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Australian Research Centre for Population Oral Health

Breastfeeding and Oral health: Information for Dental Practitioners

Breastfeeding is recognised as the oldest practice to feed a baby since the Egyptian, Greek and Roman empires[1]. Nowadays, it is considered as one of the best public interventions responsible for saving thousands of children's lives worldwide[2]. Almost all children start breastfeeding in Australia (96%)[3] and New Zealand (88%)[4], however, these percentages markedly drop with only 15%[3] and 16%[4], respectively, being exclusively breastfed until 6 months of age.

How to classify breastfeeding?

According to the World Health Organization (WHO)[5] breastfeeding can be considered as:

> **Exclusive breastfeeding:** when no other food or drink, not even water, except breast milk is offered to the baby for the first 6 months of life. However, it allows the infant to receive Oral Rehydratation Solution (ORS), drops and syrups such as vitamins, minerals and medicines.

> **Predominant breastfeeding:** when the infant's predominant source of nourishment has been breast milk. However, the infant may also have received liquids such as water, water-based drinks and fruit juice as well as ORS, drops or syrups such as vitamins, minerals and medicines.

What are the general benefits of breastfeeding?

The benefits of breastfeeding to children and mothers are well acknowledged. As infants grow, breast milk changes to accommodate children's specific nutrient and immunological needs. Breast milk also contains immune cells, antibodies and digestive enzymes that help the baby's immune and digestive systems to develop[5].

In early 2016 the prestigious scientific journal The Lancet, published a series of two papers which reviewed the short-term and long-term benefits of breastfeeding for children and mothers[6] and the determinants of breastfeeding as well as how interventions promoting breastfeeding can be effective[7].
The findings described below were based on comprehensive systematic reviews and meta-analyses available at that time.

Longer periods of breastfeeding help to:

> Reduce the risk of infectious morbidity and mortality in children;

> Increase the level of intelligence in children;

> Protect against excess weight gain and diabetes later in life in children;

> Prevent breast cancer for mothers;

> Reduce the risk of diabetes and ovarian cancer in mothers.

How can breastfeeding influence oral health?

Breastfeeding can influence two important oral health conditions: malocclusions and dental caries.

Malocclusions - Developmental aspects

Breastfeeding acts on the process of sucking, influencing the development of facial bones and muscles. Children who are breastfed present greater facial muscle activity than those who are bottle-fed due to the necessary effort to get the breast milk out. The movement of lips and tongue during breastfeeding forces the child to draw breast milk through a squeeze action, while for children who are bottle-fed the movement for obtaining the milk is more passive. Such action in breastfed children promotes more adequate craniofacial growth and development of jaw bones[8,9] than in bottle-fed children. Therefore, there is greater potential of inadequate development of these structures and consequently a lack of space to accommodate teeth in children who are bottle-fed[8]. In addition, the nipple of the infant feeding bottle is usually made from a less flexible material, which can press the interior of the oral cavity and may cause inappropriate alignment of teeth and interfere in the adequate growth of the palate[10].

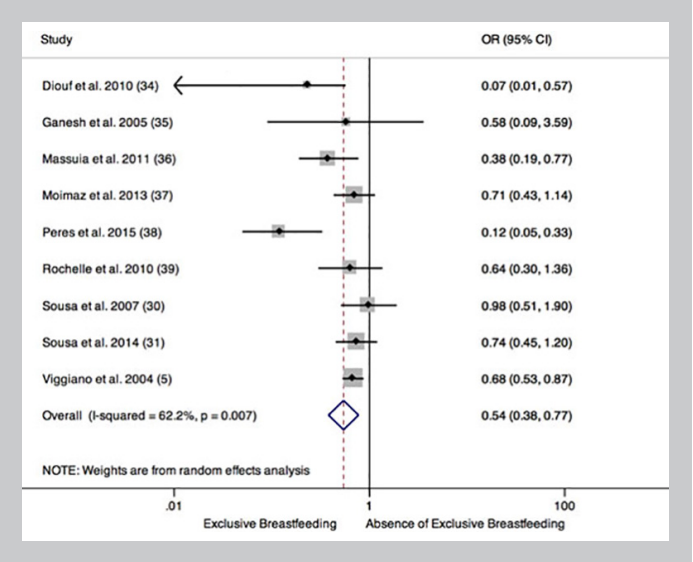
Another aspect of anatomy in favour of breastfeeding is that the mother's nipple adapts to the internal shape of the oral cavity, enabling a perfect oral seal which in turn leads to satisfactory development of nasal breathing.[11] Children who nasal breathe are less likely to develop open-mouth posture, which in turn may result in an excessive vertical facial dimension[12].

All these mechanisms contribute to the protective effect of breastfeeding on malocclusions.

