Pesquisa Brasileira em Odontopediatria e Clínica Integrada 2019, 19:e5080
DOI: http://doi.org/10.4034/PBOCI.2019.191.112
ISSN 1519-0501

ORIGINAL ARTICLE

Association Between Early Childhood Caries and Feeding Pattern in 3- to 5-Year-Old Children in Grogol Utara, South Jakarta

Rizqi Assyifa Fauzia[1], Iwany Amalliah Badruddin[2], Febriana Setiawati[3]

[1]Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia. 0000-0002-3645-7331
[2]Department of Public Health, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia. 0000-0001-6296-9093
[3]Department of Public Health, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia. 0000-0001-8515-2369

Author to whom correspondence should be addressed: Iwany Amalliah Badruddin, Department of Public Health, Faculty of Dentistry, Universitas Indonesia, Jalan Salemba Raya No.4, Jakarta Pusat, 10430, Indonesia. Phone: +62 812 9096 6140. E-mail: iwanybadruddin@gmail.com.

Academic Editors: Alessandro Leite Cavalcanti and Wilton Wilney Nascimento Padilha

Received: 13 February 2019 / Accepted: 30 June 2019 / Published: 17 July 2019

Abstract

Objective: To evaluate the relationship between the feeding method and early childhood caries (ECC) in children aged 3-5 years. **Material and Methods:** An observational study using a cross-sectional approach and convenience sampling method was performed on 165 children aged 36–71 months from eight kindergartens in Grogol Utara, Indonesia. Data on feeding and oral hygiene behavior patterns were obtained through interviews using a structured questionnaire, and an oral examination was performed to collect information on oral health using the decayed, extracted, filled surface and plaque indices. The oral examination was performed by two examiners who were calibrated for intra- and interobserver reliability (Kappa = 0.9). **Results:** The prevalence of dental caries was 83%, with mean values of decayed, extracted, filled teeth (deft) and of defs being 6.2 and 14.8, respectively. The prevalence of children with anterior dental caries was higher than that of children with posterior-only dental caries. The most severely affected teeth were maxillary central incisors (right = 62.4%; left = 61.2%), followed by maxillary lateral incisors (right = 49.1%; left = 44.2%). The caries pattern was almost symmetrical across the arches. There were significant differences between breastfeeding methods with anterior ($p<0.05$), but not with posterior dental caries. The complementary feeding initiation age was significantly different between anterior and posterior teeth caries groups ($p<0.05$), but complementary food type after tooth eruption and infant formula frequency were related only to anterior dental caries ($p<0.05$). **Conclusion:** The patterns of breastfeeding and complementary feeding were related to dental caries in anterior and posterior teeth. The feeding method that increases the ECC score in anterior and posterior teeth was the age at initiation of complementary feeding.

Keywords: Child, Preschool; Dental Caries; Breast Feeding; Bottle Feeding.

Introduction

Caries is a common oral problem in Indonesian children. According to Riset Kesehatan Dasar (RISKESDAS) in 2007 and 2013, the prevalence of oral health diseases in Indonesia increases from 23,2% to 25,9% [1]. The prevalence of caries in children aged 3-5 years old in Indonesia constantly increases [2]. In 2001, the prevalence of caries in 3- to 5-year-old children in Jakarta was 81,2% [3]. In 2008, it was found that caries prevalence of children aged 12-38 months in Jakarta is 52,7% [2]. In 2013, the prevalence of caries in 1- to 6-year-old children of South Jakarta was 76.7% [4].

Early childhood caries (ECC) is defined as ≥1 decayed, missing, or filled tooth surfaces due to caries in primary teeth in children aged ≤71 months [4]. Many terminologies were used to describe ECC, such as nursing caries, indicating that a child's feeding pattern was an important risk factor in caries development [5,6]. The feeding pattern includes breastfeeding and complementary feeding [7].

Previous authors found a significant relationship between breastfeeding for >6–7 months, with an increased risk of caries when the child reached 30 months of age [8]. The odds ratio (OR) of 30-month-old children who were exclusively breastfed for >6–7 months was 1.63. Breastfeeding children until 12 months of age might provide protection against caries compared to formula milk [9]. However, ECC in children aged 18–23 months was significantly associated (OR = 3.66) with nocturnal breastfeeding [10]. For complementary food, children aged 1–3 years who were fed >3 times a day had more dental caries than those who were fed less often. The development of caries might have been caused by the content of complementary food, which was cariogenic carbohydrate [11]. Anterior primary teeth are more susceptible to caries than posterior teeth because of their earlier eruption time, causing them to be more exposed to fermentable carbohydrates [12].

