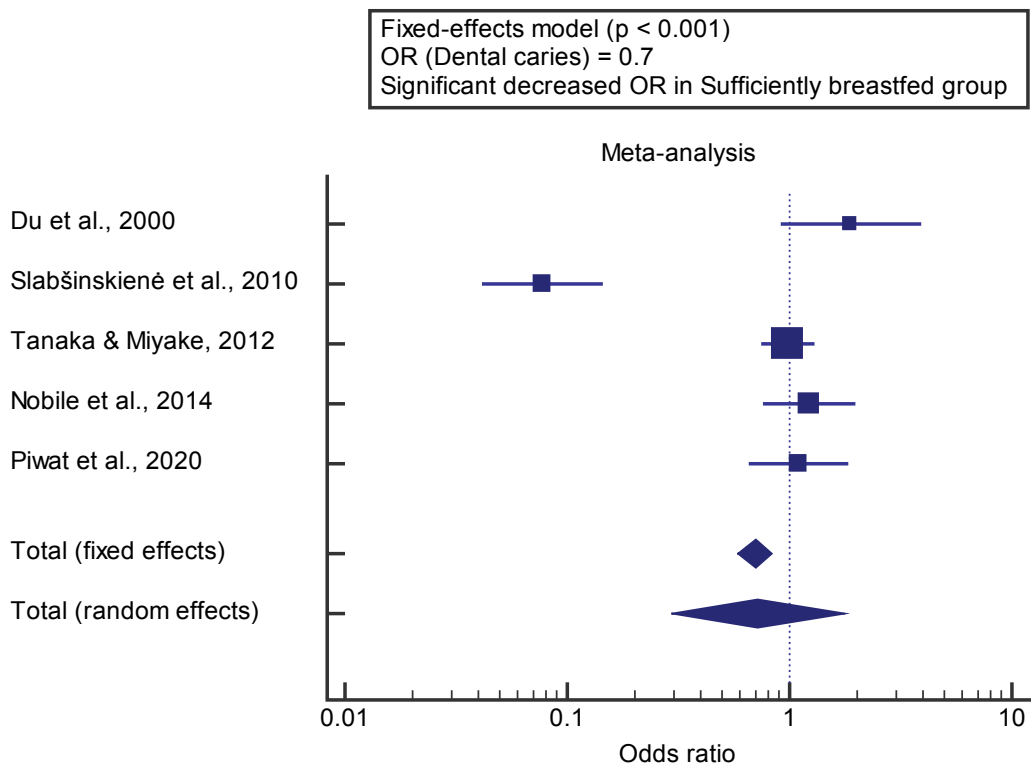


Figure 1: Forest plot (incidence of dental caries).

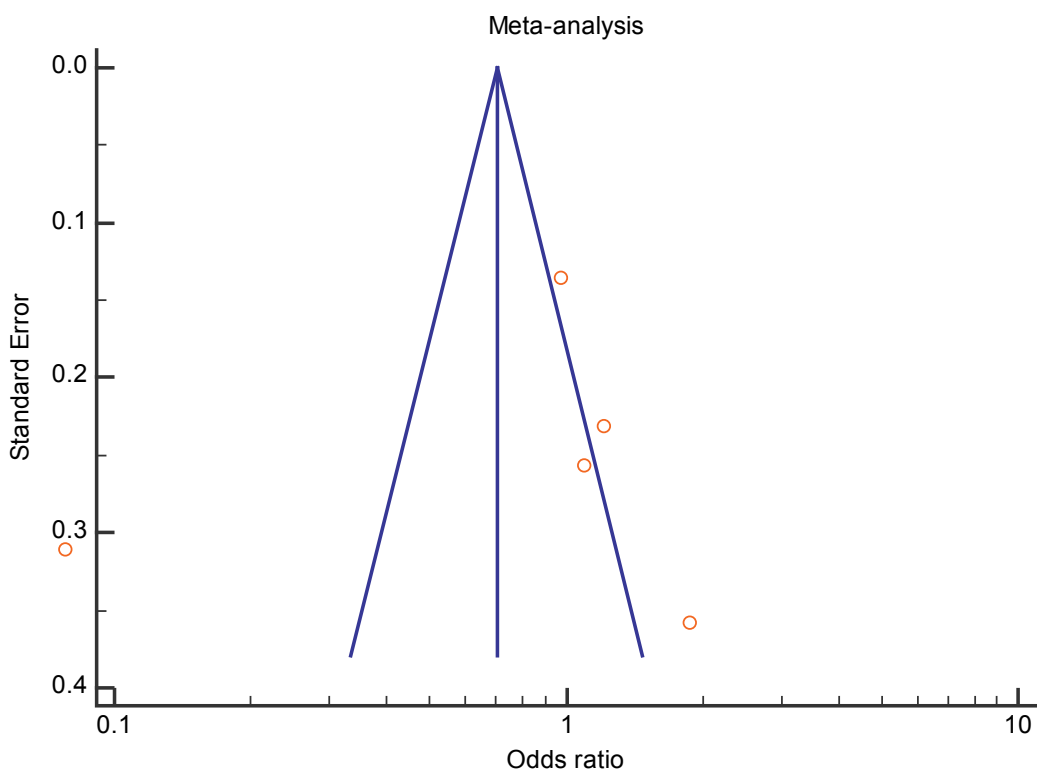


Figure 2: Funnel plot (significant publication bias).

The median follow-up time was (37.5 months). Concerning the primary outcome measure, we found 5 studies that reported the incidence of dental caries in breastfed infants.

A meta-analysis study was done on 5 studies that described

and compared the 2 different groups of infants; with an overall number of infants (N=4388).

