SUMMARY

THE INFLUENCE OF FOOD CARYOGENITY ON THE SEVERITY OF EARLY CHILDHOOD CARIES IN CHILDREN AGED 3 - 5 YEARS WITH UNDER NUTRITIONAL STATUS

(Study in Jeruksari Village, Tirto District, Pekalongan Regency)

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ABSTRACT

Children with poor nutritional status have inadequate tooth structure, so they are susceptible to caries. Caries in children under 71 months of age is known as Early Childhood Caries. ECC occurs due to frequent consumption of foods with high level of carigenicity. The aim of this study was to analyze the effect of food cariogenicity levels on the severity of ECC in children aged 3-5 years with malnutrition status.

This type of research in analytical observational with a cross sectional approach design. The research subjects were 42 malnourished children aged 3-5 years. Nutritional status was calculated using the WHO Growth Chart based on gender. Food carigenicity was obtained from a questionnaire using the food cariogenicity score according to Papas and wa categorized as mild,moderate,high. The severity of caries according to Shimono. Determining the caries severity category uses the mean value and standard deviation.Research data was tested using the Chi Square Test.

Resulted showed that :1) No high levels of food cariogenicity were found,
2) A moderate level of food cariogenicity indicates a higher level of ECC severity of 8 (66,7%), 3) A low level of food cariogenicity indicates an ECC severity level of 16 (53,3%). The results of the Chi Square Test found a significant difference between caries severity levels based on cariogenicity levels, p=0.013. Conclusion: The cariogenicity of foods with a high score was not found but higher cariogenicity of foods further increased the severity of ECC.

Keyword:malnourished children aged 3-5 years,level of food cariogenicity, severity of EC

INTRODUCTION

Nutritional status is an important indicator of quality Human Resources (HR) development. Nutritional status is a description of what a person consumes over a long period of time. The availability of nutrients in a toddler's body determines whether the nutritional status is deficient, optimal or more. The consequences of malnutrition can hinder the growth and development of toddlers [(1)].

Children under five are an age group that is vulnerable to malnutrition because children depend on their parents and food choices cause children to become malnourished. Balanced nutrition is food consumed daily that contains nutrients in the type and amount according to the body's needs to prevent nutritional problems. Children aged 3-5 years also know snacks. They tend to buy snacks they like without paying attention to their safety. Children's food consumption habits start from education in the family and are supported by the education they receive at school [(2)].

Caries in children, known as Early Childhood Caries (ECC), is the presence of one or more caries or the presence of filled teeth in the deciduous teeth of children aged less than 71 months. ECC occurs due to frequent consumption of foods with high levels of cariogenicity. Foods that contain carbohydrates are foods with a high level of cariogenicity. Foods with a high level of cariogenicity contain carbohydrates in solid and sticky physical form and carbohydrates in liquid physical form [(3)].

Nutritional intake is a factor that is directly related to oral health. The consequences of malnutrition affect the growth and development of tooth structure. Due to inadequate tooth structure, children are susceptible to ECC. Deciduous teeth are also more susceptible to caries because deciduous tooth enamel is thinner than permanent tooth enamel which is denser and contains more minerals [(4)].

The research was conducted in Jeruksari Village, Tirto District, Pekalongan Regency. The aim of this study was to analyze the effect of food cariogenicity on the severity of ECC in children aged 3-5 years with malnutrition status in Jeruksari Village, Tirto District, Pekalongan Regency.

RESEARCH METHOD

This type of research is analytical observation research with a cross sectional design. The research subjects were all children with poor nutritional status aged 3-5 years who had KMS books and had lived since birth in Jeruksari Village, Tirto District, Pekalongan Regency. The number of malnourished children is 42. The data analyzed were food cariogenicity and ECC severity. The statistical test used is the Chi Square Test.

The assessment of malnourished children is determined using the WHO Growth Chart for children aged <5 years according to gender. Food cariogenicity was calculated using the food cariogenicity score according to Papas et al [5]. Cariogenicity levels are divided into categories: high, medium, low. The food consumption survey uses daily food recording (diary record). The severity of caries was measured according to Shimono [6] and divided into categories: high, medium, low obtained from the mean value and standard deviation.

RESEARCH RESULT

Research has been conducted on the influence of food cariogenicity on the severity of ECC in children aged 3-5 years with poor nutritional status in Jeruksari Village, Tirto District, Pekalongan Regency. The number of children aged 3-5 years with poor nutritional status was 42 children. Data on the subject's family characteristics was obtained through interviews with the subject's parents. Data on family characteristics of research subjects are presented in Table 1.