Plaque is also an important risk factor in the development of caries in children. Children who did not brush their teeth before sleeping had a higher risk of ECC [13]. Children who brushed their teeth twice a day had fewer caries than children who brushed only once a day [14]. In Indonesia, studies on feeding methods that may increase ECC risk remain scarce. In South Jakarta, a study on ECC was held in Bukit Duri, and the prevalence was 50% [2]. In Grogol Utara, researches regarding ECC and feeding methods have yet to be done. Thus, this research was held in Grogol Utara to broaden the knowledge of feeding methods that may increase the risk of ECC. Knowledge of the association between ECC and feeding methods would be beneficial in planning preventive measures against primary teeth caries and decreasing the prevalence of ECC in Indonesia.

Material and Methods

Study Design and Sample

An observational study using a cross-sectional approach and convenience sampling method was performed on 165 children aged 36–71 months from eight kindergartens in Grogol Utara.

Data Collection

The data collection process included interviews of the mothers and oral examinations of the children to collect information on dental caries (decayed, extracted, filled tooth surface [defs] index) and oral hygiene (Loe and Silness' plaque index).

Data on feeding practices and oral hygiene behavior patterns were obtained through a structured questionnaire. The feeding pattern were about breastfeeding, formula milk and complementary feeding. The questions about oral hygiene behavior was reconfirmed to the children' plaque score.

The oral examination was performed by two examiners who were calibrated for intra- and interobserver reliability (0.9 - excellent agreement, for each examiner). The feeding pattern questionnaire was tested for validity and reliability for 15 mothers. If the r-count of every question was >0.514, then the questionnaire was considered valid. The questionnaire's internal reliability test result using Cronbach's α was 0.890. The questionnaire's external reliability test used test-retest in the same respondents performed two times, with an interval of 15 days. The intraclass correlation coefficient was 0.623, which meant that the questionnaire was reliable.

Data Analysis

Descriptive statistics analyses were performed to see central values of all variables. The distribution of dental caries was differentiated in quadrants. For bivariate analysis, means of defs score were compared between categories of each independent variables. Plaque score was categorized into three groups, and analyzed using Chi-square test to compute the risk of caries occurrence. Statistical analysis were carried out by IBM SPSS Statistics software version 20.0, and their significance was set at $p<0.05$ for all tests. All the analysis was separated between anterior and posterior primary teeth.

Ethical Aspects

Parents provided informed consent to enter this study, and ethical clearance was approved by the Dental Research Ethics Committee of the Faculty of Dentistry Universitas Indonesia with clearance number 54/EA/FKGUI/VII/2017.

Results

The average ages of the children and their mothers were 59 months and 34 years, respectively. The prevalence of dental caries was 83%, with mean values of decayed, extracted, filled teeth (deft) and of defs being 6.2 and 14.8, respectively. The prevalence of children with anterior dental caries - with and without posterior (85.4%; median defs = 10.00; minimum 1 and maximum 48) was higher than that of children with posterior-only dental caries (14.6%; median defs = 2.50; minimum 1 and maximum 7).

The most severely affected teeth were maxillary central incisors (right = 62.4%; left = 61.2%), followed by maxillary lateral incisors (right = 49.1%; left = 44.2%). The caries pattern was almost symmetrical across the arches (Figure 1).

