

Dietary Habits and Oral Health Practices among Children with Early Childhood Caries and Caries Free Children: A Case Control Study

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Abstract

Background: Dietary habits and practices affect dental health.

Objective: To determine the dietary habits and oral health practices among children with early childhood caries and caries free children.

Methodology: Study Design: Case-control study. Study setting and duration: Department of Operative Dentistry and Oral Pathology HBS Medical and Dental College, Islamabad, from November 2018 to September 2021. Sample of 212 children (106 cases, 106 controls) having either sex, ages between 2 to 5 years with minimum of 12 erupted teeth (including lost) were enrolled in this study. Children clinical examination was done on dental chair using explorer and mouth mirror. Current study focused on the relationship between oral practices, feeding habits and early childhood caries.

Results: Two hundred and twelve children, 90 (42.45%) male and 122 (57.54%) females, were examined. Among these 106 were caries-free and 106 had early childhood caries. Children having early childhood caries (ECC) were mostly first born, 72.38% in contrast with children without ECC, 55.24%. ($p=0.005$). Mean standard deviation of decayed, missing and filled teeth (DMFT) of children with early childhood caries was 5.2 (3.9). A greater number of children with ECC were observed to visit the dental doctor as compared to children without ECC (31.3% vs. 7.54%; $p=0.0001$). Brushing was observed in 61.32% children having ECC and in children without ECC it was 69.81%, $p=0.71$. Majority of the children of both groups were noted to use of fluoridated toothpaste (93.3% vs. 90.5%, $p=0.41$).

Conclusion: Frequent use of sugars in form of sweets, prolonged breastfeeding, delay in starting oral practices and lack of parental assistance in adoption of oral practices were factors for the incidence of ECC. Health education, awareness and proper guidelines on feeding and oral practices can significantly decrease the risk and prevalence of ECC.

Keywords: Early childhood caries, breastfeeding, awareness, dentistry

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Introduction

Early Childhood Caries (ECC) is defined as existence of at least one decayed, missed or filled tooth surfaces in any primary tooth in a child < 6 years of age.¹ Globally, it is a major problem of world especially in developing countries. It is a bacterial disease which affects the inorganic surface and demineralize it, in this way destroy the organic matrix.² In the oral cavity the oral microbes create the dental caries infection it is also called as associated with oral disease like periodontal disease.^{3,4} The frequency of ECC is remained high in under develop countries and developing states, approximately 2.3 billion people affected by permanent tooth and 537 million children affected by primary dentition.⁵

The main reason is industrialization in countries which are developed and dearth of awareness regarding hygiene in the developing countries. A lot of researches have been conducted on early childhood caries (ECC) that reported the prevalence of ECC which varies 20% to 80% caused by different age groups, registration and ethnic background.^{6,7}

Dental care include the certain parameters like education of oral health, dietary modifications, use of fluorides and regular visits to dentist.⁸ For keeping good oral health the practices and attitude are directly proportional to the knowledge related to the dental caries and periodontitis in parents of children.⁹ The role of diet in development of early childhood infection and acquisition of bacterial

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infection is very important. Energy dense foods, poor diet, foods having low nutrient level and earlier use of these foods are the main reason for increased rate of early childhood caries.^{10,11}

ECC is also link with inappropriate habits like feeding or sugar. When children are sleeping liquid milk pool around the teeth and the lower end of the teeth is protected by the tongue. The liquids which contained carbohydrate offer an appropriate culture medium for acidogenic microorganisms.¹² It's understood that children with early childhood caries are mostly taking drinks and carcinogenic sweets (Carcinogens used to flavor candy, ice cream etc) but different variations still exist.¹³

The prevalence of ECC was 16.5% in Japanese children. This study also showed association of ECC with occupation of parents and income of families.^{14,15} A study showed that prevalence of ECC was 80% in Saudi children for primary tooth having mean value of five for DMFT and prevalence of ECC to be 70% for permanent dentition with a mean of 3.5 for DMFT.¹⁶ In USA children having age of 6 to 11 years, 1/5 children had dental caries in Hispanic children than that of non-Hispanic children.¹⁷ As in our country data on oral health is very limited so this research was conducted to determine the dietary habits and oral health practices among children with early childhood caries and caries free children.

