THE EFFECTS OF INSTANT MILK DRINKING METHODS ON CARIES AMONG PRESCHOOLERS

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ABSTRACT

Dental caries or cavity in Indonesia is experienced by approximately 85% of under-five children, and one reason is the habit of drinking milk with a bottle by preschoolers. If it is not addressed properly, it will degrade the quality of child growth and development. This study was conducted to determine the effect of instant milk drinking methods to figure out caries among preschoolers. The study was observational with a cross sectional design. The population was children aged 3-5 years in RA Choirul Fikri, Ngemplak, Sleman, Yogyakarta. The sampling technique was saturated sampling with a sample of 35 children. The independent variable is instant milk drinking method, while the dependent variable was dental caries. Results showed that more children consumed milk formula using a bottle more than glass (51.4%). Ten children (28.6%) who used a bottle turned out to have caries in more than their 5 teeth, in comparison with 9 children (25.7%) who used glass with a number of caries in less than 3 teeth. Spearman Rho test showed there was an effect in instant milk drinking using either bottles or glass against child caries ($p = 0.028$ and $p = 0.034$, respectively). In conclusion, instant milk drinking using bottles was more influential in increasing child caries than using glass.

Keywords: instant milk drinking, caries, preschoolers

INTRODUCTION

Oral health is part of general health aspects that are important to children; it also affects the quality of life of children.[1] Preschoolers are one group that is susceptible to caries, because at this age children still have a poor diet, have the low level of knowledge of dental health, and are still dependent on their parents in maintaining healthy teeth and mouth.

Caries is the dental hard tissue disease characterized by inorganic substance demineralization and organic substance destruction. The prevalence of caries among preschoolers is still high, due to, among others, lack of attention and care of milk teeth (deciduous teeth or primary teeth). Many parents assume that the

milk teeth do not need to be treated because they will be replaced by permanent teeth. The functions of milk teeth are not only to chew food as the initial process of food digestion, help to speak, or beautify the face, but also to act as guides for the permanent teeth that lie below.[2]

Nutritious food is one of the main needs in every process of human life in order to grow and develop, including teeth formation. It begins from the fetal age of 6-8 months in the womb to all of the child's teeth growing completely where the growth requires calcium, phosphorus, protein, fat, minerals and vitamins in sufficient quantities. One food source that can supply all of these nutrients is milk formula. The more varied daily menu received by preschoolers will lead to the more fulfilled adequacy of all the nutrients the children need.[3]

Instant milk is made from cow's milk or artificial milk in which its composition is modified so that it can be used as a substitute for breast milk. The number of calories, vitamins, and minerals in milk formula should be appropriate to increase endurance and optimal development of children. The use of multiple brands of age-appropriate infant formula is allowed as long as does not cause gastrointestinal disorders in children.[4,5]

Dental caries or cavity has early signs of the appearance of white spots like chalk on the surface of the tooth which will then be turned into chocolate. Dental caries is a disease of dental hard tissue due to bacterial activity resulting in a softening of hard tissue of teeth followed by the formation of cavity. Many preschoolers still consume milk formula using a bottle. The drinking habits can lead to child caries called Nursing Bottle Caries, Nursing Bottle Mouth, Baby Bottle Caries, and Early Childhood Caries (ECC). [6,7]

The causes of tooth decay in toddlers can happen because of the habit of drinking milk formula in the bottle or a sweet drink when they fall asleep for a few hours and sometimes all night. The bacteria that play a role in the occurrence of caries are *Streptococcus mutants*, *Streptococcus sanguis* and some *Lactobacillus* species, and, especially for caries for deciduous teeth, *Streptococcus mutants* are very instrumental. [8]

The prevalence of dental caries among children aged 3-5 years is 1.3 times higher in children who have the habit of drinking milk with a bottle in a bedtime than those who are not used to drinking milk without a bottle. Frequency of bottle-feeding two or more times per day also increases the risk of child caries 2.27 times higher. The role of parents is quite large in preventing caries in children.[6,8] The results of a preliminary study on children in Raudatul Athfal (RA) Choirul Fikri, Ngemplak, Sleman, Yogyakarta showed that all children consumed milk formula, and the examination of the teeth and mouth found that more than 20 children suffered from dental caries.

METHODS

This was an observational study with a cross sectional study design.[9] The study population was children in RA Choirul Fikri in Ngemplak Sub-District, Sleman, Yogyakarta. The inclusion criterion was children aged 3-5 years with a habit of drinking milk formula. The sampling technique was saturated sampling, with a sample size of 35 children. The independent variable was instant milk drinking method and the dependent variable was dental caries.

The methods of instant milk drinking was divided to two, i.e., by glass and bottle. Instant milk drinking using a glass was categorized into little (<2 glasses per day), moderate (2-3 glasses per day), and much (> 3 glasses per day), whereas with a bottle it was categorized into little (<2 bottles per day), moderate (2-3 bottles per day), and much (> 3 bottles per day). Caries test results were based on a number of caries grouped into the criteria of few (<3 teeth), moderate (3-5 teeth), and many (> 5 teeth).

The research instrument was a dental diagnostic tool (sonde, excavators, mouth mirror, and tweezers), frequency recording form, the methods of instant milk drinking, and child dental examination card. The data analysis technique used Spearman Rank test to determine the effect of the methods of instant milk drinking to figure child caries. This study had received a letter worthy of ethics from Health Research Ethics Committee of Health Polytechnic of Yogyakarta No. LB.01.01/KE/XXIII/343/2015.

