

Breastfeeding and Dental Caries

Looking at the Evidence

Valerie Lavigne, DC, IBCLC, RLC¹

Share this:  

Dental caries and prolonged breastfeeding still trigger much debate among professionals and parents. Some mothers are still being told to discontinue breastfeeding their toddlers because of cavities in the mouth. Parents often feel very discouraged and upset when they are forced to stop breastfeeding their toddlers. Dental caries is one of the most common chronic diseases in childhood, and is a disease of multifactorial etiology. This paper reviews the literature on dental caries and breastfeeding. This review revealed that there was no conclusive evidence that prolonged breastfeeding increased the risk of early childhood cavities.

Keywords: Breastfeeding, dental caries, dental cavities, risk factors

Clinical Lactation, 2013, Vol. 4-1, 12-16

Mothers around the globe are encouraged to breastfeed according to the recommendations of the World Health Organization, which states that babies should be exclusively breastfed for the first six months, and up to two years and beyond with the addition of complementary food (World Health Organization, 2011). The Canadian Pediatric Society also endorses these recommendations. The health benefits of breastfeeding have been shown to reduce sudden infant death syndrome, otitis media, asthma, breast cancer, and accelerate postpartum weight loss. However, the American Academy of Pediatric Dentistry (AAPD) does not endorse the recommendation of extended breastfeeding past 12 months of age, or after the first tooth eruption, as they believe it poses a risk for early childhood cavities (ECC) (American Academy of Pediatrics Dentistry, 2011).

Dental caries is one of the most common chronic diseases in childhood creating severe problems worldwide (Losso et al., 2009). In 2003, the AAPD defined ECC as the presence of one or more decayed (non-cavitated or cavitated), missing (due to caries), or filled tooth surfaces in any primary tooth in a child up to 71 months of age or younger (Iida et al., 2007; Losso et al., 2009; Prakash et al., 2012; Ribeiro & Ribeiro, 2004). The prevalence of ECC is thought to be five times higher than asthma, and seven times higher than allergic rhinitis, ranging from 1% to 12% in preschoolers of developed countries and from 50%-80% in high-risk groups (Prakash et al., 2012; Ribeiro & Ribeiro, 2004). Teeth play an important role in digestion of food, in keeping spacing for the secondary teeth, in helping with speech development and contributing to social skills and confidence (Valaitis et al., 2000). ECC, when left untreated, has been linked with pain, bacteremia,

compromised chewing, toxic overdose of analgesics, followed by malocclusion in permanent dentition, phonetic problems, lower self-esteem, and failure to thrive (Azevedo et al., 2005; Prakash et al., 2012). Identifying the risk factors associated with ECC are very important to help prevent the condition, as children often require costly treatment with hospitalization under sedation or general anesthesia (Prakash et al., 2012). The estimation of cost to repair ECC ranges between \$200 and \$6000 if general anesthesia and hospitalization are required (Udin, 1999).

Causes of Early Childhood Caries

ECC is a disease of multifactorial etiology. The main factors are: a) cariogenic bacteria, b) fermentable carbohydrate diet, c) susceptible tooth and host, d) time (Harris et al., 2004; Losso et al., 2009; Prakash et al., 2012). ECC has also been linked with the following risk factors: demographics characteristics, oral hygiene practice, parental attitudes, educational status of the mother, temperament of child, pacifiers dipped in honey, frequent medication, and feeding habits (Azevedo et al., 2005; Prakash et al., 2012). Another risk factor worth noting from some preliminary studies is the association between the maternal level of vitamin D during pregnancy and the impact on primary dentition and ECC. It showed that mothers of children with ECC had significantly lower levels of vitamin D (Schroth, 2010).