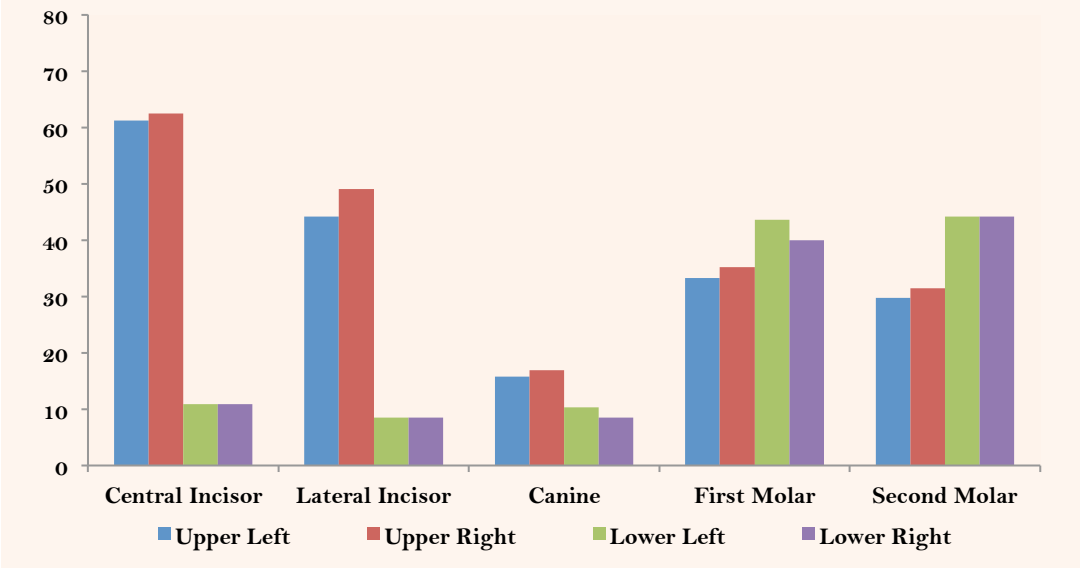

Figure 1. Distribution pattern of dental caries based on the type of tooth.

Table 1 shows the association between the feeding pattern and the anterior defs score. There were significant differences between colostrum, exclusive breastfeeding, breastfeeding frequency, contact time between teeth and breast milk, complementary feeding initiation age, food type after the first tooth eruption, and formula milk frequency with anterior caries.

Table 1. Association between feeding pattern and anterior defs score.

Variables	N	%	Anterior Caries Median (Min.-Max.) defs	p-value*
Colostrum				
Yes	135	81.8	4.00 (0–48)	0.017
No	30	19.2	7.50 (0–44)	
Exclusive Breastfeeding				
Yes	60	36.4	2.00 (0–24)	0.028
No	105	63.6)	6.00 (0–48)	
Breastfeeding Frequency				
<7 Times	90	54.5	7.50 (0–44)	0.001
≥7 Times	75	45.5	2.00 (0–48)	
Length of Breastfeeding				
≤12 Months	62	37.5	6.00 (0–44)	0.116
13–24 Months	85	51.5	2.00 (0–38)	
>24 Months	18	10.9	7.50 (0–48)	
Breastfeeding Duration				
Not Until Asleep	73	44.2	6.00 (0–48)	0.364
Until Asleep	92	55.8	4.00 (0–38)	
Contact Time Between Teeth and Breast Milk				
≥8 Months	98	59.4	2.50 (0–48)	0.049
<8 Months	67	40.6	6.00 (0–44)	

Food Type After First Tooth Eruption				
Breast Milk	6	3.6	0.00 (0–17)	0.020
Complementary Food	22	13.3	9.50 (0–30)	
Formula Milk	4	2.4	25.00 (14–44)	
Other Sweet Drinks	1	0.6		
Complementary Food and Formula Milk	27	16.3	5.00 (0–38)	
Breast Milk and Combination	105	63.6	3.00 (0–48)	
Initial Age at Complementary Feeding				
≥6 Months	116	70.3	2.00 (0–44)	0.001
<6 Months	49	29.7	12.00 (0–48)	
Formula Milk Feeding Method				
Without Bottle	57	34.6	4.00 (0–48)	0.688
With Bottle	108	65.4	5.00 (0–44)	
Formula Milk Frequency				
<3 Times	44	26.7	2.00 (0–48)	0.005
≥3 Times	121	73.3)	6.00 (0–44)	
Complementary Food Frequency				
<3 Times	40	24.2	5.50 (0–24)	0.963
≥3 times	125	75.8	4.00 (0–48)	

*Mann-Whitney and Kruskal-Wallis tests.

Only complementary feeding initiation age showed a significant difference with the posterior defs score (Table 2).

Table 2. Association between feeding pattern and posterior defs score.

