

Original research article:

Effect of feeding practices on dental caries among 3 to 5 years old children: An observational study

**¹Dr. Apexa Yadav , ²Dr. Poonacha K S , ³Dr. Anshula Deshpande , ⁴Dr. Bhavna Dave ,
⁵Dr. Vaibhavee Shah , ⁶Dr. Kinjal Patel**

¹Post Graduate Resident, Pediatric and Preventive Dentistry , Department of Pediatric and Preventive Dentistry, K. M Shah Dental College & Hosital, Sumandeep Vidyapeeth University, At. & Po. Piparia, Ta.Waghodia. Dist. Vadodara – 391760

²Professor, Pediatric and Preventive Dentistry , Department of Pediatric and Preventive Dentistry, K. M Shah Dental College & Hosital, Sumandeep Vidyapeeth University, At. & Po. Piparia, Ta.Waghodia. Dist. Vadodara – 391760

³Professor, Pediatric and Preventive Dentistry , Department of Pediatric and Preventive Dentistry, K. M Shah Dental College & Hosital, Sumandeep Vidyapeeth University, At. & Po. Piparia, Ta.Waghodia. Dist. Vadodara – 391760

⁴Dean, Head & Professor, Pediatric and Preventive Dentistry , Department of Pediatric and Preventive Dentistry, K. M Shah Dental College & Hosital, Sumandeep Vidyapeeth University, At. & Po. Piparia, Ta.Waghodia. Dist. Vadodara – 391760

⁵Post Graduate Resident, Pediatric and Preventive Dentistry , Department of Pediatric and Preventive Dentistry, K. M Shah Dental College & Hosital, Sumandeep Vidyapeeth University, At. & Po. Piparia, Ta.Waghodia. Dist. Vadodara – 391760

⁶Post Graduate Resident, Pediatric and Preventive Dentistry , Department of Pediatric and Preventive Dentistry, K. M Shah Dental College & Hosital, Sumandeep Vidyapeeth University, At. & Po. Piparia, Ta.Waghodia. Dist. Vadodara – 391760

Corresponding author: Dr. Apexa Yadav



ABSTRACT

BACKGROUND: Human milk is identified as the ideal nutrient for infants, and breast-feeding is recommended to be continued at least for the first year of life. Several studies have reported prolonged & unrestricted breast-feeding as well as bottle feeding as a potential risk factor for primary tooth caries. It is necessary to diagnose and treat Early childhood caries in its initial stage or else it has the potential to destroy the teeth rapidly particularly in primary dentition leading to pain, acute infections, feeding difficulties and speech issues. Early childhood caries could also be a predictor of tooth decay in permanent dentition.

AIM: To assess the association between infant feeding practices and caries experience of primary teeth in 3 to 5 years old children.

METHOD: A descriptive cross sectional study was conducted at Department of Paedodontics and Preventive Dentistry, K. M. Shah Dental College & Hospital and Department of Pediatrics, Dhiraj General Hospital, Sumandeep Vidyapeeth, Vadodara. One Hundred and Seventy Eight children between 3 to 5 years, visiting the departments were randomly selected for the study. Questions regarding feeding habits like type, duration and night feeding were asked to parents after which the teeth of children were examined for Early Childhood Caries.

RESULT: out of 178 children examined the mean value of caries i.e. deft score seen in Bottle (Bovine milk) fed children was 3.02; in children fed by both both [breast + bottle(bovine milk)] was 3.70; in children who were breast fed during night

the value was 1.76; in children fed with sweetened bovine milk at night the score was 5.05; in children who were fed with Non Sweetened bovine milk at night, the mean score was 3.08. The correlation between deft score and bottle feeding (p value 0.029), both (breast & bottle) feeding (p value 0.038), sweetened bovine milk and non sweetened night bottle feeding (<0.001) were found to be significant.

CONCLUSION: Within the limitation (small sample size and few parameters) of this study it could be concluded that prolonged and unrestricted breast feeding may result in increased deft score, very significant correlation was found particularly between sweetened bottle feeding and deft score, It could very well be observed from the results that overnight feeding with any type of milk causes deleterious effect on teeth.