The cariogenic micro-organisms involved in ECC are the *Streptococcus Mutans* and *Streptococcus Sobrinus* (Ribeiro & Ribeiro, 2004). The infection of *Streptococcus* is done by vertical transmission from the mother's saliva containing high levels of *Streptococcus* at a very specific time called "window of infectivity." The severity of ECC has been

¹ Valerielavigne@me.com

directly linked to the level of bacteria in the mouth and the early infection. The bacteria have been found to be present as early as six months of age, even before tooth eruption (Losso et al., 2009; Prakash et al., 2012). Caries start with the bacteria infection, which then accumulate and multiply on the teeth biofilm or hard surface. This, combined with the prolonged exposure to carbohydrate, allows for the fermentation of the sugar inside the dental plaque causing enamel demineralization resulting in cavities (Retnakumari & Cyriac, 2012; Ribeiro & Ribeiro, 2004; Udin, 1999).

There is an association between frequency of carbohydrate exposure and caries, and whether the contact occurs mainly between meals and during sleep. During these periods, the saliva decreases and does not flush the carbohydrate away from the teeth, therefore allowing the bacteria to ferment (Losso et al., 2009). Breast milk has been shown to have a higher level of carbohydrate, which could potentially make it more cariogenic (Erickson & Mazhari, 1999). However, the level of cariogenicity of breast milk has been studied and the results showed that breast milk alone, in an in-vitro model, was not cariogenic and did not cause plaque ph reduction and enamel decalcification. Breast milk combined with a sugar rich diet can allow for bacterial fermentation and can become cariogenic (Erickson & Mazhari, 1999). The diet and bacteria level, therefore, play an important role in the development of ECC.

As shown, this disease is multifactorial and controversial amongst different professional associations. This paper will then look at the evidence available in the literature to establish if there is an association between prolonged breastfeeding and ECC.

Method

To investigate this question, the Cochrane library was searched using the following terms “breastfeeding and dental caries.” A Randomized Control Trial (RCT) was found relevant to the topic (Kramer et al., 2007). PubMed was searched, using the following Mesh terms: “breastfeeding and dental caries.” Limits were added for systematic reviews, which resulted in three relevant articles (Ribeiro & Ribeiro, 2004; Valaitis et al., 2000; White, 2008). Another limit was applied to look for RCT and resulted in the same study already found in Cochrane search. When removing the limits the search produced 212 articles. Some of the relevant and available articles were included in the analysis. PubMed was searched again using other terms relevant to the topic “breastfeeding and dental cavities,” and resulted in 285

articles. Some longitudinal and cohort studies were kept for analysis (Arora et al., 2011; Azevedo et al., 2005; Iida et al., 2007; Mohebbi et al., 2008; Prakash et al., 2012; Retnakumari & Cyriac, 2012; Tanaka & Miyake, 2012). Hand searching through the references of the articles was performed to locate other relevant information (Harris et al., 2004; Losso et al., 2009; Weerheijm et al., 1998).

See [Table 1](#).

Results

The search for the highest level of evidence on dental caries and prolonged breastfeeding revealed only one RCT (Kramer et al., 2007). The cluster RCT looked at the effect of an intervention to promote breastfeeding (Promotion of Breastfeeding Intervention Trial-PROBIT) in Belarus. Children were then followed up at 6.5 years of age to determine the effects on breastfeeding and dental caries. The study randomized maternity hospital units (clusters) and one affiliated polyclinic per hospital with double randomization based on both a random numbers table and a coin flip. The experiment implemented the Baby-Friendly Hospital Initiative in the clusters hospital whereas the control hospital continued their normal practices and policies that were in effect.

The results are based on 17,046 healthy breastfed children from 31 maternity wards. The study results showed an increased rate of any breastfeeding at 3, 6, 9 and 12 months. The prevalence of exclusive breastfeeding was seven times higher in the PROBIT group versus the control. At 6.5 years of age, 81.5% of children had a dental examination follow up. The dental examination data were recorded in the PROBIT data form. The results showed no significant difference in decayed, missing, or filled teeth (DMFT) between the experimental and control group. The total number of DMFT in the experimental group was 4.3 (3.7%) and in the control group was 4.2 (3.4%).

The authors then concluded that there is no reduction in caries risk with prolonged and exclusive breastfeeding. The authors addressed a limitation of their study being that routine examinations were performed by a large number of uncalibrated public health dentists. One weakness of the study is that by the age of dental evaluation being 6.5 years, some children may have lost a majority of their deciduous incisors teeth, which may have underestimated the effects. Another weakness to consider is that the study showed an increase in breastfeeding rate with the PROBIT, but the

breastfeeding duration is not known for the children that developed caries. Nonetheless, this is a very interesting study due to the large sample size and the randomized experimental design.

