

Research Article

Feeding Practices and Their Impact on Early Childhood Caries: A Comparison Between Breastfeeding and Bottle-feeding

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Abstract

Background: Early Childhood Caries (ECC) remains a prevalent public health concern globally. Feeding practices, particularly breastfeeding and bottle-feeding, along with oral hygiene behaviors and caregiver knowledge, are critical factors influencing ECC risk. This study aimed to compare the impact of breastfeeding and bottle-feeding on the prevalence and severity of ECC among children under five years of age. **Methods:** This cross-sectional comparative study was conducted among 105 children aged under five years at City Dental College and General Hospital, Dhaka, Bangladesh, from March 2004 to June 2004. Participants were categorized into breastfed (n = 58) and bottle-fed (n = 47) groups. Data were collected on demographic characteristics, feeding and brushing practices. **Results:** The mean age of bottle-fed children was slightly higher than that of breastfed children, though not statistically significant. Night-time feeding and higher feeding frequency (≥ 5 times/day) were significantly more common in bottle-fed children ($p < 0.001$ and $p = 0.005$, respectively). Oral hygiene habits did not differ significantly between groups ($p > 0.05$). The prevalence of ECC was significantly higher among bottle-fed children (61.7%) compared to breastfed children (31.0%) ($p < 0.001$). Gingivitis was more prevalent among breastfed children (32.7%; $p = 0.017$). Maternal knowledge was generally poor to average, with only 33.3% correctly identifying factors responsible for dental caries. **Conclusion:** Bottle-feeding is significantly associated with a higher prevalence and severity of ECC, particularly in children with frequent and night-time feeding. Oral hygiene practices were similar between groups, but maternal knowledge on dental caries prevention remains inadequate.

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Keywords

Early Childhood Caries, Bottle-feeding, Breastfeeding, Oral Hygiene, Feeding Practices

1. Introduction

Early childhood caries (ECC) is defined as the presence of one or more decayed, missing, or filled tooth surfaces in any primary tooth of a child under 71 months of age. One of the earliest documented investigations into dental caries in infants dates back to 1927, when clinicians observed widespread caries in the tooth surfaces of babies [1].

Dental caries in early childhood significantly impacts a child's well-being, growth, and quality of life [1]. Despite a global decline in ECC prevalence, rates remain high. The condition affects 27.9% of five-year-olds in England, 46.6% in Brazil, between 11.0% and 53.0% in the USA, and 23% of American children aged 2-3 years [2-5].

Although the role of feeding methods in the development of ECC was not studied initially, numerous studies since then have examined the association between feeding practices, particularly breastfeeding and bottle-feeding, and ECC, with results that remain inconclusive [1].

Breast milk is universally recognized as the ideal source of nutrition for infants, providing essential nutrients and immune factors needed for optimal growth and development. Breastfeeding is considered one of the most effective interventions for improving infant survival, especially in developing countries. Exclusive breastfeeding for the first six months is estimated to prevent approximately 13% of deaths among children under five years old annually. According to the World Health Organization (WHO), exclusive breastfeeding means providing only breast milk, excluding water, juice, formula, or food, except for prescribed medications, vitamins, or minerals [6].

The systemic health benefits of breastfeeding are well-established, including reduced morbidity, fewer infectious diseases, and lower rates of low birth weight [7]. The PROBIT trial further emphasized these benefits by demonstrating decreased risks of gastrointestinal infections and inflammatory skin conditions among breastfed infants [8]. However, some evidence suggests that breastfeeding may not contribute to the development of normal occlusion [9]. WHO recommends exclusive breastfeeding for the first six months of life, followed by continued breastfeeding along with complementary foods until at least two years of age [10].