Methodology

This was a case control study conducted at Department of Operative Dentistry and Oral Pathology HBS Medical and Dental College Islamabad from November 2018 to September 2021. Ethical committee approval was obtained from the Institutional Ethics Committee. Only those children were included those parents gave written informed consent and filled the questionnaire.

Children having either gender ages between 2 to 5 years minimum 12 erupted teeth were enrolled in this study. Cases group was contained of 106 children having ECC. Control group was contained 106 children without ECC. Children having physical and mental disabilities, age <2 years or >5 years were not included in study. Clinical examination of children was done on dental chair using explorer and mouth mirror. A Cronbach's alpha of 0.80 was obtained, reflecting a high degree of reliability. In the pilot study the

prevalence of ECC was observed to be 16.5%. Sample size of 212 (106 cases, 106 controls) was calculated with confidence interval 95% and margin of error to be 80% using formula $n = z^2pq/d^2$, where p = prevalence of ECC (16.5% in Japanese children), $z = 1.96$. To select the total sample of study simple random sampling method was used. Although, current study concentrated on the relationship between oral practices, feeding habits and early childhood caries so only these factors are discussed here. Specific codes for the status of dentition were used subsequently for calculation of DMFT index "quantity of decayed, missing and filled teeth", score, to specify experience of caries. For the component (d), this comprised dentition status: "Decayed" and "Filled with decay," for the (f) component: "Filled, no decay," and for (m) component: "Missing as a result of caries." Analysis of data was done by using SPSS V-21. Frequency and percentage were used for gender. Mean and standard deviation for age was calculated. Chi-square test was applied taking P-value <0.05 taken as statistically significant.

Results

Two hundred and twelve children, 90 (42.45%) male and 122 (57.54%) females, were examined. Among these 106 were caries-free and 106 had early childhood caries. Distribution of children according to age as related to caries is shown in Table-I. Children having ECC were mostly first born (72.38%) in contrast with children without ECC (55.24%, $p=0.005$). Between two groups from mother's education point of view ($p=0.22$), father education ($P=0.36$), mother occupation ($P=0.06$) and occupation of father ($p=0.90$) statistically insignificant relationship was observed. (Table-I)

The mean DMFT of children with ECC was 5.2 ± 3.9 . A greater number of children with early childhood caries were observed to visit the dental doctor as compared to children without ECC (31.3% vs. 7.54%; $p=0.0001$). Brushing was observed in 61.32% children having ECC and in children without ECC it was 69.81%; $p=0.71$. Majority of the children of both groups were noted to use of toothpaste which are fluoridated (93.3% vs. 90.5%; $p=0.41$). Breast feeding in excess was observed in 81.1% of ECC children in contrast with 55.66% children without caries; $p=0.001$. Statistically insignificant difference was observed in consumption of sweetened juices ($p=0.35$), sticky snacks ($p=0.40$), quantity of sweetened juices

($p=0.70$) and quantity of sweetened juices ($p=0.70$) (Table-III). The mean children plaque index was 0.72 ± 0.58 in ECC children vs 0.37 ± 0.49 without ECC. ($p=0.0002$)

