

BREASTFEEDING PATTERN INFLUENCES THE OCCURRENCE OF EARLY CHILDHOOD CARIES OF CHILDREN UNDER FIVE YEARS OLD: A STUDY CASE IN BUKITTINGGI, INDONESIA

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Abstract: The Indonesian Government target 12-year-old children to be caries-free in 2030. In 2017, the deft index of children aged 2-3 years in Bukittinggi was 2.33. Thus, this condition showed that the deft index target of Indonesia has not achieved yet.

Aims: This study aimed to investigate the relationship between breastfeeding patterns and Early Childhood Caries (ECC).

Setting and Design: A cross-sectional survey located in the Integrated Post Service (*Posyandu*) in Bukittinggi City.

Methods and Material: 141 pairs of parents and children aged 2-5 years were selected with stratified random sampling in this study. The breastfeeding pattern was observed using questionnaires, and the deft index was used to examine the ECC.

Statistical analysis used: Data were collected by 6 Dentistry of Andalas University's students who had adjusted before and analyzed using the Chi-square test.

Result: The prevalence of ECC in Bukittinggi (96) it was 68.%, with the deft index was 3.45, at 95% Confidence Interval (2.90 - 4.01). The number of samples with exclusive breastfeeding (72) was 50.7%. It had a lower deft index compared to the samples with non-exclusive breastfeeding (3.70 and 4.07), $p = 0.678$. Meanwhile, 46.6% of samples with breastfeeding and complementary foods (67) had a lower deft index compared to samples with non-breastfeeding and additional food (3.51 and 4.21) with $p 0.787$.

Conclusion: In conclusion, breastfeeding may decrease the caries incident.

Key-words: ECC, deft, breastfeeding, Significant Caries Index

Key Messages: This research is aimed to provide information about the breastfeeding pattern as one of the risk factors of early childhood caries. A child who got exclusive breastfeeding

has a lower deft index than non-exclusive breastfeeding. Therefore, breastfeeding affects the occurrence of early childhood caries.

Introduction:

Early Childhood Caries (ECC) is one of the public health concerns worldwide. The prevalence of ECC in the world is between 3% to 74%.¹ In 2011, the prevalence of ECC of children aged 3 to 6 years in Italy was 60.25%, while the prevalence of ECC of children aged 2 to 5 years in Taiwan was 56%.^{2,3} In 2017, ECC prevalence in children aged 2-3 years in Bukittinggi, Indonesia was 51.5%.⁴ The American Academic Pediatric Dentistry defined Early Childhood Caries as one or more caries in primary teeth in children under 71 months old.⁵ The Government of Indonesia targets that children under 12 years are caries-free in 2030.⁶ Some research stated that breastfeeding pattern is one of the risk factors of ECC.^{1,2,3}

Bahaguna's study explained that the duration of breastfeeding related to the occurrence of ECC in India. Zafar stated that the frequency and duration of breastfeeding related to the occurrence of ECC. However, ECC has not been widely inspected by researchers in Indonesia. This study aims to investigate the relationship between the pattern of breastfeeding and ECC.

The hypothesis of this study is there's no correlation between breastfeeding patterns and Early Childhood Caries.

Subjects and Methods:

The research was a cross-sectional study located in the Integrated Post Service (*Posyandu*) Bukittinggi West Sumatera Indonesia. Permission for the research obtained from Research Ethics no. 065/KEP/FK/2017 Faculty of Medicine, Andalas University, Padang West Sumatera. The samples were 146 pairs of mothers and children ranging in age from 24 to 60 months whose four upper anterior teeth already erupted. One child represents one family and the youngest child in the family was chosen as the sample. The numbers were based on the sample size formula Lameshow hypothesis test for two population proportions.⁷ The score of $p_1=0.65$, and $p_2=0.45$ $\alpha=5$ $1-\beta=90$.

Data were collected using stratified random sampling at selected *Posyandu* and representing all sub-districts in Bukittinggi (AurBirugoTigoBaleh, GugukPanjang, and Mandiingin Koto Selayan). Data were collected by six dental students who had been trained before the research. Inter and Extra examiner calibration as well as Kappa index 0.8. The data collection was taken on Mei until August 2017 and completed under the supervision of the first author.

Data were collected through interviews using questionnaires with the mothers to investigate the patterns of breastfeeding and demographic characteristics. The questionnaire was initially tested for validation. The validity test for 30 samples was done with a score of product-moment 0.361 ($p=0.05$). The questionnaire was valid if the score was positive and bigger than 0.361. The reliability test for the questionnaire used Cronbach's Alpha.