The debate over whether bottle-feeding poses a greater risk for ECC than breastfeeding remains unresolved. While some studies have found no association between breastfeeding and ECC, others have reported a positive correlation [11-13]. Similarly, several studies have identified bottle-feeding as a risk factor for ECC, while others have not demonstrated a significant relationship [1, 6, 14-16]. A systematic review

published in 2000 concluded there was insufficient evidence to confirm that breastfeeding is a risk factor for ECC; notably, it did not compare breastfeeding directly with bottle-feeding [17]. Another review identified three specific feeding-related practices, breastfeeding beyond 18 months, feeding during night-time to soothe crying, and feeding the child to sleep, as potential contributors to ECC [18]. However, neither of these reviews directly compared breastfeeding and bottle-feeding regarding ECC.

This inconsistency in findings underscores the need for further research to clarify the relationship between feeding practices and the risk of ECC in children [19].

Therefore, in the present study, we aimed to compare the impact of breastfeeding and bottle-feeding on the prevalence and severity of ECC among children under five years of age, while examining associated oral hygiene habits and maternal knowledge.

2. Methodology & Materials

This cross-sectional comparative study was conducted among children under the age of five attending a pediatric outpatient department of City Dental College and General Hospital, Dhaka, Bangladesh, from March 2004 to June 2004. In this study, we included a total of 105 children aged between 12 and 60 months. The participants were categorized into two groups based on their predominant feeding practice: breastfed ($n = 58$) and bottle-fed ($n = 47$).

These were the following criteria for eligibility as study participants:

1. Inclusion Criteria
 - 1) Children aged 12-60 months
 - 2) Children with either predominant breastfeeding or bottle-feeding history
 - 3) Children accompanied by their mothers or primary caregivers
 - 4) Informed verbal or written consent obtained from the caregiver
2. Exclusion Criteria
 - 1) Children with mixed or indeterminate feeding practices (e.g., equal breastfeeding and bottle-feeding)
 - 2) Children with congenital dental anomalies or chronic systemic illnesses
 - 3) Children currently undergoing orthodontic or restorative dental treatment

- 4) Caregivers unwilling or unable to provide informed consent

2.1. Data Collection Procedure

Legal guardians of patients were asked to be included in the present study. Informed written consent was obtained after an explanation of the study procedure. Data were collected using a pretested, structured questionnaire designed to gather comprehensive information relevant to the study objectives. The questionnaire included sections on demographic details such as the child's age, gender, and socioeconomic status; feeding practices including duration, frequency, and night-time feeding; and oral hygiene habits like brushing frequency and method. It also covered clinical aspects, including the presence of early childhood caries (ECC), dmft (decayed, missing, filled teeth) scores, and signs of gingivitis. Additionally, mothers were asked about their knowledge regarding dental caries and the factors responsible for its development. Oral

examinations were performed by a trained dental professional using disposable dental instruments under natural light, following standard infection prevention and control protocols. The assessment of ECC was conducted according to the World Health Organization (WHO) criteria, and the severity of caries was evaluated using the dmft index.

2.2. Statistical Analysis

All data were systematically recorded using a pre-formatted data collection sheet. Quantitative variables were expressed as mean $\pm$ standard deviation, while qualitative variables were presented as frequencies and percentages. The Chi-square test was used to assess associations between categorical variables, and a p -value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 11 (Statistical Package for the Social Sciences). The Institutional Review Committee of City Dental College and General Hospital ethically approved the study.

3. Results

Table 1. Demographic Characteristics of the Study Population ($n = 105$).

Variable	Breastfed ($n = 58$)	Bottle-fed ($n = 47$)	p -value
Mean Age (months)	27.1 $\pm$ 6.4	29.3 $\pm$ 6.1	0.076
Gender			
Male	40 (68.9%)	34 (72.3%)	0.705
Female	18 (31.0%)	13 (27.6%)	
Socioeconomic Status			
Low	12 (20.7%)	8 (17.0%)	
Middle	33 (56.9%)	25 (53.2%)	0.632
High	13 (22.4%)	14 (29.8%)	
Mothers Education Level			
Illiterate	21 (36.2%)	17 (36.2%)	
Primary	11 (18.9%)	9 (19.1%)	
Secondary	9 (15.5%)	7 (14.9%)	
S.S.C	7 (12.1%)	5 (10.6%)	0.979
H.S.C	7 (12.1%)	6 (12.8%)	
Degree or Higher	3 (5.2%)	3 (6.4%)	