Exclusive breastfeeding versus absence of exclusive breastfeeding

Results from a meta-analysis[13] which enrolled nearly 4,000 children from nine studies reported consistently that exclusive breastfeeding plays an important role in protecting against malocclusions, as displayed in Figure 1. The horizontal lines indicated in the graph (Figure 1) depict the result of each study involved in this meta-analysis. The longer the horizontal lines in the graph the less precise the result of the study. The solid vertical line in the middle reflects "the line of no effect" and, therefore, horizontal lines crossing "the line of no effect" show that there was no significant difference between both groups in comparison[14]. The diamond on the bottom of the graph demonstrates the overall effect of exclusive breastfeeding as a protective factor for malocclusions. The centre of the diamond represents that the presence of a malocclusion is 46% lower in children who were exclusively breastfed than in those who were not exclusively breastfed (pooled effect estimate).

Figure 1: Exclusive breastfeeding versus absence of exclusive breastfeeding. Results from a meta-analysis regression[13].

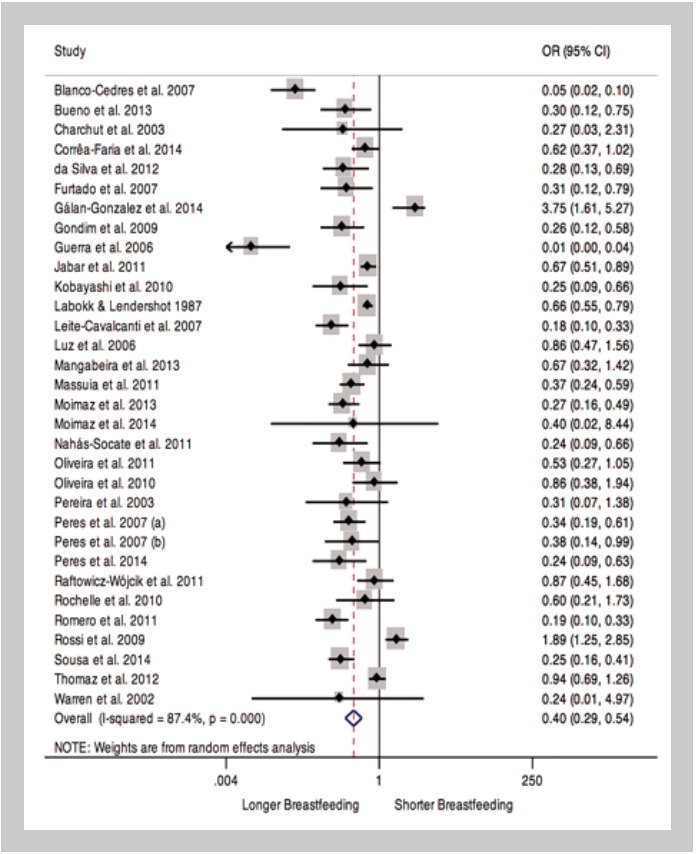


Breastfeeding for a long period versus breastfeeding for a short period

Another major contribution of systematic reviews and meta-analysis is related to how prolonged breastfeeding may contribute to prevent malocclusions. Results from 32 studies comprising 23,450 participants are presented in Figure 2. A pooled effect demonstrates that participants who were breastfed for a longer period were 60% less likely to develop malocclusions compared to those who were breastfed for a shorter period[13].

Although most of the studies included in the two described meta-analyses examined the primary dentition, malocclusion at this stage is a risk factor for malocclusion in the permanent dentition.[15]

Figure 2: Breastfeeding for long period versus breastfeeding for short period. Results from a meta-analysis regression[13].



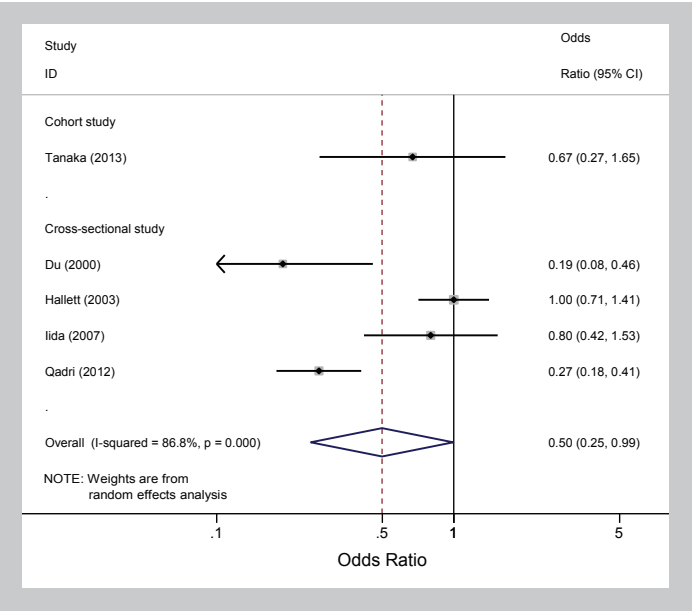
Dental Caries - Nutritional aspects

Breastfeeding also has a protective effect against dental caries. Dental caries results from a demineralisation process caused by acids released by microorganisms, such as Streptococcus mutans, that use sugar as a substrate[16]. Hence, the protective role of breastfeeding against dental caries is related to the composition of breast milk compared to other substitutes, such as infant formula[17]. Lactose is the main type of sugar found in breast milk and is less cariogenic than sucrose, which is usually found in infant formulas[17]. This is because Streptococcus mutans is less able to metabolise lactose, and instead uses sucrose as a substrate[17]. Furthermore, breast milk contains antibodies and proteins which impede bacterial growth (including Streptococcus mutans)[18]. It is also true that some formulas significantly reduce pH, leading to demineralisation of the tooth enamel[19].