Table-I: Socio demographic characteristics of Children with and without ECC

Variable		Children with ECC	Children without ECC	P-value
Age	2 to 3 years	11 (10.37)	50 (47.16)	0.29
	4 to 5 years	95 (89.62)	56 (52.83)	
Gender	Male	47 (44.33)	43 (50.0)	0.47
	Female	59 (56.19)	63 (59.43)	
Birth rank	First	76 (72.38)	58 (55.23)	0.005
	Second	8 (7.61)	40 (38.09)	
	Third	22 (20.75)	8 (7.54)	
Mother's education	Illiterate	32 (30.18)	14 (13.20)	0.22
	Middle	51 (48.11)	44 (41.50)	
	High	23 (21.69)	48 (45.28)	
Mother's occupation	Housewife	92 (86.79)	82 (77.35)	0.06
	Working	14 (13.2)	24 (22.64)	
Father's education	Illiterate	17 (16.03)	11 (10.37)	0.36
	Middle	48 (45.28)	42 (39.62)	
	High	41 (38.67)	53 (50)	
Father's occupation	Professional	54 (50.94)	49 (46.22)	0.90
	Clerical	27 (25.47)	33 (31.13)	
	Laborer	25 (23.58)	24 (22.64)	

Table-II: Practices regarding oral health of Children with and without ECC

Variable		Children with ECC	Children without ECC	P-value
Previous dental visits	Yes	33 (31.13)	8 (7.54)	0.001
	No	73 (68.86)	98 (92.45)	
Brushing	Yes	65 (61.32)	74 (69.81)	0.71
	No	41 (38.67)	32 (30.18)	
Brushing frequency	Once daily	66 (62.26)	64 (60.3)	0.89
	Twice daily	22 (20.75)	19 (17.9)	
	? 2 times daily	18 (16.98)	23 (21.69)	
Using fluoridated Toothpaste	Yes	99 (93.3)	96 (90.5)	0.41
	No	7 (6.60)	10 (9.43)	
Parental supervision of Brushing	Yes	82 (77.35)	91 (85.84)	0.91
	No	24 (22.64)	15 (14.15)	

Table-III: Children dietary habits with early Childhood caries and without Early Childhood Caries

Variable	Children with ECC	Children without ECC	P-value	
Nursing history	Breast	86 (81.1)	59 (55.66)	0.001
	Bottle	6 (5.66)	25 (23.58)	
	Mixed	14 (13.20)	22 (20.75)	
Using sticky snacks	Yes	55 (51.88)	48 (45.28)	0.40
	No	51 (48.11)	58 (54.71)	
Quantity of sticky snacks	Mean±SD	5.1±3.3	3.2±1.9	0.39
Using sweetened juices	Yes	51 (48.11)	41 (38.67)	0.35
	No	55 (51.88)	65 (61.3)	
Quantity of sweetened juices	Mean±SD	4.6±2.7	3.7±2.5	0.70
Frequency of sweetened juices	Mean±SD	4.9±3.3	3.4±2.8	0.20

Discussion

In childhood adoption of good oral health give positive results in quality of life and health.¹⁸ This study evaluated the related factors to the early childhood caries in children. Parents role in the development of children in first years of his life is very important.¹⁹ Eating and feeding habits had been observed the main element in the development of dental caries. It is observed in this study that higher sugar use in the form of sweetened juices in the middle of the meals is significantly associated ($P < 0.05$) in the development of ECC (48.11%) as it's also observed in studies of children in Brazil²⁰ and South Korea.²¹ In contrast, a study showed there was no association between cariogenic diet and development of early childhood caries.^{22,23}

In our study regarding age and gender there was no significant difference was observed. Most of the studies reported that age is significantly associated with ECC,²⁴ and gender is not associated with ECC.²⁵ In contrast a study reported that ECC is more prevalent in females.²⁶ In our study, 30.18% ECC children had mothers who were illiterate that 12.26% children without caries. McCabe and Kinirons²⁷ noted prevalence of ECC to be 40% in children whom mothers had low level education and awareness than that to 10% children whom mothers have high level awareness and education. In current study, habit

of brushing was more observed in children free caries as compare to children with ECC (69.81% vs. 61.32%). These findings are in line with studies,^{28,29} where they observed that brushing was linked with development of early childhood caries. We found that bottle feeding in excess was reported to 23.58% in children without caries and 5.66% in children with ECC. Some of the studies reported that feeding by bottle is a major risk factor for caries development while other studies did not observed this association.³⁰

In our study, in children with early childhood caries plaque index was higher (0.72 ± 0.58) as compared to children without ECC (0.37 ± 0.49). This is in line with findings of Mohebbi et al,³¹ dental plaque (OR=1.8; 95% CI 1.3-4.7).