Table 1 shows that the mean age of bottle-fed children was slightly higher (29.3 $\pm$ 6.1 months) compared to breastfed children (27.1 $\pm$ 6.4 months), although this difference was not statistically significant ($p = 0.076$). Regarding gender distri-

bution, both groups had a higher proportion of males, 68.9% in the breastfed group and 72.3% in the bottle-fed group ($p = 0.705$). The majority of participants in both groups belonged to the middle-income category (56.9% in the breastfed group

vs. 53.2% in the bottle-fed group), with no statistically significant difference ($p = 0.632$). In terms of maternal education, illiteracy was equally prevalent in both groups (36.2%). Other educational levels, including primary, secondary, S.S.C.,

H.S.C., and degree or higher, were also similarly distributed, with no significant association between education level and feeding group ($p = 0.979$).

Table 2. Distribution of Study Children by Feeding Practices.

Feeding Practices	Breastfed (n = 58)	Bottle-fed (n = 47)	p-value
Duration of feeding >12 months	38 (65.5%)	34 (72.3%)	0.457
Night-time feeding (yes)	22 (37.9%)	36 (76.6%)	<0.001
Frequency of feeding ≥ 5 times/day	21 (36.2%)	30 (63.8%)	0.005

Table 2 illustrates the feeding practices of the study participants. A higher proportion of bottle-fed children (72.3%) were fed for more than 12 months compared to breastfed children (65.5%). Night-time feeding was significantly more prevalent among bottle-fed children (76.6%) than among

those who were breastfed (37.9%), with the difference being highly significant ($p < 0.001$). Additionally, a significantly greater proportion of bottle-fed children (63.8%) were fed five or more times per day compared to breastfed children (36.2%) ($p = 0.005$).

Table 3. Distribution of Study Children by Brushing Habits.

Brushing Habit	Breastfed (n = 58)	Bottle-fed (n = 47)	p-value
Never brush	3 (5.2%)	3 (6.4%)	0.793
Clean with finger only	6 (10.3%)	4 (8.5%)	0.756
Brush twice daily	17 (24.1%)	14 (23.4%)	0.934
Brush once daily	15 (25.9%)	13 (27.7%)	0.836
Brush once/twice per week	20 (34.5%)	16 (34.0%)	0.957

Table 3 shows the distribution of brushing habits among the two feeding groups. A small percentage of children in both groups never brushed their teeth (5.2% of breastfed vs. 6.4% of bottle-fed; $p = 0.793$). Similarly, 10.3% of breastfed and 8.5% of bottle-fed children cleaned their teeth using only their fingers ($p = 0.756$). Regular brushing twice a day was reported in 24.1% of breastfed and 23.4% of bottle-fed children ($p =$

0.934), while brushing once a day was noted in 25.9% and 27.7%, respectively ($p = 0.836$). Brushing once or twice a week was also similar between the groups (34.5% vs. 34.0%; $p = 0.957$). None of these differences were statistically significant, showing that oral hygiene practices are similar regardless of feeding method.

Table 4. Prevalence and Severity of Early Childhood Caries (ECC).

Caries Parameter	Breastfed (n = 58)	Bottle-fed (n = 47)	p-value
ECC Present	18 (31.0%)	29 (61.7%)	<0.001
Mean dmft score ($\pm$ SD)	1.3 $\pm$ 1.5	3.6 $\pm$ 2.0	<0.001
Caries in upper front teeth	4 (6.9%)	10 (21.3%)	0.031
Gingivitis	19 (32.7%)	6 (12.8%)	0.017

Caries Parameter	Breastfed (n = 58)	Bottle-fed (n = 47)	p-value
No dental problems	17 (29.3%)	2 (4.3%)	0.001

Table 4 shows that the prevalence of early childhood caries (ECC) was significantly higher in bottle-fed children (61.7%) compared to breastfed children (31.0%) ($p < 0.001$). The mean decayed, missing, and filled teeth (dmft) score was also significantly greater among bottle-fed children (3.6 ± 2.0) than breastfed children (1.3 ± 1.5) ($p < 0.001$). Caries in the

upper front teeth were more commonly observed in the bottle-fed group (21.3%) compared to the breastfed group (6.9%) ($p = 0.031$). Interestingly, gingivitis was more prevalent among breastfed children (32.7%) than bottle-fed children (12.8%) ($p = 0.017$).