Another aspect that contributes to the protective role of breastfeeding against dental caries is related to the anatomy of the mother's nipple when compared to bottle nipples. The bottle nipple blocks the access of saliva to the upper incisors, leading to a reduction of the salivary neutralisation capacity, and prolonged exposure of incisors to fermentable carbohydrates[20].

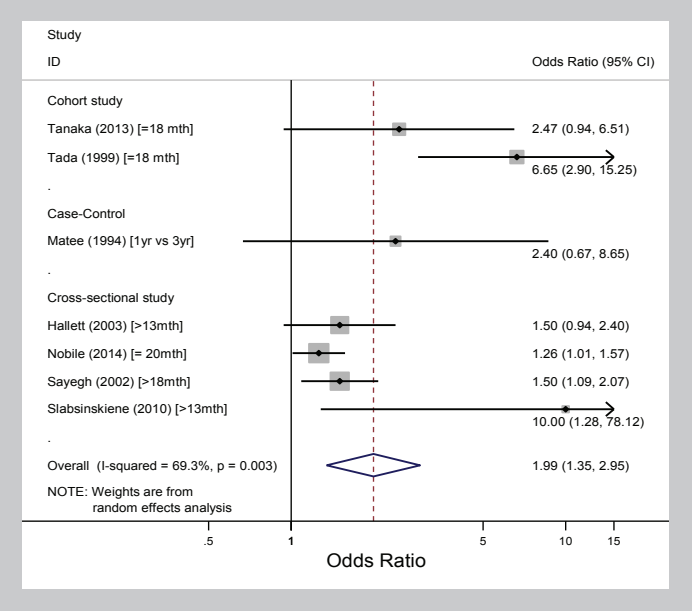
The most updated evidence suggests that children up to 12 months who were exposed to more versus less breastfeeding, have reduced risk of dental caries[21]. This result arises from a meta-analysis which includes five studies. The diamond in Figure 3 shows a reduction on the risk of dental caries equal to 50% (overall effect).

Figure 3: More versus less breastfeeding up to 12 months of age and the risk of dental caries. Results from a meta-analysis regression[21].



However, increased risk of dental caries was observed in children breastfed over more than 12 months in comparison with children who were not. Only seven studies have been included in the meta-analysis showing an approximate two-fold risk of dental caries among those who were breastfed beyond 12 months[20] (Figure 4)[21].

Figure 4: Breastfeeding beyond 12 months versus breastfeeding up to 12 months. Results from a meta-analysis regression[21].



The potential explanation for this increased risk of caries among children breastfed over 12 months is frequent or nocturnal breastfeeding[21]. Although this relationship has not been well established, mothers who are breastfeeding should be advised on dietary and oral hygiene practices for their children at the earliest possible stage.

How long should mothers breastfeed their babies?

The WHO and the National Health and Medical Research Council in Australia recommend *"…exclusive breastfeeding for six months and then continued breastfeeding combined with solid foods for 12–24 months or as long as mother and baby desire[5]".*

How can dental practitioners advise mothers who are breastfeeding their babies?

As health professionals, dental practitioners have an important role in encouraging breastfeeding as a healthy behaviour. Some general recommendations are:

- Encourage exclusive breastfeeding during the first six months and continued breastfeeding combined with solid foods for 12–24 months or as long as mother and baby desire;
- Establish a positive relationship with patients' midwives and advise on the importance of breastfeeding for infants' general and oral health;
- Inform mothers on general and oral health-related benefits of breastfeeding;
- Advise mothers to reduce the frequency and amount of sugar intake of their children;
- Provide oral hygiene and fluoride advice to mothers, such as tooth brushing with an appropriate fluoride toothpaste according to the age of the child.

Besides encouraging breastfeeding as a healthy behaviour, clinicians may clarify mothers' questions about the safety of medications used in dentistry that can be potentially excreted in breast milk. Although the most updated evidence is limited to studies with animals, for most drugs, the baby is exposed to a higher concentration during pregnancy than during lactation[22]. Therefore, dental practitioners should clearly understand the effects of the drugs on milk production and explain these effects to the patient, as well as consider dosage adjustment while breastfeeding[23]. The Australian Breastfeeding Association recommends practitioners and patients to access a free online database with information on drugs and lactation developed for health professionals and breastfeeding mothers. https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm

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