INTRODUCTION

Human milk provides all the basic constituents for the overall growth of the body, including the macronutrients and developmental factors. It acts as a safeguard, decreases septicity via immunoglobins and anti-infection proteins, therefore it is recommended as the only source of nutrition for all the babies during initial 6 months of life with continued breastfeeding up to 1 year ^[1,2].yet, there are some drawbacks of breastfeeding. As per the reports, perpetuated feeding via breast is one of the predictors of caries in primary teeth ^[3-6]. There is also a study on animals disclosed that bovine milk is less cariogenic compared to human milk ^[7]. Early childhood caries (ECC) is widespread and prevalent but the public health programme in India seems to be shirked. As per the analysis, the occurrence of ECC in pre-schoolers is about 27.5% in India, because of its dearth of awareness among the parents regarding the prevention and treatment of dental caries ^[8].

The American Academy of Paediatric Dentistry defines ECC as ‘the presence of caries in one or more primary teeth (cavitated or non-cavitated) in a child 71 months of age or younger’ ^[9]. ECC is an alert sign of caries in permanent dentition, so it needs to be prevented in the early stage because its rapid spread will result in destroying the primary dentition along with pain, feeding difficulties, speech problems and acute infections ^[10-11]. It is well recognised that ECC has a multifactorial etiology and is commonly associated with inappropriate diet and poor oral hygiene maintenance. In the existence of carbohydrates specially the fermentable carbohydrates & acid producing micropathogens dissolution of the tooth structure takes place ^[12,13]. Breastfeeding provides the nourishment for the infants but prolonged contact of tooth structure with human milk particularly at night when salivary flow is less results in acidogenic environment which leads to enamel demineralization & ECC. Long-time nocturnal breastfeeding is associated with an increased risk of ECC due to demineralization of tooth during night because of insufficient protection that is caused by decreased nocturnal salivary flow ^[14,15].

It is also found that, mother to baby transmission of Mutants Streptococcus (vertical transmission) is a key factor causing ECC. There are also few studies which state that ECC is independent to type and duration of feeding practices ^[16-19].

The aim of this study was to evaluate the relationship between different types of infant feeding practises and caries activity in primary teeth of 3- 5 years old children. In the present study the correlation between dental caries and following groups were checked. The groups were breast fed group; bottle fed group; both (breast & bottle) fed group; breast fed at night group; sweetened non sweetened bottle fed at night group.

MATERIALS AND METHODS

Study was a retrospective, cross Sectional, observational study, conducted at Department of Pediatric and Preventive Dentistry, K. M. Shah Dental College and Hospital and Department of Pediatrics, Dhiraj General Hospital, Sumandeep Vidyapeeth, Piparia, Vadodara.

Children between 3 to 5 years of Chronological age who came from non-fluoride belts, the first born child of the parents, children who brushed his/her teeth one time in a day, whose mother did not have any past and present caries experience were included in this study. Children in whom the permanent tooth has erupted and suffering from any congenital disorders or syndrome were excluded from the study.

A meticulous intraoral clinical examination was done by the principal investigator in presence of sufficient natural light using mouth mirror, probe and tweezer. Excess saliva was removed with cotton rolls from individual sites when visibility was obscured. All the criteria mentioned in objectives was assessed and the data was entered in specially designed format by principal investigator. The parents of the children examined was asked regarding the feeding habits including type, duration and frequency of feeding habits. Caries in primary teeth was evaluated and scoring was done using deft index given by Grubbel A.O in 1944^[20]. All the findings were recorded in predesign proforma.

RESULT

Statistical analysis was done using Independent sample t test. The data analysis was done using IBM SPSS 20 statistical software for windows.

178 children were included (122 boys, 56 girls) in the study for complete intraoral examination. 71(39%) children were reported with exclusive breast feeding in initial six months and 107(61%) children continued breast feeding up to 24 months.

Out of 178 children, 133 children had history of bottle-feeding and 73 children had both (breast & bottle) feeding at some stage. Overnight feeding was reported in 117 children. Out of them 38 children had breast milk, 38 children had bottle feeding without added sugar and 41 children had sweetened bottle feeding. From these 59 children were 3 years old, 66 children were 4 years old and 53 children were 5 years old. 65.73% caries prevalence was found in present study.