Conclusion

Frequent use of sugars in form of sweets, prolonged breastfeeding, delay in starting oral practices and lack of parental assistance in adoption of oral practices were factors for the incidence of ECC. Health education, awareness and proper guidelines on feeding and oral practices can significantly decrease the risk and prevalence of ECC.

Authors Contribution: SS: Conception of work, and Revising. **MB:** Design of work and revising **SS:** Acquisition and analysis of data and drafting. **SMAA:** Design of work and revising. **SN:** Conception of work and drafting. **SN:** Interpretation of data and drafting.

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References

1. Kakanur M, Nayak M, Patil SS, Thakur R, Paul ST, Tewathia N. Exploring the multitude of risk factors associated with early childhood caries. *Indian J Dent Res.* 2017; 28: 27-32.
2. Kikutani T, Yoshida M, Enoki H, Yamashita Y, Akifusa S, Shimazaki Y, et al. Relationship between nutrition status and dental occlusion in community-dwelling frail elderly people. *Geriatrics & Gerontology Inter* 2013 13(1):50-54.
3. Scannapieco FA. The oral microbiome: its role in health and in oral and systemic infections. *Clinical Microbiology Newsletter.* 2013;35(20):163-169.

4. Aas JA, Paster BJ, Stokes LN, Olsen I, Dewhirst FE. Defining the normal bacterial flora of the oral cavity. *Journal of clinical microbiology*. 2005;43(11):5721-5732.
5. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators (2016). Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 388(10053):1545-1602.
6. Eslamipour F, Afshari Z, Najimi A. Prevalence of malocclusion in permanent dentition of Iranian population: a review article. *Iran J Public Health*. 2018;47(2):178.
7. Araki M, Yasuda Y, Ogawa T, Tumorkhum T, Ganburged G, Bazar A et al. Associations between malocclusion and oral health-related quality of life among mongolian adolescents. *Int J Environ Res Public Health*. 2017;14:902-912.
8. Al-Qahtani SM, Abdul Razak P, Khan SDAA. Knowledge and practice of preventive measures for oral health care among male intermediate schoolchildren in Abha, Saudi Arabia. *Int J Environ Res Public Health*. 2020;17:701-703.
9. Mumtaz R, Attaullah, Khan A. A comparative evaluation of oral health knowledge, attitudes and practices of dental and pharmacy students of Riphah International University. *Pakistan Oral Dental J*. 2009; 29(1): 137-140.
10. Menegaz AM, Silva AER, Cascaes AM. Educational interventions in health services and oral health: systematic review. *Revista de Saúde Pública*. 2018; 52: 51-52.
11. Hayden C, Bowler JO, Chambers S, Freeman R, Humphris G, Richards D, Cecil JE. Obesity and dental caries in children: A systematic review and meta-analysis. *Community Dent. Oral Epidemiol*. 2013; 41: 289-308.
12. McDonald Ralph E., Avery David R., Dental caries in the child and adolescent. In: *Dentistry for the child and adolescent*. 10th ed. Missouri: Mosby;2016; 203-35.
13. Soliman RS, Abdel Rahman A, Dowidar KM. Cariogenic effect of dietary habits among caries free and early childhood caries children. *Alexandria Dental J*. 2017;42(1):62-6.
14. Alayyan W, Al Halabi M, Hussein I, Khamis A, Kowash M. A systematic review and meta-analysis of school children's caries studies in gulf cooperation council states. *J Int Soci Prevent Community Dentist* 2017;7(5):234.