Variables	N	%	Posterior Caries Median (Min.-Max.) defs	p-value*
Colostrum				
Yes	135	81.8	3.00 (0–40)	0.155
No	30	19.2	6.50 (0–39)	
Exclusive Breastfeeding				
Yes	60	36.4	2.50 (0–40)	0.069
No	105	63.6	4.00 (0–40)	
Breastfeeding Frequency				
< 7 Times	90	54.5	4.00 (0–40)	0.051
≥ 7 Times	75	45.5	2.00(0–40)	
Length of Breastfeeding				
≤ 12 Months	62	37.6	3.00 (0–39)	0.321
13–24 Months	85	51.5	2.00 (0–40)	
> 24 Months	18	10.9	4.00 (0–40)	
Breastfeeding Duration				
Not Until Asleep	73	44.2	3.00 (0–40)	0.333
Until Asleep	92	55.8	2.50 (0–36)	
Contact Time Between Teeth and Breast Milk				
≥8 Months	98	59.4	2.00 (0–40)	0.512
<8 Months	67	40.6	3.00 (0–39)	
Food Type After First Tooth Eruption				
Breast Milk	6	3.6	5.00 (0–26)	0.101
Complementary Food	22	13.3	7.50 (0–36)	
Formula Milk	4	2.4	27.00 (0–39)	
Other Sweet Drinks	1	0.6		
Complementary Food and Formula Milk	27	16.3	3.00 (0–35)	
Breast Milk and Combination	105	63.6	2.00 (0–40)	

Initial Age at Complementary Feeding				
≥6 Months	116	70.3	2.50 (0–40)	0.041
<6 Months	49	29.7	5.00 (0–40)	
Formula Milk Feeding Method				
Without Bottle	57	34.6	3.00 (0–40)	0.804
With Bottle	108	65.4	3.00 (0–39)	
Formula Milk Frequency				
<3 Times	44	26.7	2.00 (0–40)	0.091
≥3 Times	121	73.3	3.00 (0–40)	
Complementary Food Frequency				
<3 Times	40	24.2	3.00 (0–23)	0.591
≥3 Times	125	75.8	3.00 (0–40)	

*Mann-Whitney and Kruskal-Wallis tests.

Mothers also were asked for information on the oral hygiene behavior of their children. The questionnaire was confirmed with the plaque index in the oral examination. The Mann-Whitney U test demonstrated a significant difference between children with good and bad oral hygiene behavior and the plaque score (Table 3). ECC occurrence also showed a significant difference with the plaque index (Table 4). The ORs showed that children with a fair and poor plaque index have 5.77 and 8.52 times higher risks of ECC, respectively than children with a good plaque index.

Table 3. Plaque score based on oral hygiene behavior.

Oral Hygiene Behavior		Plaque Score	p-value*
	N	Median (Minimum-Maximum)	
Good	51	1.00 (0.00–2.00)	0.046
Bad	114	1.08 (0.00–2.00)	

*Mann-Whitney test.

Table 4. Prevalence of ECC based on the plaque index.

Plaque Index	Caries Free		ECC		Total		OR (95% CI)	p-value*
	N	%	N	%	N	%		
Good	46	71.9	18	28.1	64	100.0	1	
Fair	27	30.7	61	69.3	88	100.0	5.77 (2.84–11.73)	0.001
Poor	3	23.1	10	76.9	13	100.0	8.52 (2.09–34.56)	
Total	76	46.1	89	53.9	165	100.0		

CI = Confidence Interval; *Chi-Square test.

Discussion

In this study, the prevalence of ECC increased as age increased. It was also found that the prevalence of ECC increased significantly with age [13]. In 5-year-old children, the prevalence of posterior caries (37.5%) was higher than that of anterior caries (35.1%). It has been demonstrated that the prevalence of posterior caries increased from 3–5 years of age, which was almost the same as the prevalence of anterior caries [14].

The mean defs score was found higher in anterior teeth than posterior teeth. This finding is in agreement with that described in the literature that revealed maxillary central incisors to be the most affected by caries in 3- to 4-year-old children [15]. Incisors are the first teeth to erupt and,

therefore, are exposed longer to cariogenic substances than posterior teeth [15]. Previous studies have shown that the maxillary incisors were the most severely affected by caries [16,17]. This suggests that prolonged and nighttime bottle-feeding practices in infants and toddlers are the etiology for this condition. Liquids containing sucrose in the bottle are cariogenic and can serve as a culture medium for acidogenic microorganisms [17,18].