Evidence from Systematic Reviews

The next level of evidence to consider was systematic reviews. White (2008) produced a systematic review to answer a clinical scenario using a PICO (population-intervention-comparison-outcome) style question: “does continuation of breastfeeding increase the risk of early childhood caries in infants of over six months of age compared with other methods of infant feeding?” This was a well-performed review. The author described her search strategy and mesh terms used, showed a table of summary of the relevant papers. Her review concluded that there is a lack of consistent evidence linking breastfeeding to the development of ECC. She suggests that an emphasis should be placed on promoting good oral hygiene practice from the time of eruption of the first tooth, and giving parents advice on reducing the frequency and consumption of sugar containing foods and drinks.

Another review by Ribeiro and Ribeiro (2004) looked at ECC and breastfeeding. The study described the ECC problem well, possible etiologies, and the role of breast milk. However, the review did not describe in detail the search strategy used to find the studies. The studies used were displayed in a table, but there were no details on the quality assessment process for the articles in the review. The studies were difficult to compare due to inconsistent results. However, they still were able to conclude that there were no scientific association between human milk and ECC. They do state that this is a complex relation to establish and that there are many variables that can affect the relationship.

Valaitis et al. (2000) produced another systematic review. This review followed a strong methodology, which is described step by step in a table. They offered a description of the ECC problem and showed a figure on the interrelationships of factors in the development of ECC. The review included 28 relevant articles, and the authors did assess the quality of the study. They mentioned that no articles of strong quality were included and only findings from articles rated as moderate and weak were presented. They noted that some of the results of the studies often contradict one another and findings are not always reproducible. However, they still concluded that the evidence does not suggest a consistent and strong association between breastfeeding and ECC. They do suggest that future

research should be performed with more rigorous research methods.

Evidence from Cross-Sectional Studies

Some other studies of interest used retrospective cross-sectional data. Nunes et al. (2012) did a retrospective cohort study involving a sample size of 206 low-income children. This study had a clear description of the inclusion and exclusion criteria. They also used a seven-level hierarchical theoretical framework model to control for the variables associated with ECC. The results showed that prolonged breastfeeding was not a risk factor for ECC after adjusting for some confounders. Interestingly, they did state that age, high sucrose consumption between meals, and the quality of oral hygiene were associated with ECC.

Mohebbi (2008) performed a cross-sectional study with a sample size of 504 children. He concluded that milk-bottle-feeding at night should be limited and was associated to ECC, whereas prolonged breastfeeding appears to have no such negative dental consequences. Another study (Iida et al. 2007) looked at a sample size of 1,576 children, aged two-to-five years old. The results of the different models used to analyze the data showed no evidence that either breastfeeding or its duration was independently associated with an increased risk of ECC. One weakness to note from a retrospective study is the data may be subject to recall bias. Also, in this study some of the confounding variables were not adjusted for due to lack of available data. However, this study is definitely worth noting considering the large sample size.

Azevedo (2005), in contrast, showed a positive association between prolonged breastfeeding and ECC. One important element that was not taken at all into consideration, or adjusted for in this study, was the food habits, snacks between meals, which would have an impact on the results. Tanaka and Miyake (2012) showed that breastfeeding for 18 months or longer was positively associated with the prevalence of dental caries, whereas breastfeeding for 6 to 17 months was non-significantly inversely associated with the prevalence of dental caries. Their sample size was 2,056 children, aged 3 years old. The information was obtained by questionnaire, and the study did adjust for confounders. However, a major weakness is that the breastfeeding duration was the period during which the infants received breast milk, regardless of exclusivity. This poses a problem and may have contributed to dental caries if children were exposed to bottles and formula at any point. They do state that the study still may have many confounding

factors that cannot be controlled, and therefore no cause and effect relationship should be drawn.