Table 5. Association Between Feeding and Brushing Habits with ECC Status.

Parameters	ECC Present (n = 47)	ECC Absent (n = 58)	p-value
Feeding Frequency ≥ 5 /day	30 (63.8%)	21 (36.2%)	0.005
Night-time Feeding (yes)	36 (76.6%)	22 (37.9%)	<0.001
Never Brush / Clean with Finger / Brush 1-2 times a Week	30 (63.8%)	22 (37.9%)	0.008
Once or Twice Daily	19 (40.4%)	28 (59.6%)	0.051

Table 5 shows that a significantly higher proportion of children with ECC were fed five or more times per day (63.8%) compared to those without ECC (36.2%) ($p = 0.005$). Night-time feeding was also more prevalent among children with ECC (76.6%) than those without ECC (37.9%), and this association was highly significant ($p < 0.001$). Children with

ECC were more likely to have poor oral hygiene practices, including never brushing, cleaning with a finger, or brushing only once or twice a week (63.8%), compared to children without ECC (37.9%) ($p = 0.008$). In contrast, brushing once or twice daily was more common among children without ECC (59.6%) than those with ECC (40.4%).

Table 6. Maternal Knowledge Regarding Dental Caries and Its Causes (n = 105).

Knowledge Domain	Frequency (n)	Percentage (%)
General Knowledge about Dental Caries		
Poor	25	23.8%
Average	64	60.9%
Good	16	15.2%
Knowledge of Factors Responsible for Caries		
Correct Knowledge	35	33.3%
No Knowledge	53	50.5%
Irrelevant Answers	17	16.2%

Table 6 shows that out of 105 mothers, the majority demonstrated an average level of general knowledge about dental caries (60.9%), while 23.8% had poor knowledge and only 15.2% had good knowledge. When asked specifically

about the factors responsible for dental diseases, only 33.3% of mothers provided correct responses. Half of the respondents (50.5%) had no knowledge regarding causative factors, and 16.2% gave irrelevant answers. These findings indicate a

general lack of awareness and highlight the need for improved oral health education among caregivers.

4. Discussion

This study assessed the prevalence of early childhood caries (ECC) and associated oral health behaviors among breastfed and bottle-fed children attending the outpatient department of City Dental College and Hospital, Dhaka.

The mean age of bottle-fed children was slightly higher than that of breastfed children, although the difference was not statistically significant. Gender distribution was also similar, with a predominance of male children in both groups. Most participants belonged to middle-income households, and no significant association was found between socioeconomic status or maternal education level and infant feeding practices.

In terms of oral health conditions, the overall prevalence of dental caries was 44.8%, followed by gingivitis (23.8%) and caries in the upper front teeth (13.3%). This prevalence is lower than the national findings by A. M. Bhuiyan (74.76%) and international findings by Fatima et al. (80%) [20, 21]. Caries was most commonly observed among children aged 3-5 years (30.4%), which slightly differs from Bhuiyan's study, where children under five had the highest prevalence [20]. Fatima et al. similarly found peak prevalence at age five (80%) [21].

Supporting these observations, Qadri et al. reported caries in 70% of children, with a mean DMFT score of 4.25 ± 4.2 [15]. Du M et al. found that 45% of children were caries-free, while 14% had rampant caries, with mean dmft and dmfs scores of 2.57 and 4.25, respectively. The prevalence and severity of caries were noted to increase with age [13]. Another study by Du et al. reported 36% caries prevalence, 7% rampant caries, and 12% of children having extensive caries involving both primary molars and anterior teeth [22].