Caries was present in 37 (62.27%) children of 3 years age, 47 (71.21%) children of 4 years age and 33 (62.26%) children of 5 years age. (Table I) Carious lesions were observed more in boys (n=81, 66.39%) compared to girls (n=36, 64.28%). (Table II)

178 children were screened for dental caries experience. The association observed between different feeding practices and dental caries is depicted in Table III.

The mean deft score among children exclusively breast fed up to six months was 1.76 compared with 3.45 among children fed more than 6 months. The difference between deft and exclusively breast fed up to six months was statistically significant ($p < 0.001$).

From 178 children, 133 children had bottle (Bovine milk) feeding. From which 96 children (72.18%) had active carious lesions whereas 37 children were caries free. The correlation between the bottle feeding duration & deft Score showed a significant correlation with a p value of < 0.001 .

Children who had both (breast & bottle) feeding had a caries prevalence of 73.97%. The correlation between the both feeding (breast & bottle) & deft Score showed a significant correlation with a p value of < 0.001 .

Children fed overnight with any type of milk had a caries prevalence of 74.53%, whereas prevalence among children not fed overnight was 26.06%.

Children fed overnight only with breast milk had a caries prevalence of 71.05% & significantly higher mean deft score (1.76) compared to children who were not fed overnight with breast milk with caries prevalence of 28.94%. (OR=0.982, 95% CI 0.44 2)

A parallel pattern was evident with overnight bottle feeding with added sugar, where caries prevalence was 87.80% (OR=3.6, 95% CI 1.33-9.89), and a higher mean deft score 5.05. The correlation between Sweetened Bottle feeding at night & deft Score showed significant correlation with a p value of <0.001.

Children fed overnight with bottle milk without adding sugar had a caries prevalence of 89.47%, compared with children not fed overnight (OR=1.43, 95% CI 1.4-12.82) and had significantly higher mean deft score (3.08). The correlation between the nonsweetened Bottle feeding at night & deft Score showed a poor positive correlation, and was not significant with a p value of 0.094.

Table I. Prevalence of dental caries according to the age of children

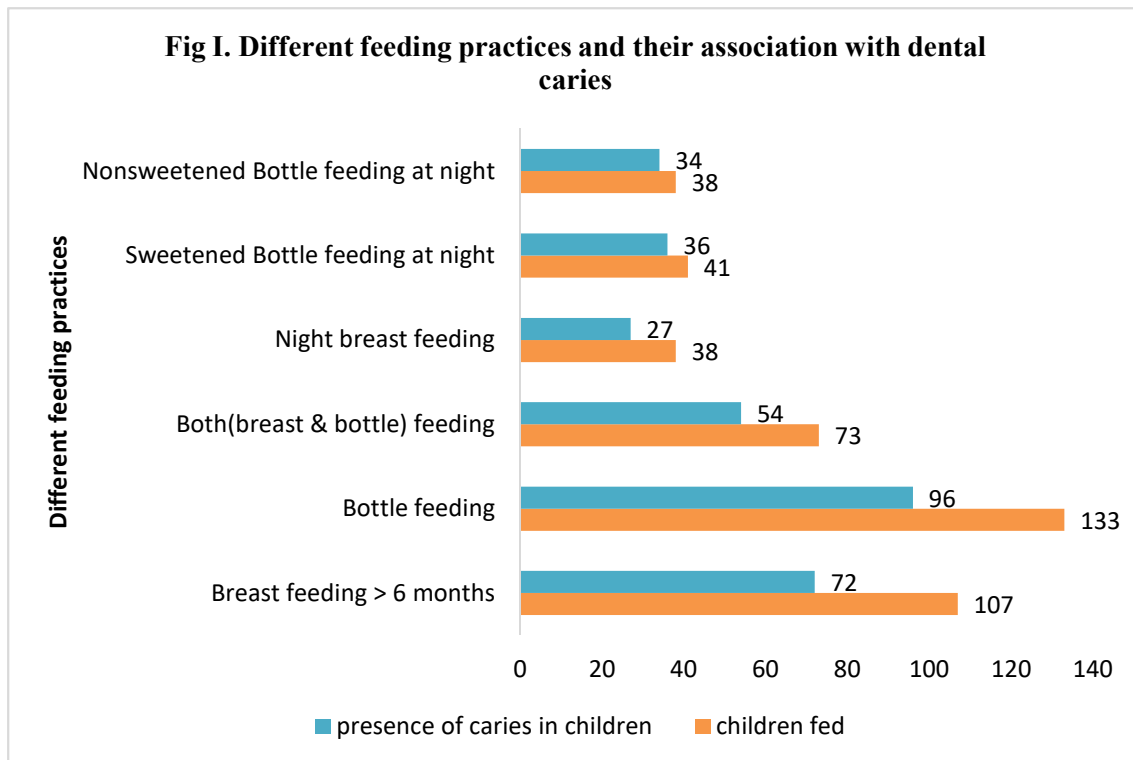
Age	N	Caries present (N)	Caries present (%)
3 years	59	37	62.27
4 years	66	47	71.21
5 years	53	33	62.26