The mean anterior defs score was higher in children who were not given colostrum (Table 1). The colostrum contains specific antibodies for Streptococcus species in the oral cavity [19] and immunologic components, such as secretory immunoglobulin A (IgA), lactoferrin, and leukocytes. Therefore, colostrum can provide protection against *S. mutans* and prevent the initiation of caries [19].

The mean anterior defs score was higher in children who were not exclusively breastfed (Table 2). The previous study showed that exclusive breastfeeding for 3–6 months was significantly associated with a lower incidence of caries in children [21]. The mean anterior defs score was higher in children who were breastfed <7 times a day. Breast milk components, such as casein and IgA, could inhibit *S. mutans* adhesion on saliva-coated hydroxyapatite [22]. Breast milk contains antibodies against cariogenic bacteria, so a higher breastfeeding frequency can prevent the caries process [19]. The mean anterior defs score was higher in children with a <7-month contact time of breast milk and teeth. Some authors have shown that caries severity was higher in children whose contact time of breast milk and teeth was <8 months [23]. The contact time of breast milk and teeth was counted from the time the first tooth erupted until breastfeeding stopped [23]. Breast milk itself is not cariogenic unless combined with another carbohydrate source [24]. So, the earlier the child was given other food or drinks, the higher the risk of caries.

Anterior dental caries is more prevalent in children given breast milk and combination feeding after the first tooth eruption. However, the highest mean anterior defs score is in children given formula milk. Sucrose is the most cariogenic substance, and that higher frequency and longer contact with sucrose can be risk factors for caries [25]. Formula milk, even those that do not contain sucrose, can be cariogenic [24]. The cariogenicity of food also is determined by the consistency because it affects the retention time in the oral cavity [27]. Liquids have a shorter retention time than sticky food [27], which might be the reason why caries is more prevalent in children given breast milk and combination feeding after the first tooth eruption.

The mean anterior defs score was higher in children introduced to complementary food before they were six months old. According to previous findings, there was no significant association between ECC and initial age at beginning complementary food. However, the relative risk was higher in children given complementary food before rather than after 6 months of age [28]. Other authors reported a significant association between caries severity and initial age at introduction of complementary food. In our study, the mean anterior defs score was higher in children given formula milk >3 times a day. Formula milk is more cariogenic than breast milk, and its cariogenicity is almost the same as that of sucrose [26].

There was no significant difference between the length of breastfeeding and the anterior caries score. The length of breastfeeding does not count only the exposure to breast milk exclusively, but for how long the breast milk was given until it was stopped. This might include other cariogenic substances given within that time [23]. This variable was obtained through interviews, so there might be recall bias because the mother could not provide accurate information. The breastfeeding duration also did not show a significant difference with the anterior caries score. Other authors reported a significant association between caries development and the habit of letting children sleep with the nipple still in their mouth [29].

The formula milk feeding method did not demonstrate a significant difference with the anterior caries score. Bottle feeding can increase the ECC score if there was additional sugar, and the milk was given at night before bedtime [5]. The complementary feeding frequency did not show a significant difference with the anterior caries score. Although the higher frequency of cariogenic substances can increase exposure, the exposure time cannot be known accurately. Cariogenicity is also determined by food consistency, which affects its retention time in the oral cavity [27].

There was a significant difference between the initial age at complementary feeding and the posterior caries score. The mean defs score of posterior caries was higher in children who were given complementary food before they were 6 months old. Similarly, other researchers have also shown a significant difference between ECC and initial age at complementary feeding [11,28]. All breastfeeding and other complementary feeding variables showed no significant difference with the posterior caries score. According to some authors, breast milk is not cariogenic [19].

Differences in the anterior and posterior caries scores were caused by order of eruption of primary teeth [29]. Cariogenic substances affect teeth immediately after they erupt. Incisors are the first teeth to erupt, so they are the first to be exposed to cariogenic substances, and their exposure duration is longer than that of posterior teeth. Posterior primary teeth erupt after the age of 1 year, so their exposure duration is shorter than that of anterior teeth [29]. After the eruption, tooth enamel undergoes posteruptive maturation by accumulating calcium and phosphate. Posteruptive maturation occurs by two processes: remineralization and demineralization [30]. The highest caries risk period would be within 2-4 years after eruption and the longer the teeth are present in the oral cavity, the more they will undergo the two processes. Progressively, when demineralization dominates remineralization, caries will result. Therefore, anterior teeth that have erupted first are more susceptible to caries than posterior teeth [12].