Discussion

After completing this research, the most striking finding is that ECC is a disease of multiple causes. It becomes difficult to isolate one element and a cause and effect when performing studies. When looking at ECC and breastfeeding alone, a link between the two has been difficult to establish. Some factors to consider that may have an effect are the level of bacteria present in the mouth, a susceptible host and a high sugar (sucrose) intake. Breast milk contains carbohydrates and sugar. However, it was only when mixed with other food that this became an issue. Breastfeeding children with higher levels of bacteria may have more ECC when compared to other breastfeeding children with lower levels of bacteria.

Some authors reported that *S.mutans* may not be able to use lactose, the sugar found in breast milk, as readily as sucrose, found in food or artificial milk, and some breast-milk antibodies may help impede bacterial growth (Mandel, 1996; Rugg-Gunn et al., 1985). One must remember that the bacteria were shown to be transferred from the mother at a specific time in the toddler's life.

It is also important to understand that the mechanics of breastfeeding versus bottle feeding are very different. When babies breastfeed, the nipple is drawn far back in the mouth and the milk is released into the throat more directly, whereas in bottle feeding the milk pools around the teeth. The use of a bottle is associated with reduced salivary flow, which would cause the fermentable carbohydrate to pool around the teeth and promote the development of ECC (Ribeiro & Ribeiro, 2004).

In my opinion, the most important factor, which is common to many of these studies, that contributes to ECC is the level of sugar rich food and between meal snacks that are consumed. This, combined with a high level of bacteria, seems to contribute to ECC. It is then crucial that parents be informed on proper dental hygiene for their children from infancy, and be sensitized towards the appropriate non-cariogenic snacks to feed them. Therefore, the mother's decision to continue breastfeeding should not be affected by the appearance of dental caries in their children, as no solid research has shown a direct link between the two.

Conclusion

Mothers should be encouraged to breastfeed as long as they desire since no conclusive evidence has established

a relationship between prolonged breastfeeding and the development of ECC.

References

- American Academy of Pediatrics Dentistry. (2011). *Policy on Early Childhood Caries (ECC): Classifications, consequences, and preventive strategies*. Retrieved from: http://www.aapd.org/media/Policies_Guidelines/P_ECCClassifications.pdf
- Arora, A., Scott, J.A., Bhole, S., Do, L., Schwarz, E., & Blinkhorn, A. S. (2011). Early childhood feeding practices and dental caries in preschool children: A multi-centre birth cohort study. *BMC Public Health*, 11, 28. doi: 10.1186/1471-2458-11-28
- Azevedo, T. D., Bezerra, A. C., & de Toledo, O. A. (2005). Feeding habits and severe early childhood caries in Brazilian preschool children. *Pediatric Dentistry*, 27(1), 28-33.
- Erickson, P.R., & Mazhari, E. (1999). Investigation of the role of human breast milk in caries development. *Pediatric Dentistry*, 21(2), 86-90.
- Harris, R., Nicoll, A.D., Adair, P.M., & Pine, C. M. (2004). Risk factors for dental caries in young children: A systematic review of the literature. *Community Dental Health*, 21(1 Suppl), 71-85.
- Iida, H., Auinger, P., Billings, R.J., & Weitzman, M. (2007). Association between infant breastfeeding and early childhood caries in the United States. *Pediatrics*, 120(4), e944-952. doi: 10.1542/peds.2006-0124
- Kramer, M. S., Vanilovich, I., Matush, L., Bogdanovich, N., Zhang, X., Shishko, G., . . Platt, R.W. (2007). The effect of prolonged and exclusive breast-feeding on dental caries in early school-age children. New evidence from a large randomized trial. *Caries Research*, 41(6), 484-488. doi: 10.1159/000108596
- Losso, E. M., Tavares, M. C., Silva, J. Y., & Urban Cde, A. (2009). Severe early childhood caries: An integral approach. *Journal of Pediatrics (Rio J)*, 85(4), 295-300. doi: doi:10.2223/JPED.1908
- Mandel, I. D. (1996). Caries prevention: Current strategies, new directions. *Journal of the American Dental Association*, 127(10), 1477-1488.
- Mohebbi, S. Z., Virtanen, J. I., Vahid-Golpayegani, M., & Vehkalahti, M. M. (2008). Feeding habits as determinants of early childhood caries in a population where prolonged breastfeeding is the norm. *Community Dental and Oral Epidemiology*, 36(4), 363-369.
- Nunes, A M., Alves, C.M., Borba de Araujo, F., Ortiz, T.M., Ribeiro, M.R., Silva, A. A., & Ribeiro, C.C. (2012). Association between prolonged breast-feeding and early childhood caries: A hierarchical approach. *Community Dental and Oral Epidemiology*. doi: 10.1111/j.1600-0528.2012.00703.x
- Prakash, P., Subramaniam, P., Durgesh, B. H., & Konde, S. (2012). Prevalence of early childhood caries and associated risk factors in preschool children of urban Bangalore, India: A cross-sectional study. *European Journal of Dentistry*, 6(2), 141-152.
- Retnakumari, N., & Cyriac, G. (2012). Childhood caries as influenced by maternal and child characteristics in pre-school children of Kerala: An epidemiological study. *Contemporary Clinical Dentistry*, 3(1), 2-8. doi: 10.4103/0976-237x.94538

