



ORIGINAL RESEARCH PAPER

Dental Science

ASSOCIATION BETWEEN EARLY CHILDHOOD CARIES: THE MODE OF DELIVERY, FEEDING PRACTICES AND ORAL HYGIENE HABITS IN 3-6 YEARS OLD IN UDAIPUR, RAJASTHAN.

KEY WORDS: ECC, Mode of delivery, Feeding practice, Oral hygiene practice

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ABSTRACT

Background: Dental caries is an international public health challenge in young children. Early Childhood Caries is a rapidly progressing disease leading to severe pain, anxiety, and sleep loss, and is a major health problem. The study's objective is to determine the relationship between early childhood caries in Udaipur children and their feeding practices, oral hygiene practices, and mode of birth. **Aim:** To determine the relationship between early childhood caries in children with feeding practices, oral hygiene practices, and mode of birth. **Methodology:** A cross-sectional study is being conducted involving 270 children aged 3 to 6 years along with their mothers, recruited from Anganwadis, and play homes. Data on feeding, mode of delivery and oral hygiene habits is obtained through interviews using a structured questionnaire and oral examination is being performed using a mouth mirror and a blunt explorer. The severity of caries experience of children is measured using dmft index. The criteria of the American Academy of Pediatric Dentistry is used to categorise ECC. Evaluation of caries will be done based on the criteria given by World Health Organisation (WHO). Regarding the assessment of dental plaque, Silness and Loe (1964) plaque index is used. The tabulated data will be statistically analysed using turkey post hoc test. **Results:** **Conclusion:**

INTRODUCTION:

A healthy oral environment during early childhood is very important for lifelong oral health. Early childhood caries (ECC) is one of the most prevalent oral diseases during early childhood that causes discomfort, pain, and nutritional imbalance, ultimately leading to a decline in the quality of life of the child. ECC is defined as the presence of 1 or more decayed, missing, or filled tooth surfaces in any primary tooth in a child younger than 6 years. [1]

It is a common condition and more than 600 million children worldwide are estimated to suffer from untreated caries in their deciduous teeth. The severe forms of ECC may cause difficulties to eat, sleep and attaining school due to loss of tooth substance and pain. [2]

It is well known that *S. mutans* plays a major role in the etiology of dental caries. The *S. mutans* colonization from newborns through childhood has been previously studied, suggesting that children acquire *S. mutans* primarily from their mothers approximately at 1 and 2 years of age, respectively, following or even prior to the emergence of primary teeth. [3]

Longitudinal studies describe the major risk factors of ECC has been associated with demographic characteristics, oral hygiene practices and maternal factors. Most epidemiological studies search for an explanation regarding maternal factors related to mode of delivery, parental attitudes and awareness, household income, educational status of mother, socioeconomic status (SES), pacifiers dipped in honey, frequency of fermentable carbohydrates consumption, and dietary habits. [3]

The mode of childbirth delivery cesarean section versus vaginal birth has emerged as a possible factor affecting ECC risk. Vaginal delivery facilitates the transmission of beneficial maternal microbiota to the newborn, potentially reducing caries risk. In contrast, cesarean delivery may alter the oral microbiome's composition, influencing long-term caries development. [4]

There has been a dramatic rise in rates of cesarean section over recent decades. In a public health perspective, it seems important to know whether infants delivered by cesarean section should be considered a risk group for ECC in order to

intensify preventive measures against dental caries among these children. [5]

Some recent studies have identified a correlation between breastfeeding and early childhood caries. There appears to be a preventive benefit of breastfeeding in the first 6-12 months of life compared to not breastfeeding, however there is a higher prevalence of ECC when nursing is continued after the first year. The age at which breastfeeding begins to have a negative impact on dental health is unknown, with research employing a range of cutoffs. In addition, a correlation has been established between night time nursing and an increased risk of ECC. [6]

The development of ECC is related to bottle-feeding during bedtime, bad dietary habits, and the composition of food consumed every day. It is indisputable that the consumption of cariogenic food imposes a risk on children's teeth. [7]

Both at the local and national levels, there is a lack of accurate information or data regarding the prevalence of ECC. Our nation's prevalence rate of ECC is continuously rising despite awareness and preventative efforts. Primary teeth therefore deserve a lot of attention. In order to establish a successful preventive program in the future, this study would provide baseline data.

The purpose of this study was to determine the relationship between early childhood caries in children with feeding practices, oral hygiene practices, and mode of birth.

MATERIALS AND METHODS:

The study was conducted on children aged 3 to 6 years and their mothers were accessed at Preschools, and Anganwadis. Necessary permission was also obtained from the respective school authorities.