Before the interview, the mothers signed informed consent as approval. ECC was obtained by examining the teeth using the deft index and categorized as mild ($0 \geq 2.6$), moderate ($2.6 \leq 4.4$), and severe (> 4.4).⁸ Significant Caries Index (SCI) is used by adding up all the highest one-third deft indexes, divided by one-third of the samples.⁹

The parents accompanied the children during the examination. Inspections were carried out under sufficient lighting. Due to the limited amount and sterilization of dental mouth glass, explorer, and excavator in the *Posyandu*, the instruments were used if needed. Before examining the oral cavity, children were asked to rinse their mouth with water. The teeth with debris were cleaned before the examination. One sample was examined by two dental students.

Faculty of Medicine, Andalas University, Padang, West Sumatera, gave an Ethical Clearance permit for this research. Data were analyzed using the Statistical Package for Social Science (SPSS) version 15. The result is significant if $p < 0.05$ (Significance level 95%). The prevalence of caries between the two groups was then tested using the chi-square test.

Results:

Samples of 141 children consisted of 59 boys and 82 girls, with age ranging from 24 months to 60 months old. Most children are 48 months old, with an average period of 43.7 months old. Out of the 141 samples examined, 96 children (68.1%) had caries with a deft index of 3.45 ± 3.31 SD with a 95% Confidence Interval for Mean 2.90 - 4.01 and Significant Caries Index 6.55. And out of the 101 children who had caries, only five children (3.4%) had taken restoration.

Children who received breastfeeding 0-6-month-olds had a lower deft index of 3.70 than children who did not receive breastfeeding 4.07. Children who get breastfeeding and complementary food until the age of 2 years had a lower deft index of 3.28 than children who did not 3.61. Children who stopped breastfeeding after two years old had a higher index of deft than children who stopped before two years old. (3.59 vs 3.02). The data are shown in Table 1.

Children with age ranging between 2 to 5 years with mild caries category were (70) 49.6%, the medium caries category were (18) 12.8%, severe category were (53) 37.6%. Children who get breastfeeding until six-month-olds have mostly mild caries index (52,8%). Children who were given breastfeeding and complimentary food until two years of age have mostly mild caries index of 50.7%. Children who received breast milk, formula milk, and complementary foods had higher severe caries index than those who get breastfeed and complimentary foods (39.2% vs. 35.8%) with $p = 0.913$. Children who stopped breastfeeding at two years old had a severe category of caries, higher than children who stopped than children who stopped before 2 years (41.6% vs 30.8%). Based on the WHO category, the deft index is categorized as mild, moderate, and severe, and the results of the statistical analysis can be seen in Table 2.

Discussion:

Results showed the number of 68.1% for caries prevalence for children aged 2-5 years, with 3.43 deft index and 6.55 SIC index. This result is higher than the deft index in Bukittinggi for 2-3 years old of 2.33.⁴ The result showed that only two teeth had been restored and ten teeth had experienced premature loss. Almost all caries teeth in primary teeth have not received treatment. Treatment of primary teeth gets less attention from parents. Primary teeth have the same function as permanent teeth and provide a place for permanent teeth to erupt.¹ Caries in primary teeth progress quickly, and it will cause to have a premature loss. Premature loss can decrease food intake, therefore, it can disrupt the physical and brain growth and speech function that may cause low self-confidence in children.¹¹ In recent times, dental health promotion programs for children under five years in Indonesia are not too popular.³

The results showed prevalence caries of this study were also higher than the caries prevalence in Indonesia for children aged 2-5 years, which is 48,4%.¹² These results are still far from the WHO target in 2010, in which 95% of children under the age of five are caries-free. The Indonesian government is currently pursuing more promotive and preventive programs for elementary school children; however, there are lack of promotive and preventive programs for toddler, even though primary teeth also have the same function as permanent teeth.⁸

The SIC index in this research is 6.55. It illustrated that the average defect index in one-third of children with high caries index. This high number will require higher treatment costs for the next period.⁹ The SIC index in this study was higher than the study in Gampaha Sri Lanka for pre-school children, which SIC index was 4.09 with caries prevalence 38% and deft index 1.41.¹³ WHO targets children under 12 years to have a SIC index under 3 in 2015.⁹ WHO recommends being focus on the attempt of decreasing the SIC index. This recommendation is to achieve the WHO goal, health for all.

Caries is a progressive demineralization process in the hard tissues of teeth by organic acids derived from food residues that contain sugar. Primary teeth are more susceptible to caries because the enamel structure of deciduous teeth is less dense and thinner than permanent teeth.¹⁴ Primary teeth have the same function as permanent teeth, but unfortunately get lack of attention from parents. Most children experienced caries without treatments. The American Academic Pediatricians recommend children's first visit to the dentist start from the age of one year old and routinely make a dentist visit at least twice a year.⁵ The oral hygiene

promotion program in Indonesian has not operated for pre-school children and patterns of breastfeeding can be a cause of high caries incidents.