- Ribeiro, N. M., & Ribeiro, M. A. (2004). Breastfeeding and early childhood caries: A critical review. *Journal of Pediatrics (Rio J)*, 80(5 Suppl), S199-210.
- Rugg-Gunn, A. J., Roberts, G.J., & Wright, W.G. (1985). Effect of human milk on plaque pH in situ and enamel dissolution in vitro compared with bovine milk, lactose, and sucrose. *Caries Research*, 19(4), 327-334.
- Schroth, R. J. (2010). *Influence of maternal prenatal vitamin d status on infant oral health*. University of Manitoba. Retrieved from <http://hdl.handle.net/1993/4274>
- Tanaka, K., & Miyake, Y. (2012). Association between breastfeeding and dental caries in Japanese children. *Journal of Epidemiology*, 22(1), 72-77.
- Udin, R. D. (1999). Newer approaches to preventing dental caries in children. *Journal of the California Dental Association*, 27(11), 843-851.
- Valaitis, R., Hesch, R., Passarelli, C., Sheehan, D., & Sinton, J. (2000). A systematic review of the relationship between breastfeeding and early childhood caries. *Canadian Journal of Public Health*, 91(6), 411-417.
- Weerheijm, K. L., Uyttendaele-Speybrouck, B.F., Euwe, H.C., & Groen, H.J. (1998). Prolonged demand breast-feeding and nursing caries. *Caries Research*, 32(1), 46-50.
- White, V. (2008). Breastfeeding and the risk of early childhood caries. *Evidence-Based Dentistry*, 9(3), 86-88. doi: 10.1038/sj.ebd.6400603
- World Health Organization. (2011, January 15, 2011). *Exclusive breastfeeding for six months best for babies everywhere*. Retrieved from: http://www.who.int/mediacentre/news/statements/2011/breastfeeding_20110115/en/



Valerie Lavigne, DC, IBCLC, RLC graduated from the Canadian Memorial Chiropractic College in 1998. In July 2005, she became an IBCLC, the first chiropractor in Quebec with the title. She has her fellowship in pediatrics from the International Chiropractic Pediatric Association and has started a Master of Science at the Anglo-European Chiropractic College in Pediatric musculoskeletal health. She is working as a chiropractor in her chiropractic clinic in Kirkland, Quebec and as an IBCLC at the Herzl Goldfarb Breastfeeding Clinic since 2010.

Guidelines for the Care of Late Preterm Infants

The U.S. National Perinatal Association has recently released [*Multidisciplinary Guidelines for the Care of Late Preterm Infants*](#). The guidelines, developed by a multidisciplinary team initiated at a 2010 summit, give healthcare providers and others a roadmap to focus attention on the unique needs of late preterm infants, from birth through early childhood, helping to ensure potential health risks are not overlooked. This document outlines strategic approaches to evaluating and managing the care of late preterm infants for physicians, midwives, nurses, ancillary members of the healthcare team, and parents. Topics include in-hospital assessment and care, transition to outpatient care, short-term follow-up care, and long-term follow-up care.

Source: Coalition for Improved Maternity Services