

Relationship between Breastfeeding Status and Early Childhood Caries Prevalence in 6-24 months old children in Jakarta

Febriana Setiawati^{1*}, Heriandi Sutad², Anton Rahardjo¹

1. Department of Preventive and Public Health Dentistry Universitas Indonesia, Jakarta, Indonesia.
2. Department of Pedodontics, Universitas Indonesia, Jakarta, Indonesia.

Abstract

The aims of this study was to analyze the relations breastfeeding status and Early Childhood Caries (ECC) prevalence among 6-24 years old children in Jakarta, Indonesia. Interview using questionnaire to mother were conducted to obtain breastfeeding status, oral health behavior, and intra oral visual examination to obtained ECC status of 56 children. Prevalence of ECC in breastfed children was 37.5%, and prevalence of ECC in non-breastfed children was 70.8%, with odds ratio of 4.05 ($p < 0.001$). There was a significant association between breastfeeding status with ECC. Groups of children who are not breastfed have 4 times greater risk to suffer ECC compared to children who are breastfed.

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Introduction

The prevalence and severity level of caries in children aged under 5-yr-old in several countries are quite high and have showed tendency to increase. The prevalence of Early Childhood Caries (ECC) in 12-60-month-old children ranged 3-90%.¹⁻⁶ In Indonesia, ECC has become an important health problem. From a research conducted in five areas in Jakarta in 2007, the prevalence of ECC in children aged of under 3-yr-old was 52.7% with an average def-t score of 2.85.⁷ Whilst the research conducted in North Jakarta in 2010, the prevalence of ECC children aged of 6-24 months was 63.1%, with the severity level of 3.3 teeth per child.⁸ ECC is a condition in children aged of under 71 months that follows criteria such as the presence of one or more caries, loss of teeth due to caries, and filled primary tooth.⁹ ECC is more prevalent in children with low socio-economic status, single parent or low education level, since they are related to the parents' ability to provide nutritious meals to the children. Caries in children can lead

to impaired masticatory function, which can increase the risk to suffer from various infections and lack of nutrition that will ultimately lead to a state of malnutrition among children under five years of age. ECC is an important issue in many countries around the world, especially developing countries.¹⁰⁻¹²

Sucrose is the most cariogenic carbohydrate and highly consumed. An adequate frequency and duration contact between sucrose and enamel surface is the main risk for dental caries occurrence.¹³⁻¹⁵ Giving formula milk or other sweetened beverages in children, worsened by poor oral hygiene will adversely affect dental health.¹⁶ Breast milk has rich ingredients for a child's health, for instance, *Secretory Immunoglobulin A* (SIgA) and proteins compounds. It also has a buffer capacity to inhibit dental caries process.^{13,17} SIgA is main immunoglobulin, and its level in breast milk is more than 90%.¹⁸ Breastfeeding can decrease caries incidence because it reduces cariogenic consumption.¹⁹ The antibody of SIgA has a function to inhibit early forming of *S. mutans* colonization. Breast milk's nutrition, buffer capacity and other defense mechanism inhibit microorganisms' in oral cavity.²⁰ Because of the buffer capacity effect and the ability to increase enamel remineralization by depositing calcium and phosphate on the surface of the enamel, breast milk has a complex defense mechanism

*Corresponding author:

Febriana Setiawati
Department of Preventive and Public Health Dentistry, Universitas Indonesia, Jakarta, Indonesia.

that inhibits the growth of microorganisms, including *S. mutans*.²¹

From previous studies, it was found that IgA levels in formula-fed children is lower than children who were breastfed. Further, the incidence of caries are lower in higher concentration of IgA.²² Milk is generally known as a non-cariogenic or anti-cariogenic beside the fact that lactose is fermented by *S. mutans* in plaque. The concentration of lactose in cow's milk is 4%, whereas in breast milk lactose concentration is 6-9%. On the other hand, milk has anti-cariogenic combination of components in the form of protein (casein), calcium and phosphate. In breast milk, the concentration of these substances is lower than cow's milk.²³ Cow's milk acts to prevent caries because it contains high calcium and phosphate, but it is also due to the activity of the protein milk buffer. Protein in the form of casein in cow's milk allows the formation of a stable binding of calcium phosphate that is preventing caries.²⁴ Laktoperoxidase and lactoferrin in breast milk reduces the amount of intra-oral bacteria. The content of IgA, proteins and minerals in milk have a role in determining the protective effect of breastfeeding on the ECC occurrence.²¹

Children who were breastfed have lower risk of caries than children who are bottle-fed from birth.^{25,26} Children who consume snacks containing carbohydrates are more at risk to develop caries. In children who are breastfed, the occurrence of caries is associated with hereditary email fragility, maintaining dental health care, and the consumption of cariogenic food besides breast milk. Among the many important health benefits of breastfeeding for children and mothers, breast milk is thought to have a preventive effect on the occurrence of ECC. On the other hand, prolonged exposure of tooth to breast milk is thought to be a risk factor for ECC.²⁷