RESULTS AND DISCUSSION

The respondents in this study consisted of 35 children and the majority of respondents aged 5 years (15 children). Of the respondents, four were boys (11.4%) and 11 were girls (31.4%). Table 1 shows that 18 children used bottle-feeding and 10 children (28.6%) had a drinking frequency of more than 3 bottles per day. In contrast, of 17 children with glass-feeding, only 3 children (8.6%) had a drinking frequency of more than 3 glasses per day.

Deciduous teeth are more susceptible to caries than permanent teeth because deciduous teeth enamel contains more organic matter and water and less amount of mineral than permanent teeth. Habits of bottle-feeding among children to sleep can increase the risk of caries, because the ingested fluid will be inundated in the mouth around the surface of the teeth and demineralization can occur, and a decrease in the rate of saliva when the child is asleep will exacerbate the cleanliness of child's mouth. [3,6]

Table 1. Respondent Criteria by the Methods of Instant Milk Drinking

Method	Frequency	Children (n)	Percentage (%)
Bottle	Little	10	28.6
	Moderate	2	5.7
	Much	6	17.1
Glass	Little	3	8.6
	Moderate	5	14.3
	Much	9	25.7
Total		35	100

Drinking milk using a bottle can cause increasingly severe dental caries in children, when the time to drink milk is especially at night. It is because the production of saliva is automatically reduced. Reduced saliva in the mouth can be a means for germs to grow and change milk to acid. It is this acid that would be the beginning of the formation of dental caries. [8,9]

Table 2. Cross-tabulation between Instant Milk Drinking Methods and Rate of Caries

Method	Caries Criteria						Total	
	Many		Moderate		Few			
	n	%	n	%	n	%	n	%
Bottle	10	28.6	2	5.7	6	17.1	18	51.4
Glass	3	8.6	5	14.3	9	25.7	17	48.6
Total	13	37.2	7	20.0	15	42.8	35	100.0

Infants and young children accustomed to drinking instant milk/sweet liquid in a bottle while sleeping are more likely to suck the bottle faster than the rate of ingestion, so often the milk in the mouth is collected too long.

Frequency of drinking milk with a bottle twice or more per day also increases the risk of caries 2.27 times higher compared not with the bottle. Early instant milk drinking will result in increased rates of child caries severity. Growth in the number of bacterial colonies of Streptococcus mutans in toddlers' plaque who drink instant milk is more than breast-fed infants.[8]

Saliva is the major defense system of the host against caries. Saliva serves to clean food debris and bacteria from the teeth and to provide a buffer against acid production. Individuals with decreased salivary flow will have an increased tooth susceptibility to caries. One of the disadvantages in consuming instant milk , especially if the child is a toddler and instant milk drinking has been performed more than 1 year, is the possibility of nursing bottle caries. Extending the time of instant milk drinking that exceeds the transition of feeding liquid to solid food would cause early caries.[9]

Table 3. Test result of *Spearman Rho*

	Bottle	Glass	Rate of Caries
Correlation coefficient	1.000	-.155	-.157
Sig. (2-tailed)	.	.551	.034
N	18	17	18
Correlation coefficient	-.155	1.000	-.044
Sig. (2-tailed)	.551	.	.028
N	17	17	17
Correlation coefficient	-.157	-.044	1.000
Sig. (2-tailed)	.034	.028	.

Spearman Rho test results showed there was an effect of instant milk drinking method using a bottle ($p = 0.028$) and glass ($p = 0.034$) against the number of caries (Table 3). The habit of drinking instant milk using a bottle can cause caries in children, especially at bedtime, because the milk will be leaving a deposition and attachment of carbohydrate on the surface of the tooth. [9,10]

The frequency of bottle feeding in children also affects the incidence of caries. Carbohydrate eaten bit by bit but repeatedly has the potential cariogenicity greater than eaten at once. Sucrose is a type of carbohydrate in milk that can provide sweetness and energy source for the body. Excessive amounts and long-term consumption of sucrose causes dental caries because sucrose in milk flooded in the mouth throughout the night will undergo hydrolysis process by plaque bacteria into acid. [4,9,11]

If feeding (breast milk or bottle) is done too often at night without cleaning the oral cavity, the risk of child caries will be higher. Some reports indicate that parents' behavior towards the ability to understand how to maintain oral hygiene of children has a positive correlation with the frequency of maintaining oral hygiene and oral health status of preschoolers.[2,3]

Another study states that only 68% of respondents were aware of the concept of oral health in children, 50% knew the signs of dental caries children, and only 4% were aware of the application of fluorine.[12] Programs of oral health

promotion are effectively done as a preventive effort to improve the oral health status of children of preschool age.[13]

CONCLUSION

Instant milk drinking methods effect on the rate of child caries. The use of the bottle when instant milk drinking may increase the rate of caries compared to glass.

RECOMMENDATION

Some suggestions parents can do to reduce the risk of caries due to instant milk drinking are that instant milk drinking is not done for a long time and is not extended, children should not be allowed to sleep with a bottle filled with sweet liquids except water, and mothers should clean their child's teeth after drinking milk.

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