Table II. Prevalence of dental caries according gender

	Total	Caries present (N)	Caries present (%)
Boys	122	81	66.39
Girls	57	36	64.28

Table III. caries status in different feeding practices

Feeding practices	N	Caries present	Caries absent	Mean	Std deviation	P value
Breast feeding > 6 months	107	72(67.28%)	35	3.45	3.415	<0.001
Bottle feeding	133	96(72.18%)	37	3.02	4.213	<0.001
Both(breast & bottle) feeding	73	54(73.97%)	19	3.70	2.54	<0.001
Night breast feeding	38	27(71.05%)	11	1.76	3.309	<0.319
Sweetened Bottle feeding at night	41	36(87.80%)	05	5.05	3.822	<0.001
Non-sweetened Bottle feeding at night	38	34(89.47)	04	3.08	3.099	0.094



DISCUSSION

An increase in the prevalence of dental caries has been observed, attributing to a change in lifestyle, increased consumption of sugary foods, carbonated drinks and lack of awareness towards proper oral hygiene maintenance. It has been found that caries prevalence is more in developing and underdeveloped countries compared to the developed nations ^[21].

The first tooth usually erupts in an infant's mouth between 6 and 12 months of age. As each tooth erupts the risk of developing dental caries increases, hence with age and increase in number of teeth caries risk increases. Cariogenic bacteria are transmitted to the child via close contact with the mother's saliva²² but their levels and cariogenicity vary between individuals³⁵ depending on maternal bacterial levels, maternal caries prevalence, oral hygiene practices and exposure to dietary sugars ^[23]. That's why in this study mother with no previous caries experience had been considered for better standardization.

Accurate feeding practices and that too breastfeeding during early childhood plays an important role in child's growth and development, improves brain and nervous system, building immune system as well as decreases the probability of sudden death syndrome as per the WHO norms, breastfeeding is an ideal way of providing ideal food for the healthy growth and development of infants ^[24] Indian Academy of Pediatrics has also recommended exclusive breastfeeding up to 6 months is the optimal way of feeding the infants.

In the present study it was seen that children having prolonged (more than six months) and unrestricted breastfeeding had more caries compared to children others. This is an accordance with studies by various other authors ^[25,26]. In this study mean deft score was more in infants who were on bottle milk compared to breast milk suggestive of bovine being more cariogenic than breast milk. It has been found that breast milk contains several other factors, such as lysozyme, lactoferrin, and oligosaccharides, which are important in preventing infections

and supporting the growth of beneficial bacteria during a critical development and growth period early in life [25,26,28,32,34].

Also, shorter duration of breast-feeding could be associated with poor bottle habits, such as bedtime bottle-feeding, which have been shown to increase the risk of ECC^[27]. This study also uncovers that the children who was fed both by breast and bottle showed more deft score than breast fed and bottle fed alone, emphasizing the synergistic effect of both feeding practices on dental caries.

In the present study it was found that children who were fed over night with any type of feeding practices had higher caries prevalence. Feeding at night with any type of feeding practices causes more deleterious effect because salivary flow at night decreases. Establishing healthy eating patterns at early stage can contribute to reduce the risk of caries experience. This supports the findings of Gussy MG^[33] who found that the frequency of dietary intake in preschool-aged children was more important than the amount. Mattos Graner who reported salty foods introduced to infants younger than 7 months of age showed a lower prevalence of caries compared with infants who were not introduced to these foods by 7 months^[34].