In this study, the mean dmft score was significantly higher in bottle-fed children (3.6 ± 2.0) than in breastfed children (1.3 ± 1.5) ($p < 0.001$). This is consistent with Qadri et al.'s findings, which showed a higher mean DMFT among bottle-fed children (5.33 ± 4.6) compared to breastfed children (3.27 ± 3.5) [15].

Night-time feeding and higher feeding frequency were both significantly associated with ECC in this study, emphasizing the role of prolonged exposure to fermentable carbohydrates in caries development. These results are supported by earlier studies that identified prolonged bottle use and night-time feeding as important risk factors for ECC [23, 24]. Du et al. found significant predictors of caries included geographic location, age, maternal education, and feeding fruit juice from a bottle [13]. Qadri et al. similarly identified age and feeding practices as significant risk factors ($p < 0.001$) [15]. Another study by Du et al. found that children who were exclusively bottle-fed had five times the risk of developing rampant caries compared to breastfed children [22].

The prevalence of ECC in this study was significantly higher among bottle-fed children (61.7%) compared to

breastfed children (31.0%) ($p < 0.001$). Qadri et al. also reported a significantly higher prevalence and severity of ECC among bottle-fed children (z-statistic = -2.1; $p = 0.036$) [15]. Majorana et al. found significantly lower caries prevalence among toddlers who were exclusively or predominantly breastfed compared to those who were formula-fed ($p < 0.01$) [6].

Oral hygiene practices were generally inadequate. Children with ECC were significantly more likely to never brush their teeth, use fingers for cleaning, or brush infrequently. In contrast, brushing once or twice daily was more common among children without ECC, emphasizing the protective role of regular oral hygiene. These findings align with Islam M. H. and Kaimenyl's work, which also reported lower dental disease rates with more frequent brushing [25, 26]. Du et al. found that children from rural areas, where brushing was less regular, had higher caries experience than urban children. The findings further support that caregivers often assume breastfeeding carries a lower caries risk, possibly leading to neglect of hygiene practices [13].

Parental knowledge was also a significant factor. While 60.9% of mothers had average knowledge of dental caries, only 15.2% had good knowledge, and just one-third could correctly identify the causes of dental diseases. Over half were unaware or gave irrelevant responses. Similar patterns were reported by Awal et al. and Alam, who highlighted that poor caregiver awareness contributes significantly to pediatric dental disease burden [27, 28].

Caries prevalence was also higher among male children, which corresponds with findings by Alam [28]. Gingivitis was more prevalent in males as well, consistent with the findings of Khandaker, who reported a prevalence of 21.33% among boys [29].

Maternal education showed a clearer impact, with higher rates of dental caries and gingivitis among children whose mothers had only primary education. This aligns with the study by Hinds K, which associated lower maternal education and poor socioeconomic conditions with increased dental disease in children [30].

Further, knowledge about oral hygiene among mothers had a notable influence. Those with poor knowledge had children with a higher prevalence of caries, a finding echoed in the work of Lange D. E., who emphasized that awareness of oral hygiene is crucial for disease prevention [31]. Nijel A. E. also demonstrated a 65% reduction in caries in children whose mothers received preventive oral health education compared to those who did not [32].

Begum highlighted a changing trend in the distribution of dental caries, which was once more prevalent among the affluent but is now increasingly affecting rural and low-income populations in Bangladesh. While developed nations have achieved a 40% reduction in dental caries over the last decade through effective preventive strategies, its prevalence is rising in developing countries [33]. This shift highlights the urgent need for organized oral health education programs and accessible dental

care services in resource-limited settings like Bangladesh.

5. Limitations of the Study

This study had several limitations. First, this study was conducted at a single center; the results might not fully represent the wider population, especially in rural or community areas. Secondly, the sample size was relatively small, which may limit the generalizability of the results. Lastly, some parents were hesitant to participate fully in the interviews, perceiving no immediate benefit from the study. As a result, their responses may not have truly reflected their actual knowledge, attitudes, or practices regarding oral health, which could have introduced response bias.