Breastfeeding as the best nutrition for children are rarely given, or given only a short time. As a substitute or complementary given formula or other drinks containing sugar such as sweet tea or condensed milk solution.^{28,29} Breast milk and its companion is a source of nutrients. Breastfeeding provides many benefits, among others, provide optimal nutrition to infants, immunological protection and minimize the family expenses.³⁰ WHO recommends breastfeeding exclusively until 6 months old baby is then given

complementary foods and continued breastfeeding until the child is 2 years old.³¹ Breastfeeding associated with a low degree of caries severity.³² One of the goals of the millennium development goals, is to improve maternal and child health, reducing child mortality and malnutrition in children under 5 years, as well as reducing the incidence of infection.³³

A seven months longitudinal study in 2010 in children aged 1-4 years showed no association between prolonged breastfeeding (≥ 12 months) with the dental health of children, but there is a relationship between breastfeeding and bottle feeding at night with ECC events.³⁴ Results of a 2006 study conducted using retrospective cohort in children aged 25-30 months with prolonged breastfeeding habits showed no ECC in infants breastfed until the age of 12 months without prolonged breastfeeding. Breastfeeding at night at the age of 12 months is a risk ECC. This finding was different from the results of another research in cross-sectional study in children aged 12-36 months which showed no relationship between prolonged breastfeeding and incidence of ECC.³⁵ A cross-sectional study conducted in children aged 2-5 years showed that breastfeeding history, duration and exclusive breastfeeding provide a protective effect on the incidence of ECC.³⁶ The aims of this study was to analyze the relations breastfeeding status and Early Childhood Caries (ECC) prevalence among 6-24 years old children in Jakarta, Indonesia.

Materials and methods

This study is part of a cross-sectional study conducted in 429 children aged 6-24 months in Jakarta were selected by multistage cluster random sampling. This study was conducted in 2012 among 56 of 6-24 old months children and their mother in Integrated Health Service Centre in North Jakarta, the capital city of Indonesia.

An interviewed questionnaire was conducted to the mothers to get socio demographic data, oral health care behavior, and breastfeeding status. Intra oral visual examination was conducted to get ECC status using def-t index. Laboratory test using Elisa technic was conduct to get breast milk SIgA levels of mothers and salivary SIgA levels of children.

The research protocol was approved by the Faculty of Dentistry of Ethical Committee prior to data collection. Sample was taken as sub sample from a cross sectional study conducted in 424 children aged 6-24 months in North Jakarta. The first random sampling is in sub district level and the second level is in children in integrated health post. The total sample frame was obtained from all integrated health post. Therefore, the data used in this study were obtained from a representative sample of children whose ages were 6-24 months old and their mothers in DKI Jakarta. Minimum required sample size were 43.

SlgA sample were taken from 56 children, comprising of 32 breastfed (breast milk sample and saliva sample) and 24 non breastfed children (saliva sample). Mothers were asked to collect breast milk with minimum 1-2 ml, and then it was kept in a cool box. Before keep in -20°C , add PMFS (phenyl methanil sulfonil fluoride) to keep saliva protein did not degrade. Saliva sample were collected using cotton bud, then collect to Eppendorf tube dan keep in cool box.

Before keep in -20°C , add PMFS to keep saliva protein did not terurai. SlgA level in children saliva and SlgA level in breast milk was analyzed using ELISA method with Kit ELISA Salimetric. Further, for non breast milk children, saliva sample were collect using cotton bud, then collect to Eppendorf tube and keep in cool box.

Before keep in -20°C , add PMFS to keep saliva protein to decompose. SlgA level in children saliva and SlgA level in breast milk was analyzed using ELISA method with Kit ELISA Salimetric.

Results

Relationship between Breastfeeding Status and ECC status are shown in table 1, 2 and figure 1. Mean ECC was 1.38 and 3.38 in breastfeeding and non-breastfeeding children respectively. In this research we found SlgA level in breast milk and SlgA level in child's saliva was higher in children without ECC compared to children with ECC. There was significant relationship between SlgA level in breast milk and SlgA level in child's saliva ($p < 0.05$, $r = 0.581$).

There was no significant relationship between SlgA level in breast milk and SlgA level in saliva ($p > 0.05$ and $r = 0.396$). From the result of this study there is a significant relationship between breastfeeding status with prevalence of

ECC. Groups of children who are not breastfed 4 times greater risk to suffer ECC compared to children who are breastfed.

Breastfeeding	ECC+		ECC -		Total		p	OR	95%CI
	n	%	n	%	n	%			
yes	12	37.5	20	62.5	32	57.1	0.017	-	-
no	17	70.8	7	29.2	24	42.9		4.05	1.30 - 12.59
Total	29	51.8	27	48.2	56	100			

Table 1. Relationship between Breastfed Status and ECC Status.