Nevertheless, regular tooth brushing and use of fluoridated toothpaste, fluoride in water, daily carbohydrate uptake, snacking in between meals are the factors which play an important role in prevention and occurrence of dental caries. This study we could find out only the presence or absence of dental caries but not the severity of dental caries. Bitewing x-rays were not used due to limitations as patients were also screened in general hospital. The socioeconomic standard of the child was not considered. As the feeding history was obtained retrospectively, possible recollecting bias is a limitation. However, most of the mothers had no difficulty in recollecting the dietary history.

CONCLUSION

Within the limitations of the study, children who were reported with bottle feeding presented with more carious teeth as compared to children who were breast fed. Also, night bottle feeding with added sugar was found to be more carious hence it can be concluded that prolonged bottle feeding with sweetened milk is found to be more cariogenic as compared to breast milk. Preventive interventions for dental caries should be established as early as possible. Mothers should be encouraged for exclusive breast feeding at least up to 6 months that is beneficial for child's health. Breastfeeding for greater than 24 months increases the risk of having S-ECC.

REFERENCES:

1. Gartner LM, Morton J, Lawrence RA. Breast-feeding and the use of human milk. *Pediatrics*. 2005; 115:496–506.
2. American Academy of Pediatric Dentistry. Policy on dietary recommendations for infants, children, and adolescents. *Pediatr Dent*. 2005; 27:36–7.
3. Azevedo TD, Bezerra AC, Toledo OA. Feeding habits and severe early childhood caries in Brazilian preschool children. *Pediatr Dent*. 2005; 27:28–33.
4. Dini EL, Holt RD, Bedi R. Caries and its association with infant feeding and oral health-related behaviors in 3- to 4-year-old Brazilian children. *Community Dent Oral Epidemiol*. 2000; 28:241–8.
5. Sayegh A, Dini EL, Holt RD, Bedi R. Oral health sociodemographic factors, dietary and oral hygiene practices in Jordanian children. *J Dent*. 2005; 33:379–88.
6. Al-Dashti AA, Williams SA, Curzon ME. Breast-feeding, bottle-feeding and dental caries in Kuwait, a country with low-fluoride levels in the water supply. *Community Dent Health*. 1995; 12:42–7.

7. Bowen WH, Lawrence RA. Comparison of the cariogenicity of cola, honey, cow milk, human milk, and sucrose. *Pediatrics*. 2005; 116:921–6.
8. Prashanth Prakash, Priya Subramaniam, B.H.Durgesh, Sapna Konde. Prevalence of early childhood caries and associated risk factors in preschool children of urban Bangalore, India: A cross-sectional study. *European Journal of Dentistry* April 2012 - Vol.6, 142- 152.
9. Policy on early childhood caries (ECC): classification, consequences and preventive strategies. Vol 31. Washington DC: AAPD; 2008. pp. 6, 9-10.
10. Skeie MS, Raadal M, Strand GV, Espelid I. The relationship between caries in the primary dentition at 5 years of age and permanent dentition at 10 years of age - a longitudinal study. *Int J Paediatr Dent*. 2006;16:152-60.
11. Li Y, Wang W. Predicting caries in permanent teeth from caries in primary teeth: an eight-year cohort study. *J Dent Res*. 2002;81:561-6.
12. Schroth RJ, Harrison RL, Moffatt MEK. Oral health of indigenous children and the influence of early childhood caries; childhood health and well-being. *Pediatr Clin North Am*. 2009;56:1481-99.
13. Shigenobu K, Yuko ON. Early childhood caries and childhood periodontal disease. *Pediatric Infectious Diseases Revisited*. 2007;177-97.
14. William HB, Ruth AL. Comparison of the cariogenicity of cola, honey, cow milk, human milk, and sucrose. *Pediatrics*. 2005;116:921-6.
15. Serwint JR, Mungo R, Negrete VF, Duggan AK, Korsch BM. Child-rearing practices and nursing caries. *Pediatrics*. 1993; 92:233–7.
16. Roberts GJ, Cleaton-Jones PE, Fatti LP, et al. Patterns of breast- and bottle-feeding and their association with dental caries in 1- to 4-year-old South African children. 1. Dental caries prevalence and experience. *Community Dent Health*. 1993; 10:405–13.
17. Ramos-Gomez FJ, Tomar SL, Ellison, Artiga N, Sintes J, Vicuna G. Assessment of early childhood caries and dietary habits in a population of migrant Hispanic children in Stockton, California. *J Dent Child*. 1999; 66:395–403.
18. Rosenblatt A, Zarzar P. Breast-feeding and early childhood caries: an assessment among Brazilian infants. *Int J Paediatr Dent*. 2004; 14:439–45
19. Iida H, Auinger P, Billings RJ, Weitzman M. Association between infant breast-feeding and early childhood caries in the United States. *Pediatrics*. 2007; 120:944–52.
20. Soben Peter. *Essentials of Public Health Dentistry, (Community Dentistry) Sixth Edition* Arya Medi publishing house 184-185.
21. Joshi N, Sujan SG, Joshi K, Parekh H, Dave B. Prevalence, Severity and Related Factors of Dental Caries in School Going Children of Vadodara City – An Epidemiological Study. *J Int Oral Health* 2013; 5(4):40-48
22. Van PHWH, Soe W, Van HMA. Risk factors of early childhood caries in a Southeast Asian population. *J Dent Res* 2006;85:85–8.
23. Thitasomakul S, Piwat S, Thearomtree A, Chankanka O, Pithpornchaiyakul W, Madyusoh S. Risks for early childhood caries analyzed by negative binomial models. *J Dent Res* 2009;88:137–41.
24. Lucas A. Programming by early nutrition: an experimental approach. *J Nutr*. 1998;128(suppl 2):401-6S.
25. Hong CH, Bagramian RA, HashimNainar SM, Straffon LH, Shen L, Hsu CY. High caries prevalence and risk factors among young preschool children in an urban community with water fluoridation. *Int J Paediatr Dent*. 2014;24:32-42.
26. Sankeshwari RM, Ankola AV, Tangade PS, Hebbal MI. Feeding habits and oral hygiene practices as determinants of early childhood caries in 3- to 5-year-old children of Belgaum city, India. *Oral Health Prev Dent*. 2012;10:283-90.