Conclusion

The variable related to both anterior and posterior ECC was complementary food given before 6 months of age. We hope that the results found in this study will be helpful in planning preventive measures against ECC in Indonesia. If further research is possible, it will be better to use a cohort design to find the relationship between cause and effect more accurately and using the more accurate record for data retrieval of the feeding method so it will not be based only on the subject's memory.

Authors' Contributions: IAB and FS designed the study, supervised the data acquisition, contributed in analysis, interpretation, and critically revised the manuscript. RAF performed the data acquisition, analysis, interpretation, and drafted the manuscript.

Financial Support: PITTA Grant from the Research and Community Development Center of Universitas Indonesia with contract number 2155/UN2.R3.1/HKP.05.00/2018.

Conflict of Interest: The authors declare no conflicts of interest.

Acknowledgment: The authors would like to thank the teachers and mothers at the Preschools and Community Health Center at Grogol Utara, South Jakarta.

References

[1] Badan Penelitian dan Pengembangan Kesehatan. Riset kesehatan dasar (RISKESDAS) 2013. Lap Nas 2013. 2013; 1-384. [In Indonesian].

[2] Sugito FS, Djoharnas H, Darwita RR. Breastfeeding and early childhood caries (ECC) severity of children under three years old in DKI Jakarta. Makara Kesehatan 2008; 12(2):86-91. https://doi.org/10.7454/msk.v12i2.310

[3] Yulita I, Elly D, Victrix AA. Air susu ibu dan karies gigi sulung. J Health Quality 2013; 4(1):69-76. [In Indonesian].

[4] American Academy of Pediatric Dentistry. Definition of early childhood caries (ECC). Available at: http://www.aapd.org/media/Policies_Guidelines/D_ECC.pdf . [Accessed on April 15, 2017).

[5] Makhdoom S, Khan MA, Qureshi Z. Assessment of early childhood caries (ECC) and its relationship with feeding practices – A study. Pak Oral Dental J 2015; 35(2):254-7.

[6] Gandeeban K, Ramakrishnan M, Halawany HS, Abraham NB, Jacob V, Anil S. The role of feeding practices as a determinant of the pufa index in children with early childhood caries. J Clin Pediatr Dent 2016; 40(6):464-71. https://doi.org/10.17796/1053-4628-40.6.464

[7] Permatasari AA. Hubungan Pemberian ASI dan Susu Formula dengan Kejadian Karies pada Anak Usia 1-4 tahun. [Jakarta (INA)]. Fakultas Kedokteran Gigi Universitas Indonesia; 2000. [In Indonesian].

[8] Kato T, Yorifuji T, Yamakawa M, Inoue S, Saito K, Doi H, et al. Association of breast feeding with early childhood dental caries: Japanese population-based study. BMJ Open 2015; 5:e006982. https://doi.org/10.1136/bmjopen-2014-006982

[9] Tham R, Bowatte G, Dharmage SC, Tan DJ, Lau MX, Dai X, et al. Breastfeeding and the risk of dental caries: A systematic review and meta-analysis. Acta Pediatr 2015; 104(467):62-84. https://doi.org/10.1111/apa.13118

[10] Nakayama Y, Mori M. Association between nocturnal breastfeeding and snacking habits and the risk of early childhood caries in 18- to 23-month-old Japanese children. J Epidemiol 2015; 25(2):142-7. https://doi.org/10.2188/jea.je20140097

[11] Setyowati, D. Perbedaan angka keparahan karies gigi sulung anak usia 1-3 tahun yang diberi makanan pendamping asi sebelum usia 6 bulan dan setelah usia 6 bulan di Puskesmas Kedungdoro Surabaya tahun 2006 [Thesis]. [Surabaya (INA)]. Fakultas Kedokteran Gigi Universitas Airlangga; 2006. [In Indonesian].