Sample Size

With a 95% confidence interval and a 5% margin of error, a sample size of 270 was calculated using the formula $n = z^2 pq/d^2$. Consequently, 270 mother-child pairs took part in the study.

Inclusion Criteria

- Healthy and normal children, aged three to six years, with

- dental caries in primary teeth
- Mothers and children who are willing to participate and provide their consent

Exclusion Criteria

- Children and mothers who are medically compromised
- Children who are having difficulty opening the mouths
- Children who have lost their mothers at the time of birth.

The criteria of the American Academy of Pediatric Dentistry were used to categorise ECC.[8] Twenty-three closed-ended questions were provided to the mothers.

The Questionnaire Consisted Of 4 Parts:

Part 1: Included general sociodemographic data (age, sex, gender, and mother's name),
 Part 2: Maternal pregnancy and past medical history (mode of delivery and birth weight of child),
 Part 3: Child's feeding practice (breastfeeding, bottle-feeding, night-time feeding), dietary habits,
 Part 4: Oral health practices of children. All of the necessary and pertinent information was gathered from the mother because the questions contained two to four possibilities, and the answering mothers were asked to check the appropriate replies.

The single dentist performed a clinical examination with a blunt explorer and mouth mirror. The World Health Organization's (WHO) criteria were used to evaluate caries. The severity of caries experience of children was measured using dmft index. Regarding the assessment of dental plaque, Silness and Loe (1964) plaque index is used.

Statistical Analysis

Summarized data was presented using Tables and Graphs. The data was analyzed by SPSS (21.0 version). The tabulated data was statistically analyzed using the Turkey post hoc test. The one-way ANOVA was used to determine any statistically significant differences between the means. Chi square test was used to find the association among categorical variables. The level of statistical significance was set at p-value less than 0.05.

RESULT:

Table 1 describes that study was carried out in 270 children (aged three to six years), among which 138 (51.1%) were males and 132 (48.9%) were female, table 2 description of questionnaire items respectively. Table 3 describes mean dmft score and graph 1 shows the relationship between preferred method of cleaning and dmft scores and plaque scores.

Table 1

	Frequency	Percent
Male	138	51.1
Female	132	48.9
Total	270	100.0

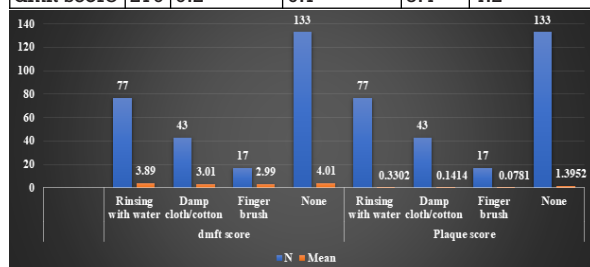
Table 2

Questions	Answer	N	Percent	Mean of dmft Score
Type of delivery	C- section	120	44.0	5.4
	Normal	147	54.0	3.2
	Forcep	3	2.0	2.1
Feeding method	Breast- feeding exclusively	114	42	2.3
	Bottle feeding exclusively	19	7.0	5.7
	Breast and bottle feeding	137	50.7	3.1
Duration of breast feeding	Birth to 6 months	191	70.74	3.11
	Birth to 12 months	34	12.59	4.98
	Birth to 24 months	29	10.74	2.87

	Birth to more than 24 months	16	5.92	3.66
Duration of bottle feeding	Till 1 year	159	58.8	2.89
	Till 2 year	79	29.25	3.98
	Till 3 year	27	10	4.33
	More than 3 years	5	1.85	3.21
frequency of feeding at night	One or two times	200	74.07	2.77
	3 to 7 times	57	21.11	3.33
	Through out night	13	4.81	3.662
Quantity of sugar added in the milk	0-.5 tbs	119	44.07	3.11
	1 tbs	70	25.93	3.87
	2-3 tbs	13	4.81	4.2
	None	68	25.19	2.98
Introduction of weaning food in diet	4-6 months of age	52	19.26	3.65
	> 6 months old	218	80.74	4.02
Any additional food is given to the child	Yes	75	27.78	4.00
	No	195	72.22	2.76
Any vitamin or calcium supplements given to the child	Yes	102	37.78	2.07
	No	168	62.22	3.89
Is cleaning of tooth with water done after every meal	Yes	129	47.78	2.06
	No	141	52.22	3.67
Frequency of tooth brushing	Once a day	149	55.19	3.66
	Twice a day	52	19.26	2.89
	Thrice a day	5	1.85	2.7
	Rarely	64	23.70	4.04
Preferable method to clean the teeth during infancy	Rinsing with water	77	28.52	3.89
	Damp cloth/cotton	43	15.93	3.01
	Finger brush	17	6.30	2.99
	None	133	49.26	4.01
P value	<0.0001			

Table 3

	N	Minimum	Maximum	Mean	Std. Deviation
dmft score	270	0.2	6.7	5.4	4.2



Graph 1: Relationship between preferred method of cleaning and plaque and dmft scores

DISCUSSION:

In the present study, we examined a set of risk factors, including maternal factor, oral health factors, and children's dietary behaviour factors, in relationship with ECC in Udaipur children.