27. Abrera-Rubio R, Collado MC, Laitinen K, Salminen S, Isolauri E, Mira A. The human milk microbiome changes over lactation and is shaped by maternal weight and mode of delivery. *Am J Clin Nutr.* 2012;96:544–51.
28. LeBouder E, Rey-Nores JE, Raby AC, et al. Modulation of neonatal microbial recognition: TLR-mediated innate immune responses are specifically and differentially modulated by human milk. *J Immunol.* 2006;176:3742–52.
29. Al-Dashti AA, Williams SA, Curzon ME. Breast-feeding, bottle-feeding and dental caries in Kuwait, a country with low-fluoride levels in the water supply. *Community Dent Health.* 1995;12:42–7.
30. Roberts GJ, Cleaton-Jones PE, Fatti LP, et al. Patterns of breast- and bottle-feeding and their association with dental caries in 1- to 4-year-old South African children. Dental caries prevalence and experience. *Community Dent Health.* 1993;10:405–13.
31. Ripa LW. Nursing habits and dental decay in infants: “nursing bottle caries” *J Dent Child.* 1978;45:274–5.
32. Walesca MA, Pordeus IA, Paiva SM, Martins CC. Breast and Bottle Feedings Risk Factors for Dental Caries: A Systematic Review and Meta-Analysis. *Pone.* 2015; 18: 1-14.
33. Gussy MG, Waters EG, Walsh O, Kilpatrick N. Early childhood caries: current evidence for aetiology and prevention. *J Paed Child Oral Health* 2006; 42: 37 –43.
34. Mattos-Graner RO, Zelante F, Line RC, Mayer MP. Association between caries prevalence and clinical, microbiological and dietary variables in 1.0 to 2.5-year-old Brazilian children. *Caries Res* 1998; 32: 319–23.

Date of Submission: 02 March 2020

Date of Peer Review: 11 April 2020

Date of Acceptance: 26 May 2020

Date of Publishing: 02 June 2020

Author Declaration: Source of support: Nil, Conflict of interest: Nil

Ethics Committee Approval obtained for this study? YES

Was informed consent obtained from the subjects involved in the study? YES

For any images presented appropriate consent has been obtained from the subjects: NA

Plagiarism Checked: Urkund Software

Author work published under a Creative Commons Attribution 4.0 International License



Creative Commons Attribution
4.0 International License

CC BY 4.0

DOI: 10.36848/IJBAMR/2020/12220.51535