15. Kato H, Tanaka K, Shimizu K, Nagata C, Furukawa S, Arakawa M, Miyake Y. Parental occupations, educational levels, and income and prevalence of dental caries in 3-year old Japanese children. *Environ Health Prevent Med*. 2017;22(1):80.
16. Al Agili DE. A systematic review of population-based dental caries studies among children in Saudi Arabia. *Saudi Dental J*. 2013;25(1):3-11.
17. Dye BA, Thornton-Evans G, Li X, Iafolla TJ. Dental caries and sealant prevalence in children and adolescents in the United States, 2011-2012. *NCHS Data Brief*. 2015 Mar;(191):1-8.
18. Abiola A, Eyitope O, Sonn O, Morenike F. Do maternal factors influence the dental health status of Nigerian pre-school children? *Int J Paediatr Dent*. 2009;19(6):448-54.
19. Hooley M, Skouteris H, Boganin C, Satur J, Kilpatrick N. Parental influence and the development of dental caries in children aged 0-6 years: a systematic review of the literature. *J Dent*. 2012;40(11):873-85.
20. Rosenblatt A, Zarzar P. The prevalence of early childhood caries in 12-to 36-month-old children in Recife, Brazil. *ASDC J Dent Child* 2002;69(3):319-24.
21. Jin BH, Ma DS, Moon HS, Paik DI, Hahn SH, Horowitz AM. Early childhood caries: prevalence and risk factors in Seoul, Korea. *J Public Health Dent* 2003; 63 (3):183-8.
22. Parisotto M, Oliveira S, Silva MS, Almeida EC, Rodrigues KA, Santos N. The importance of feeding practices, oral hygiene and socioeconomic factors in the early childhood caries prevalence in preschool children from Itatiba - SP. *Rev Odontol Bras Centr* 2010;19(51):59-70.
23. Ribeiro AG, Oliveira AF, Rosenblatt A. [Early childhood caries: prevalence and risk factors in 4-year-old preschoolers in João Pessoa, Paraíba, Brazil]. *Cad Saúde Pública* 2005, 21(6):1695-1700.
24. Quinonez R, Keels M, Vann W Jr, McIver F, Heller K, Whitt J. Early childhood caries: analysis of psychosocial and biological factors in a high-risk population. *Caries Res*. 2000; 35: 376-83
25. Kuriakose S, Prasannan M, Remya KC, Kurian J, Sreejith KR. Prevalence of early childhood caries among preschool children in Trivandrum and its association with various risk factors. *Contemp Clin Dent*. 2015; 6: 69–73.
26. Nobile CGA, Fortunato L, Bianco A, Pileggi C, Pavia M. Pattern and severity of early childhood caries in Southern Italy: a preschool-based cross-sectional study. *BMC Public Health*. 2014; 14:206-18.
27. Kinirons M, McCabe M. Familial and maternal factors affecting the dental health and dental attendance of preschool children. *Community Dent Health*. 1995; 12: 226-9.
28. Szatko F, Wierzbicka M, Dybizbanska E, Struzycka I, Iwanicka F. Oral health of Polish three year- olds and mothers' oral health-related knowledge. *Community Dent Health* 2004;21:175-80
29. Abdel Aziz WE, Dowidar KM, El Tantawi MM. Association of healthy eating, juice consumption, and bacterial counts with early childhood caries. *Pediatr Dent*. 2015;37:462-7.
30. Avila WM, Pordeus IA, Paiva SM, Martins CC. Breast and bottle feeding as risk factors for dental caries: A systematic review and meta-analysis. *PLoS One*. 2015;10:e0142922.
31. Mohebbi SZ, Virtanen JI, Vahid-Golpayegani M, Vehkalahti MM. Early childhood caries and dental plaque among 1-3-year-olds in Tehran, Iran. *J Indian Soc Pedod Prev Dent* 2006; 24:177-81.