About half of children worldwide have ECC, with prevalences varying between 2.1% and 85.5% in both developed and developing nations. Unfortunately, the ECC typically went

untreated. Over 620 million children globally suffered from untreated ECC in 2015, with children aged one to four years old being the most impacted.[9]

Type Of Delivery

The mean dmft was statistically higher in C-section (5.4) as compared to children born vaginally (3.2) which was similarly seen in study conducted by Katarina Boustedt et al (2018) and conclude that children delivered with caesarian section exhibited a significantly increased risk of having early childhood caries at the age of 5 years.[10] Another retrospective cohort study conducted by Xin Ge et al (2023) concluded that the prevalence of ECC was higher in C-section delivery children than in vaginal delivery children, and the severity of ECC in CSD children was higher. C-section delivery was a risk factor for ECC in 3-year-old children.[11]

Feeding Method

Children who were exclusively bottle-fed showed the higher value of mean deft (5.7) followed by children who were both bottle and breastfed (3.1). The lowest mean (2.3) was seen in the group who were exclusively breastfed. A study conducted by Devenish G et al (2020) found that breastfeeding practices were not associated with ECC.[12] A contradictory result find by Banu Öter et al (2021) that There was no significant difference between children's dft and DMFT index value and breastfeeding, cupfeeding and bottlefeeding type and duration.[13]

Night Feeding

The frequency of night feeding is in direct relationship with the increase in severity of ECC. There was a significant difference between children who were fed 1-2 times (2.77), 3-7 times (3.33) and throughout the night (3.6). Similar study conducted by Barjatya K et al (2020) and the study concluded that the content of the bottle feed and feeding practices at night are the strongest factors among all feeding habits associated with ECC.[14]

Sugar Consumption

Highly significant correlation was found between the consumption of sugar in milk and ECC. The mean deft of children consuming more than 2-3 table spoons was found to be the highest (4.2). A study conducted by Mariana Silveira Echeverria et al (2023) the highest prevalence of ECC (43.3%) was in children in which sugar was introduced into the infant's diet before 12 months of age.[15] Devenish G et al (2020) concluded that the only factors independently associated with ECC were high free sugars intakes.[12]

Introduction Of Weaning Food

In our study the children who were given weaning food and confectionery or biscuits had higher mean deft. Children who were introduced to weaning food in > 6 month old showed the higher value of mean deft (4.02) than the delayed introduction of weaning food. Park YH et al (2022) conduct a study and concluded that delayed introduction of weaning food was associated with a higher likelihood of early childhood caries.[16]

Oral hygiene practice

In our study Children who brush rarely showed the higher value of mean deft (4.04). A study conducted by Satya PYadav et al (2022) it was found that oral hygiene practices by the parents or caregiver are strongly associated with the prevalence of ECC. [17] Another study by G Bulut (2023) had found that early introduction to tooth-brushing and regular dental visits were significantly effective in reducing the ECC.[18]

Plaque

In our study dental plaque is significantly associated with ECC and poor oral hygiene. Plaque index showed higher value (1.39) in children who don't brush regularly which was

similarly in study conducted by Chanpum P et al (2020) ECC prevalence is significantly associated with the level of dental plaque, breastfeeding to sleep, and oral cleaning. Among all factors, the level of dental plaque is the most significant factor associated with ECC.[19]

Limitation

The use of a retrospective questionnaire, which reflected the accuracy of parent's recollections of nursing practices, was one of the study's limitations. The mother's opinions about nursing and vaginal delivery, such as the societal value of providing accurate answers, may have influenced some of their answers. Children from a particular social class who attended private preschools or play houses made up the study sample.

CONCLUSION

- According to the current study, feeding practices are the primary factor contributing to the worsening of ECC.
- Increased caries prevalence has been linked to bottle feeding, nighttime feeding, and the introduction of processed ready-made foods or infant formula.
- By planning general and health promotion initiatives aimed at young children, this can be managed.
- The program must stress the importance of avoiding or consuming fewer foods high in sugar, avoiding nighttime bottle feeding, and maintaining mealtime intervals.
- Early childhood intervention would seem to be the best course of action to guarantee lifelong good dental practices.