6. Conclusion and Recommendations

This study found that bottle-feeding, especially when frequent and during nighttime, was significantly associated with a higher prevalence and severity of early childhood caries (ECC). While brushing habits were similar between groups, poor oral hygiene and limited maternal knowledge about dental health were more common among children with ECC. These findings highlight the importance of promoting breastfeeding, reducing cariogenic feeding behaviors, and improving caregiver awareness to prevent ECC in young children.

Further study with a prospective and longitudinal study design, including a larger sample size, needs to be done to validate the findings of this study.

Abbreviations

ECC	Early Childhood Caries
WHO	World Health Organization
SPSS	Statistical Package for the Social Sciences

Author Contributions

Mohammad Ashiqur Rahman: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft

Mohammad Ashfaqur Rahman: Methodology

Mamta Rukhsana: Investigation, Project administration

Fatima-Tuz-Johora Tamanna: Data curation

Rahnoma Islam: Resources

Zunaid Ahmed: Formal Analysis

Anjuman Ara Yasmin Khan: Software, Supervision

Rezwana Binte Anwar: Data curation, Writing – original draft

Nawshin Salsabil Roja: Funding acquisition, Resources, Validation

Ethical Approval

This study was ethically approved.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] 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(11): e0142922.
- [2] Public Health England. National Dental Epidemiology Programme for England: oral health survey of five-year-old children in 2012 - a report of prevalence and severity of dental decay. London: Crown Publications; 2013. Available from: <http://www.nwph.net/dentalhealth/Oral%20Health%205yr%20old%20children%202012%20final%20report%20gateway%20approved.pdf>
- [3] Health Ministry, Health Care Office, Surveillance Registry on Health. SB Brazil Project: oral health status of the population 2010 - main results. [In Portuguese]. Available from: http://dab.saude.gov.br/CNSB/sbbrasil/arquivos/projeto_sb2010_relatorio_final.pdf
- [4] Tyagi R. The prevalence of nursing caries in Davangere pre-school children and its relationship with feeding practices and socioeconomic status of the family. *J Indian Soc Pedod Prev Dent*. 2008; 26: 153-7.
- [5] Dye B, 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; 191: 1-8.
- [6] Majorana A, Cagetti MG, Bardellini E, Amadori F, Conti G, Strohenger L, Campus G. Feeding and smoking habits as cumulative risk factors for early childhood caries in toddlers, after adjustment for several behavioral determinants: a retrospective study. *BMC Pediatr*. 2014; 14: 45.
- [7] Horta B, Victora C. Long-term effects of breastfeeding: a systematic review. Geneva: World Health Organization; 2013.
- [8] Kramer MS, Chalmers B, Hodnett ED, Sevkovskaya Z, Dzidovich I, Shapiro S, et al. Promotion of Breastfeeding Intervention Trial (PROBIT): a randomized trial in the Republic of Belarus. *JAMA*. 2001; 285(4): 413-20.
- [9] Hermont A, Martins C, Zina L, Auad S, Paiva S, Pordeus I. Breastfeeding, bottle feeding practices and malocclusion in primary dentition: a systematic review of cohort studies. *Int J Environ Res Public Health*. 2015; 12: 3133-51.
- [10] World Health Organization, UNICEF. Global strategy for infant and young child feeding. Geneva: WHO; 2003. Available from: <http://www.who.int/nutrition/publications/infantfeeding/9241562218/en>