Table 1 Family characteristics of research subjects

Variabel			amount	Percentage (%)
Age	Mother	average : 32,7 y Rentang usia : 23-47yh		
	Father	average : 37 y Rentang usia: 26-50y		
Education	Mother	SD	28	66,7 %
		SMP	10	23,8 %
		SMA	2	4,8 %
		SMK	1	2,4 %
		dll	1	2,4%
	Father	SD	27	64,3 %
		SMP	11	26,2 %
		SMA	1	2,4 %
		D3	1	2,4 %
		dll	2	4,7%
Income/mounth	Tidak tentu		13	31,0%
	Rp.1.000.0000		5	11,9%
	Rp. 1.500.000 – Rp. 3.000.000		14	33,3%
	And other		10	23,8%
Home status	hitchhiking		21	50,0%
	Private		18	42,9%
	And other		3	7,1%
number of family heads per household	2 KK		20	51,3%
	1 KK		13	33,3%
	3 KK		3	7,1%
	3>KK		6	14,2%
Work	Buruh		34	81,0%
Number of people in one house	4		4	9,5%
	5		11	28,2%
	6		9	21,4%
	7		6	14,3%
	8		4	9,5%
	>8		12	17,1%

Data on the characteristics of research subjects are presented in Table 2

Table 2. Characteristics of research subjects

Variabel		amount	Percentage
Prefer main meal		9	23,1%
Prefer snack		30	76,9%
No answer		2	4,9%
Brushing teeth	Never	4	9,8%
	Once a day	2	4,9%
	Twice a day	35	85,4%
	No answer	1	2,38%
Was treated in hospital	Once	11	26,2%
	Never	31	73,8%
Drink sweets through bottles	Once	32	76,2%
	Never	10	23,8%

Determination of ECC severity categories using the Shimono method (6). Based on the research results, the mean and standard deviation of the ECC severity level were 42.83 + 6,495, so the ECC severity categories obtained for the research subjects were as follows (Table 3).

Table 3. ECC severity categories of research subjects

Category ECC Severity Level	n	Score range
High	14	>49,32
Medium	10	36,33 – 49,32
Low	18	< 36,33

Food cariogenicity was calculated using the food cariogenicity score according to Papas et al (5). Food cariogenicity levels are divided into: high, medium, low.The frequency distribution of food cariogenicity is presented in Table 4.

Table 4. Distribution of food cariogenicity among research subjects

Kariogenitas makanan	n	Percentage (%)
Low (skor range 1-3)	30	71,4%
Medium (skor range 3,1-5)	12	28,6%
High (skor range >5)	0	0,0%

The frequency distribution of the severity of ECC in research subjects based on food cariogenicity is presented in Table 5.

Table 5. Frequency distribution of ECC severity levels in research subjects based on food cariogenicity along with the probability value of the Chi Square Test

Food Cariogenicity Level	Food Cariogenicity Level			Total	p
	Low n (%)	Medium n (%)	High n (%)		
Low	16 (53.3%)	8 (26.7%)	6 (20.0%)	30 (100%)	0.013*
Medium	2 (16.7%)	2 (16.7%)	8 (66.7%)	12 (100%)	

Table 5 shows that there were no subjects with high food cariogenicity and subjects with moderate food cariogenicity showed a higher level of ECC severity. The results of the Chi Square Test found a significant difference in the severity of ECC based on food cariogenicity (p=0.013).

RESEARCH DISCUSSION

This study aims to examine the effect of food cariogenicity on the severity of ECC in malnourished children aged 3-5 years in Jeruksari Village, Tirto District, Pekalongan Regency. The subjects studied were 42 children with poor nutritional status. Malnutrition in malnourished children causes the production and quality of saliva to decrease, thus affecting the ability of the oral cavity to protect the teeth. Inadequate tooth structure due to insufficient nutritional intake also affects the development of ECC. The severity of ECC affects nutritional intake in children and leads to future health [(7)].

Jeruksari Village is on the north coast of Central Java. The results of the characteristic data show that the status of houses is still occupied by 50%. Each house consists of 2 families (51.3%). The number of residents is 5 people (28.2%) in each house. This situation is because parts of the northern region have been flooded so they live with their parents or other families who are not affected by the flood. Most of the children with malnutrition, 76.9%, prefer snacks to main meals.

The results of the study showed that there were no subjects with high food cariogenicity, possibly because the design of this study was cross sectional so that past food history was not recorded. Subjects with moderate food cariogenicity showed a high level of ECC severity as many as 8 children (66.7%). These results can be caused by the behavior of children who like to consume snacks. Foods with moderate cariogenicity include foods in the form of non-sticky solids, sticky semi-solids and liquids (biscuits, donuts, crackers, Oreos, sweet iced tea). The shape and consistency of food affects the attachment of food in the mouth. These results indicate that the higher the child's consumption of cariogenic foods, the higher the severity of ECC. Higher levels of food cariogenicity risk increasing the severity of ECC. One of the etiologies of caries is substrate. Substrate is food waste in the mouth that contains carbohydrates which are fermented by bacteria to obtain energy. Carbohydrates are highly cariogenic substances. The sugar contained in carbohydrates is very effective in causing caries and will reduce the pH of saliva so that demineralization occurs. Chewed foods that are high in fiber can stimulate saliva and have a low potential for food adhesion [(10)].