REFERENCES:

1. Park, Y. H., & Choi, Y. Y. (2022). Feeding Practices and Early Childhood Caries in Korean Preschool Children. *international dental journal*, 72(3), 392-398.
2. Boustedt, K., Dahlgren, J., Roswall, J., & Twetman, S. (2021). Is the mode of childbirth delivery linked to the prevalence of early childhood caries? A systematic review and meta-analysis. *European Archives of Paediatric Dentistry*, 22(5), 765-772.
3. Öter, B., Kul, T. K., Tirali, E., & Çehreli, S. B. (2021). The association between mode of delivery and maternal factors and dental caries in children. *ADO Klinik Bilimler Dergisi*, 10(2), 92-98.
4. Xiang, L., Kozlitina, I. A., Mohammadian, M., Choopani, R., & Mohammadian-Hafshejani, A. (2024). The association between mode of childbirth delivery and early childhood caries: A comprehensive systematic review and meta-analysis. *Plos one*, 19(9), e0310405.
5. Antão, C., Teixeira, C., & Gomes, M. J. (2019). Effect of mode of delivery on early oral colonization and childhood dental caries: a systematic review. *Portuguese Journal of Public Health*, 36(3), 164-173.
6. Ahmed, S. M., & Naher, N. (2023). Association of childhood feeding practices and occurrence of early childhood caries: A cross sectional study among children under 5 years of age across two urban slum areas of.
7. Sari, N., Amalia, R., & Supartinah, A. (2021). The association between parenting styles and feeding styles on early childhood caries. *Scientific Dental Journal*, 5(2), 63-67.
8. American Academy of Pediatric Dentistry. Policy on early childhood caries (ECC): Consequences and preventive strategies. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry; 2024:89-92.
9. Lam PP, Chua H, Ekambaram M, Lo EC, Yiu CK. Does early childhood caries increase caries development among school children and adolescents? A systematic review and meta-analysis. *International journal of environmental research and public health*. 2022 Oct 18;19(20):13459.
10. Boustedt K, Roswall J, Twetman S, Dahlgren J. Influence of mode of delivery, family and nursing determinants on early childhood caries development: a prospective cohort study. *Acta Odontologica Scandinavica*. 2018 Nov 17;76(8):595-9.
11. Ge X, Lyu X, Zhou Z, Mi Y, He T, Wu B, Liu F. Caesarean-section delivery and caries risk of 3-year-old Chinese children: a retrospective cohort study. *BMC Oral Health*. 2023 Jun 8;23(1):373.
12. Devenish G, Mukhtar A, Begley A, Spencer AJ, Thomson WM, Ha D, Do L, Scott JA. Early childhood feeding practices and dental caries among Australian preschoolers. *The American journal of clinical nutrition*. 2020 Apr 1;111(4):821-8.
13. Öter B, Kul TK, Tirali E, Çehreli SB. The association between mode of delivery and maternal factors and dental caries in children. *ADO Klinik Bilimler Dergisi*. 2021;10(2):92-8.
14. Barjatya K, Nayak UA, Vatsal A. Association between early childhood caries and feeding practices among 3-5-year-old children of Indore, India. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 2020 Apr 1;38(2):98-103.
15. Echeverria MS, Schuch HS, Cenci MS, Motta JV, Bertoldi AD, Britto Correa M, Huysmans MC, Demarco FF. Early sugar introduction associated with early childhood caries occurrence. *Caries research*. 2023 Jul 24;57(2):152-8.
16. Park YH, Choi YY. Feeding Practices and Early Childhood Caries in Korean Preschool Children. *international dental journal*. 2022 Jun 1;72(3):392-8.
17. Yadav SP, Meghpara M, Marwah N, Nigam AG, Godhani S, Chalanana S. Association of early childhood caries with feeding, dietary habits, and oral hygiene practices among rural and urban school children of Jaipur.

- International Journal of Clinical Pediatric Dentistry. 2022 May; 15(3):273.
18. Bulut GÜ, Kilin A G. The impact of infant feeding and oral hygiene habits on early childhood caries: A cross-sectional study. Nigerian journal of clinical practice. 2023 Oct 25; 26(6):810-8.
 19. Chanpum P, Duangthip D, Trairatvorakul C, Songsiripradubboon S. Early childhood caries and its associated factors among 9-to 18-month old exclusively breastfed children in Thailand: a cross-sectional study. International Journal of Environmental Research and Public Health. 2020 May; 17(9):3194.