ECC Status	SlgA in Breastmilk ($\mu\text{g/ml}$)		SlgA in child's saliva ($\mu\text{g/ml}$)		r	p
	Mean	SD	Mean	SD		
ECC -	342.175	56.940	158.680	108.669	0.396	0.084
ECC +	337.048	83.987	120.087	87.351	0.581	0.048

Table 2. Relationship between SlgA level in breast milk and SlgA level in child's saliva according to ECC status.

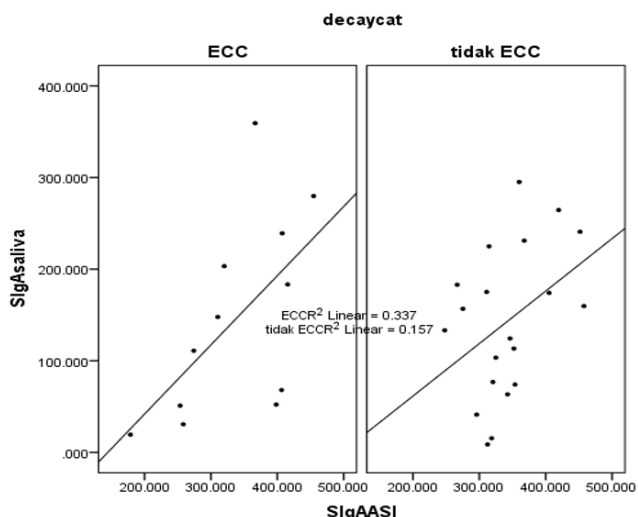


Figure 1. Relationship between SlgA level in breast milk and SlgA level in child's saliva according to ECC status.

Discussion

This study results were consistent with previous study that was conducted in 260 children aged 3-5 years, found that breastfeeding for more than 40 days can prevent and inhibit the occurrence of Nursing Bottle Caries.³⁶ Children are not breastfeeding or breastfeeding only 3 months showed significantly higher caries prevalence than those who breastfeed longer.³⁸

Research conducted Prabakhar et al found that pure cow's milk and packaging sweet cow's milk causes the growth of bacteria and fermentation higher than breast milk.³⁹ Some researchers suggest that breast milk is

cariogenic as well. However, lactose is protected by the presence of antimicrobial substances and enzymes in milk. Furthermore lactase enzyme break down lactose into glucose and galactose in the digestive rather than in the mouth.⁴⁰ Breast milk alone which includes the content of lactose can cause dental caries. Breastfeeding has been shown to have many benefits, including benefits to the teeth and oral cavity, such as reducing the risk of malocclusion, the failure of the formation of the face, snoring and breathing disorders during sleep.⁴⁰

WHO recommendation is that to have the health benefits of breastfeeding for children are encouraged to give exclusively breastfeed for the first 6 months and continued until the child is 2 years old. On the other hand, some studies report found that prolonged exposure to breastfeeding day or night is a risk of ECC. A randomized trial study showed that there is no evidence on the benefits or dangers of prolonged breastfeeding and exclusive breastfeeding against dental caries in early school age.⁴¹ Review of council AAPD 2008, stated that the ad libitum feeding should be avoided after the eruption the first primary teeth and the provision of carbohydrates cariogenic.⁹

Scottish Intercollegiate Guidelines Network also stated that infants should be exclusively breastfed until the age of 6 months, after which it must be given adequate complementary foods in addition to continue breastfeeding.⁴²

Al Amoudi et al, 2008 stated that there was a positive correlation between mother's and child's saliva SIgA with or without ECC.⁴³ Breastfeeding stimulates IgA and SIgA secretion that actively facilitates a baby's immune system, which does not happen in baby who is bottle-fed.⁴⁴

SIgA level was significantly higher in saliva of children who were breastfed.⁴⁵ This may be because of the positive correlation between breast milk and saliva SIgA in this study. SIgA level in breast milk and saliva was higher in the group of children without ECC compared to those without ECC. This finding confirms the studies done previously, which found that high level of SIgA in saliva was related with the risk of caries, and concluded that saliva SIgA played a role in caries prevention.⁴³

Some studies on children and adults showed the same results. Children with caries-free or caries-resistant have higher

immunoglobulins concentration that is related to low risk of caries.⁴⁵

Conclusions

This study found that mean breast milk SIgA level was $340.252\mu\text{g/ml} \pm 67.055\mu\text{g/ml}$ and mean saliva SIgA saliva was $140, 126\mu\text{g/ml} \pm 99.950\mu\text{g/ml}$. Using simple linier regression analysis, this study found a significant linier relationship was found ($p=0.004$), positive pattern between breast milk and saliva SIgA ($r=0.492$).

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Declaration of Interest

The authors report no conflict of interest.

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