The results of the research at low levels of food cariogenicity also included 6 children (20%) experiencing high ECC severity. This is likely because the child drinks bottle milk while sleeping. According to the American Academy of Pediatric Dentistry 1996, breastfeeding at night for a long period of time can also cause widespread tooth decay. Prolonged duration of bottle feeding and breast milk until the child falls asleep is related to the risk of ECC. The habit of drinking bottle milk or breast milk until you fall asleep causes fluid to pool in the cervical part of the upper anterior teeth (9). The habit of maintaining dental hygiene by brushing teeth shows that 85.4% of children brush their teeth twice a day but only when bathing. Brushing and cleaning the mouth is very important to avoid reducing saliva pH. A decrease in salivary pH causes the oral cavity environment to become acidic and causes demineralization of the tooth structure [(10)].

Formula milk is given as a substitute for breast milk. This can be caused by, among other things, breast milk not flowing smoothly and busy working mothers. Added sugar to formula milk can also increase the potential for ECC to occur. Sweet liquids that stick to teeth promote the growth of microorganisms due to the sucrose content. The lactose content in milk can cause enamel demineralization [(11)].

Socioeconomic status factors, low parental education have a significant influence on ECC [(12)]. The social status of the people of Jeruksari Village is relatively low. Most work as laborers (81%). Of the parents of children with malnutrition, 66.7% of mothers were elementary school graduates, as were 64.3% of fathers who were elementary school graduates. The average age of the mother is 32 years and the father is 37 years with an uncertain monthly income (31%). Families with low socioeconomic status tend to choose foods with low nutrition and look for cheaper energy sources with low diet quality [(13)]. Children with low economic status have a two times higher risk of dental caries. Circumstances the demographics of the research location which was affected by tidal floods, made children accustomed to eating instant food which felt more filling because of the large amount of noodles and instant food when the rainy season started. Parents' knowledge and ability to provide food with low cariogenicity is somewhat difficult. Parents provide more practical and instant food because both parents work.

CONCLUSIONS

Based on the results of research regarding the effect of food cariogenicity on levels severity of ECC in children with poor nutritional status aged 3-5 years in Jeruksari Village, District Pekalongan :

The cariogenicity of food with a high score was not obtained but the level of cariogenicity was higher dietary intake, further increases the severity of ECC.

BIBLIOGRAPHY

1. Unicef, 2019. *The* state *of the world's children 2019: children, food and nutrition: growing well in a changing world*.
2. Kemenkes (2018). Buletin Stunting Kementrian Kesehatan Republik Indonesia
3. Papas, A. S., Palmer, C. A., Rounds, M. C., Herman, J. O. A. B., McGANDY, R. B., Hartz, S. C., ... & DePaola, P. A. U. L. (1989). Longitudinal relationships between nutrition and oral health. *Ann NY Acad Sci*, *561*(1), 124-142.
4. Marshall, T. A., Levy, S. M., Broffitt, B., Warren, J. J., Eichenberger-Gilmore, J. M., Burns, T. L., & Stumbo, P. J. (2003). Dental caries and beverage consumption in young children. *Pediatrics*, *112*(3), e184-e191.
5. Papas, A. S., Palmer, C. A., Rounds, M. C., Herman, J. O. A. B., McGANDY, R. B., Hartz, S. C., ... & DePaola, P. A. U. L. (1989). Longitudinal relationships between nutrition and oral health. *Ann NY Acad Sci*, *561*(1), 124-142.
6. Oyuntsetseg, B., Okazaki, Y., Hori, M., Rodis, O. M., Matsumura, S., & Shimono, T. (2004). Caries activity test in Mongolian and Japanese children. *Pediatric Dental Journal*, *14*(1), 61-67.
7. American Academy of Pediatric Dentistry.Policy on Early Childhood Caries (ECC):classifications,consequences and preventive strategies Pediatr.Dent.2014:36(6)-50
8. Ramayanti, S., & Purnakarya, I. (2013). Peran makanan terhadap kejadian karies gigi. *Jurnal Kesehatan Masyarakat Andalas*, *7*(2), 89-93.
9. Donna Trim, B. S. N., & Clavia Tendoh, B. S. N. (2009). The Effect of Providing a Physical/Nutrition and Oral Health Education Program for School-Aged Children/Adolescents in an After-School Setting. *learning*, 141.
10. Olczak-Kowalczyk, D., Gozdowski, D., & Turska-Szybka, A. (2021). Protective Factors for Early Childhood Caries in 3-Year-Old Children in Poland. *Frontiers in Pediatrics*, *9*(March), 1–10. https://doi.org/10.3389/fped.2021.583660
11. Kubota Y,Nhep,Pech S,Durward C,Ogawa H.Association between early childhood caries and maternal factors among 18 to 36 month old children in a rural area of Cambodia. Oral Health Prev Dent, 2020;18(1):973-80
12. Anil, S., & Anand, P. S. (2017). Early childhood caries: Prevalence, risk factors, and prevention. *Frontiers in Pediatrics*, *5*(July), 1–7. https://doi.org/10.3389/fped.2017.00157
13. Pechey R dan Monsivais P,2016,Sosioeconomic Inequqlities in The Healthines of Food Expenditures,Prev Med,Elsivier,88:203-209.