[12] Lynch RJM. The primary and mixed dentition, post-eruptive enamel maturation and dental caries: A review. Int Dent J 2013; 63(Suppl 2):3-13. https://doi.org/10.1111/idj.12076

[13] Nobile CG, Fortunato L, Bianco A, Pileggi C, Pavia M. Pattern and severity of early childhood caries in Southern Italy: A preschool-based cross-sectional study. BMC Public Health 2014; 14:206. https://doi.org/10.1186/1471-2458-14-206

[14] Jiang YY. Prevalence of early childhood caries among 2- to 5-year old preschoolers in kindergartens of Weifang City, China: A cross-sectional study. Oral Health Prev Dent 2017; 15(1):89-97. https://doi.org/10.3290/j.ohpd.a37718

[15] Ripa LW. Nursing caries: A comprehensive review. Pediatr Dent 1988; 10(4):268-82.

[16] Singh S, Vijayakumar N, Priyadarshini HR, Shobha M. Prevalence of early childhood caries among 3-5 year old pre-schoolers in schools of Marathahalli, Bangalore. Dent Res J 2014; 9(6):710-4.

[17] Sutjipto RW, Kuntari S. The prevalence of early childhood caries and severe early childhood caries in preschool children at Gunung Anyar Surabaya. Majalah Kedokteran Gigi 2014; 47(4):186-9. https://doi.org/10.20473/j.djmkg.v47.i4.p186-189

[18] Dean JA, Avery DR, McDonald RE. McDonald and Avery's Dentistry for the Child and Adolescent. 9th. ed. St. Louis: Mosby; 2011.

[19] Oulis CJ, Berdouses ED, Vadiakas G, Lygidakis NA. Feeding practices of Greek children with and without nursing caries. Pediatr Dent 1999; 21(7):409-16.

[20] Ballard O, Morrow AL. Human milk composition: Nutrients and bioactive factors. Pediatr Clin North Am 2013; 60(1):49-74. https://doi.org/10.1016/j.pcl.2012.10.002

[21] Olatosi OO, Sote EO. Association of early childhood caries with breastfeeding and bottle feeding in Southwestern Nigerian children of preschool age. J West Afr Coll Surg 2014; 4(1):31-53.

[22] Danielsson Niemi L, Hernell O, Johansson I. Human milk compounds inhibiting adhesion of mutans streptococci to host ligand-coated hydroxyapatite in vitro. Caries Res 2009; 43(3):171-89. https://doi.org/10.1159/000213888

[23] Setiawati, F.Peran Pola Pemberian Air Susu Ibu (ASI) dalam Pencegahan Early Childhood Caries (ECC) di DKI Jakarta [Disertasi]. [Jakarta (INA)] Fakultas Kedokteran Gigi Universitas Indonesia, 2012. [In Indonesian].

[24] Erickson PR, Mazhari E. Investigation of the role of human breast milk in caries development. Pediatr Dent 1999; 21(2):86-90.

[25] Ribeiro NME, Ribeiro MAS. Breastfeeding and early childhood caries: A critical review. J Pediatr 2004; 80(5):S199-S210. https://doi.org/10.1590/S0021-75572004000700012

[26] Peres RC, Coppi LC, Volpato MC, Groppo FC, Cury JA, Rosalen PL. Cariogenic potential of cows', human and infant formula milks and effect of fluoride supplementation. Br J Nutr 2009; 101(3):376-82. https://doi.org/10.1017/S0007114508020734

[27] Gupta P, Gupta N, Pawar AP, Birajdar SS, Natt AS, Singh HP. Role of sugar and sugar substitutes in dental caries: A review. ISRN Dent 2013; 2013:519421. https://doi.org/10.1155/2013/519421

[28] Feldens CA, Giugliani ERJ, Vigo A, Vítolo MR. Early feeding practices and severe early childhood caries in four-year-old children from Southern Brazil: A birth cohort study. Caries Res 2010; 44(5):445-52. https://doi.org/10.1159/000319898

[29] Jain M, Namdev R, Bodh M, Dutta S, Singhal P, Kumar A. Social and behavioral determinants for early childhood caries among preschool children in India. J Dent Res Dent Clin Dent Prospects 2015; 9(2):115-20. https://doi.org/10.15171/joddd.2014.023

[30] Briner WW, Francis MD, Widder JS. Factors affecting the rate of post-eruptive maturation of dental enamel. Calcif Tissue Res 1971; 7(1):249-56. https://doi.org/10.1007/BF02062612