- [11] Corrêa-Faria P, Martins-Júnior PA, Vieira-Andrade RG, Marques LS, Ramos-Jorge ML. Factors associated with the development of early childhood caries among Brazilian preschoolers. *Braz Oral Res.* 2013; 27: 356-62.
- [12] Perera PJ, Fernando MP, Warnakulasooriya TD, Ranathunga N. Effect of feeding practices on dental caries among preschool children: a hospital based analytical cross sectional study. *Asia Pac J Clin Nutr.* 2014; 23: 272-7.
- [13] Du M, Luo Y, Zeng X, Alkhabit N, Bedi R. Caries in preschool children and its risk factors in 2 provinces in China. *Quintessence Int.* 2007; 38: 143-51.
- [14] Plonka KA, Pukallus ML, Barnett AG, Holcombe TF, Walsh LJ, Seow WK. A longitudinal case-control study of caries development from birth to 36 months. *Caries Res.* 2013; 47: 117-27.
- [15] Qadri G, Nourallah A, Splieth C. Early childhood caries and feeding practices in kindergarten children. *Quintessence Int.* 2012; 43: 503-10.
- [16] Declerck D, Leroy R, Martens L, Lesaffre E, Garcia-Zattera MJ, Vander Broucke S, et al. Factors associated with prevalence and severity of caries experience in preschool children. *Community Dent Oral Epidemiol.* 2008; 36: 168-78.
- [17] Valaitis R, Hesch R, Passarelli C, Sheehan D, Sinton J. A systematic review of the relationship between breastfeeding and early childhood caries. *Can J Public Health.* 2000; 91: 411-7.
- [18] Harris R, Nicoll AD, Adair PM, Pine CM. Risk factors for dental caries in young children: a systematic review of the literature. *Community Dent Health.* 2004; 21(1 Suppl): 71-85.
- [19] Al-Jewair TS, Leake JL. The prevalence and risks of early childhood caries (ECC) in Toronto, Canada. *J Contemp Dent Pract.* 2010; 11: 1-8.
- [20] Bhuiyan AM. Prevalence of dental diseases in Bangladesh. *Bangladesh Dent J.* 1989; 5: 21-43.
- [21] Fahmida A. The dental caries consensus conference. *Teachers Assoc J.* 2001; 2: 12-4.
- [22] Du M, Bian Z, Guo L, Holt R, Champion J, Bedi R. Caries patterns and their relationship to infant feeding and socio-economic status in 2-4-year-old Chinese children. *Int Dent J.* 2000 Dec; 50(6): 385-9.
- [23] Begum A. Changing trends of dental caries prevalence. *Bangladesh Dent J.* 1984-85; 3(8): 18-20.
- [24] Jalil KA. Dental caries: role of fluoride in Bangladesh. *Bangladesh Dent J.* 1988-89; 5(1): 25-7.
- [25] Islam MH. A study on oro-dental hygiene among the 500 primary school children in a rural area of Bangladesh [dissertation]. Dhaka: NIPSOM; 1987. p. 22-31.
- [26] Kaimenyi JT, Ndungu FL, Maind SW, Chindia M. Oral hygiene habit and dental health awareness of Kenyan children aged 9-15 years in a peri-urban and urban school. *East Afr Med J.* 1993 Feb; 70(2): 67-70.
- [27] Awal MA, Shahidullah. Knowledge of mothers about dental caries and its prevention in a selected urban area. *J Prev Soc Med.* 1997; 16(1): 7-10.
- [28] Alam MR, Sarkar AM. Prevalence of dental caries of a rural primary school children. *Teachers Assoc J.* 1988; 1(1): 14-7.
- [29] Khandaker MMH. Prevalence of gingivitis and its relationship with oral hygiene. *Bangladesh Dent J.* 1997; 12: 60-5.
- [30] Hinds K. A national nutritional, dietary and dental survey. *East Afr Med J.* 2000; 11: 17-21.
- [31] Lange DE. The practical approach to improved oral hygiene. *Int Dent J.* 1988 Sep; 38(3): 154-62.
- [32] Nizel AE. Nutrition in preventive dentistry: science and practice. 2nd ed. Philadelphia: WB Saunders; 1972. p. xii-506.
- [33] Begum J, Barman A, Bhuiyan SA, Rahman AJ. Dental caries in primary school children in rural areas of Dhaka. *Bangladesh Med Res Counc Bull.* 1987 Dec; 13(2): 80-4.