Using the fixed-effects model, the meta-analysis process revealed a highly significant decrease in the incidence of dental

caries in the sufficiently breastfed group compared to the Less sufficiently breastfed group, in breastfed infants ( $p < 0.001$ ). Which came in agreement with Tham et al.,<sup>[2]</sup> Ha et al.,<sup>[10]</sup> Avila et al.,<sup>[11]</sup> Feldens et al.,<sup>[12]</sup> Hartwig et al.,<sup>[13]</sup> and Peres et al.,<sup>[14]</sup>

Tham et al., reported that youngsters exposed to longer as opposed to the shorter length of breastfeeding up to age twelve months (more as opposed to less breastfeeding), had a discounted danger of caries (OR 0.50,  $I^2$  86.8%). youngsters breastfed > twelve months had an elevated danger of caries whilst compared with youngsters breastfed < 12 months (seven studies (OR 1.99;  $I^2$  69.3%). Amongst children breastfed > twelve months, the ones fed nocturnally or more frequently had a similarly extended caries danger (5 research, OR 7.14) there has been a loss of studies on kids aged > three hundred and sixty-five days simultaneously assessing caries risk in breastfed, bottle-fed and children, not bottle or breastfed, along with particular breastfeeding practices, ingesting sweet drinks and foods.<sup>[2]</sup>

Ha et al., reported that findings were in keeping with the latest systematic overview, which concluded that breastfeeding up to the age of 24 months become not related to an elevated risk of early childhood caries. There were several reports of the protecting effect of breastfeeding as much as 12 months of age against dental caries. The results of this have a look at add to this database and corroborate research in Brazil that suggested that sustained breastfeeding at 24 months and beyond become related to a drastically higher incidence and severe caries. On this look, this association changed into more potent among kids without exposure to fluoridated water in youth. But, importantly for countries with water fluoridation packages, other researchers have now not tested the moderating impact of exposure to fluoridated water on the association between sustained breastfeeding and dental caries.<sup>[10]</sup>

Avila et al., showed that breastfed children had less dental caries than bottle-fed children (OR 0.43). Also, bottle-fed children had more caries ( $p < 0.05$ ). Breastfeeding can protect against dental caries in early childhood. The benefits of breastfeeding until age two is recommended by WHO/UNICEF guidelines.<sup>[11]</sup>

Feldens et al., reported that independent of different variables, and breastfeeding at 12 months, at 38 months the ECC incidence changed into 1.8 instances better in children breastfed greater than three instances / day ( $P < 0.05$ ), 1.4 instances higher in children bottle-fed more than three instances/day ( $P > 0.05$ ) and 1.5 instances better with a combined excessive frequency of bottle and breastfeeding together ( $P < 0.05$ ). Incidence of S-ECC became significantly associated with frequent breastfeeding (RR = 2.4;  $P < 0.05$ ) and with extra frequency of intake of other foods or drinks (RR = 1.7,  $P < 0.05$ ).<sup>[12]</sup>

Hartwig et al., reported that, a total of 325 children in the study. The incidence of caries was 13%. Children who had a higher frequency of sucrose intake and those with a dental plaque were more likely to have dental caries.<sup>[13]</sup>

Peres et al., reported that the average number of decayed tooth surfaces (DMFS). Marginal structural modeling became used to estimate the managed direct effect of breastfeeding (0–12, 13–

23, and  $\geq 24$  months) on DMFS and S-ECC. The superiority of S-ECC was 23.9%. The suggested quantity of DMFS changed to 4.05. Youngsters who were breastfed for  $\geq 24$  months had a better quantity of DMFS RR: 1.9) and a 2.4 times better threat of getting S-ECC (RR: 2.4) than those who were breastfed up to 12 months of age. Breastfeeding between 13 and 23 months had no impact on dental caries.<sup>[14]</sup>

Our result came in disagreement with Kato et al.,<sup>[15]</sup> Mwakayoka et al.,<sup>[16]</sup> and Nirunsittirat et al.<sup>[17]</sup>

Kato et al., reported that, at the age of 30 months, babies who had been breastfed for at least 6 or 7 months, both fully and partly, had a greater risk of dental caries relative to infants who had been exclusively formula-fed. ORs were 1.78) solely for the breastfed group and 1.39 for the partly breastfed group. However, the correlations were attenuated during the follow-up period and were no longer statistically relevant beyond the age of 42 months for the partially breastfed community and beyond.<sup>[15]</sup>

Mwakayoka et al., reported that, Caries-free children were 79.8%, 83.8% and 94.7% for dmft1, dmft2 and dmft3, and caries-free children were 0.49 (1.23), 0.4 (1.14) and 0.10 (0.53) respectively. Older age [(OR = 2.722  $p = < 0.001$ )]; and daily intake of factory-made sugar foods/snacks is associated with caries at 1-2 years of age [(OR = 3.061  $p < 0.05$ ]. There was no correlation between extended breastfeeding for more than 1 year and breastfeeding at night with dental caries.<sup>[16]</sup>

Nirunsittirat et al., It was confirmed that 88.1 percent of 556 children had dental caries with a mean DMFS of 14.2. Lower DMFS (RR 0.77) and lower prevalence of caries were significantly associated with complete breastfeeding for 6-11 months (RR 0.45). Sleeping frequency during breast- or bottle-feeding increased the risk of dose-response caries. The length of any breastfeeding and dental caries were not correlated with any.<sup>[17]</sup>

## Conclusion

To conclude, the prevalence of dental caries was very low. Frequent consumption of factory-made bottle-feeding was associated with higher odds of developing dental caries. Breastfeeding and breastfeeding at night had a protective effect on dental caries.

## Competing Interests

The authors declare that they have no competing interests. All the listed authors contributed significantly to the conception and design of study, acquisition, analysis, and interpretation of data and drafting of the manuscript, to justify authorship.

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