The coverage of children who received breastfeed until six months old is 51.1%, with the deft index lower than children without breastfeeding. This result was smaller than the basic health research in 2013 (54.3%).¹² WHO recommends breastfeeding for six months and continue to breastfeed plus complementary foods until the age of 2 years. Exclusive breastfeeding means that children only consume breast milk without complementary foods, including water, except drugs and vitamins that needed until the age of 6 months.⁵In this study, the consumption of breastfeeding is categorized based on consumption time and not classified as exclusive. Most parents in the six months of children give ASI with additional water and some parents have not done breastfeed at all.

Breastfeeding contains lactoferrin, lysozyme, and secretory immunoglobulin A (Sig A), which provide a protective effect from the *Streptococcus mutans*. *Streptococcus mutans* is a bacteria that cause caries. Lactoferrin binds to bacterial iron, which causes bacteria cannot multiply, and lysozyme breaks down bacterial walls while immunoglobulin-A inhibits the early colonization of *Streptococcus*.¹⁵ Therefore, breastfeeding can inhibit the formation of caries in primary teeth.

Children who get breastfeeding and complementary foods from the age of 6 months to 24 months have a lower deft index than children who do not. The provision of breastfeeding will delay and reduce the provision of cariogenic foods and drinks. Many parents are too early to give formula milk or sweet beverages with high sugar content as a substitute for breastfeeding. The price of formula milk is also high, causing some parents to replace formula milk with a type of milk product with a very high sugar content but fewer nutrient levels.

The study's result showed that 36.8% of children didn't get breastfeeding for two years. WHO recommended breastfeeding until 6 months old and continued with breastfeeding and eating complimentary food. Some parents said that when the children started to consume the complimentary food, they stopped the breastfeeding due to a thought that solid food had completed the need of children. In the book of children and mother's health, noted that how to give foods to children including breastfeeding. The parent's level of education will take effect on the ability to accept information. Mothers with low education are difficult to obtain information about health and nutrition. The environment is very influential on health status.

Children under five years old are very dependent on the environment, especially to mothers, in determining their attitudes and behavior in maintaining dental and oral health. ¹⁷

The results showed no significant relationship between breastfeeding and breastfeeding with complementary foods from the age of six months to two years old with ECC. The results of this study are not in line with several breastfeeding studies affecting the occurrence of ECC. The duration of breastfeeding will affect ECC. AAPDC recommends breastfeeding for a year after birth. Breastfeeding is a non-cariogenic food that does not cause a pH decrease in the mouth. Breastfeeding will increase enamel remineralization because of calcium and phosphate content. Breastfeeding also contains protective ingredients that shield teeth from caries.

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Table :Original

Table 1. Prevalence of ECC (deft index)

| Variable | N (%) | Prevalence ECC | x deft | SD | CI |
|--------------------------------------------------------|------------|-------------------|--------|-------|-------------|
| 0-6 month | | | | | |
| Breastfeed | 72 (51,1%) | 48(66.7%) | 3,41 | 3,42 | 258-4,24 |
| Non-Breastfeed | 69 (48.9%) | 50 (69.4%) | 3.56 | 2.22 | 2.78-4.34 |
| 6–24 month | | | | | |
| Breastfeed+Complementary foods | 67 (47,5%) | 46 (68.6%) | 3.28 | 3.13 | 2,52-4.05 |
| Breastfeed and formula milk and complementary foods | 74 (52.5%) | 48 (66.9%) | 3.61 | 3.491 | 2.80-4.42 |
| Stop Breastfeeding | | | | | |
| 2 years old | 89 (63%) | 60(67.4%) | 3.59 | 3.41 | 2.88 – 4.29 |
| Before 2 years old | 52 (36.8%) | 34 (65%) | 3.02 | 3.20 | 2.09 -3,94 |

Table 2. Prevalence and ECC (WHO Category)

| variables | ECC (WHO Category) | | | | | | Total | p |
|-------------------------------------------------------|--------------------|------|--------|------|--------|------|-------|-------|
| | Mild | | Medium | | Severe | | | |
| | f | % | f | % | f | % | | |
| 0-6 month | | | | | | | | |
| Breastfeed | 38 | 52.8 | 8 | 11.1 | 26 | 36.1 | 72 | 0,708 |
| Not-breastfeed | 32 | 46.4 | 10 | 14.5 | 27 | 39.1 | 69 | |
| 6-24 month | | | | | | | | |
| Breastfeed and complementary food | 34 | 50,7 | 9 | 13.4 | 24 | 35.8 | 67 | 0,913 |
| Breastfeed and formula milk and complementary food | 36 | 48.6 | 9 | 12.2 | 29 | 39.2 | 74 | |
| Stop breastfeeding | | | | | | | | |
| 2 years old | 41 | 46.1 | 11 | 12.4 | 37 | 41.6 | 89 | 0.433 |
| Before 2 years old | 29 | 55.8 | 7 | 13.5 | 16 | 30.8 | 52 | |

p > 0,005