Correlation of Feeding Practices and Dental Caries among Preschool Children of Jazan, KSA: A Cross-sectional Study

Zarah AH Dahas, Huda AJ Khormi, Satish Vishwanathaiah, Prabhadevi Maganur, Alhassan AA Owis, Sanjeev B Khanagar, Wejdan AM Alowi

ABSTRACT

Objective: Breastfeeding is integral for the healthy development of infants during the first year of life. The objective of this study was to investigate the feeding practices and their effect on dental health among Saudi children in rural Jazan, the southern region of Saudi Arabia.

Materials and methods: A cross-sectional study was conducted among 330 participants from two villages namely Baish and Abu-Areesh of Jazan Province, Kingdom of Saudi Arabia. Mothers whose children were above 2 years of age agreed for a face-to-face interview to discuss about feeding practices followed for their children. Later, these children underwent a complete dental examination.

Results: In this study, it was found that a majority of mothers, 203 (61.15%) of them breastfed their children for less than a year, 105 (31.8%) of them breastfed for 2 to 4 years, and the remaining 22 (6.6%) of them breastfed for more than 4 years. Two hundred and forty-nine (75.15%) of them breastfed for more than 6 months of age. Numerous studies have been carried out in Saudi Arabia regarding infant feeding practices. The studies reported that infant feeding among mothers in the country is less than optimal.3 The research conducted at a University Hospital in western Saudi Arabia regarding infant feeding practices reported that breastfeeding rates were 90% for infants in the first 6 months of life but dropped to 72% soon after that.

Mothers gave various justifications for such drastic drop in rates, such as inadequate milk supply (50%), their role as working mothers (12.7%), and lifestyle (10%), which prevented them from exclusively breastfeeding kids during the first 6 months. It was noted that the most common impediment to sustain breastfeeding through the recommended period was the general misconception among mothers regarding adequacy of milk supply.1 In another recent study (2014) regarding breastfeeding practices adopted by Saudi mothers, babies were mixed fed (introduction of feeding bottle) along with other weaning foods for up to 2 years or later.1,2 Mothers regarding adequacy of milk supply. 3 In another recent study, the most common impediment to sustain breastfeeding through the first 6 months of life but dropped to 72% soon after that. Mothers gave various justifications for such drastic drop in rates, such as inadequate milk supply (50%), their role as working mothers (12.7%), and lifestyle (10%), which prevented them from exclusively breastfeeding kids during the first 6 months. It was noted that the most common impediment to sustain breastfeeding through the recommended period was the general misconception among mothers regarding adequacy of milk supply.1 In another recent study (2014) regarding breastfeeding practices adopted by Saudi mothers, babies were mixed fed (introduction of feeding bottle)

Introduction

The importance and necessity of breastfeeding is well-established globally. In Saudi Arabia, the law is based on the Quran and the Hadiths, or the sayings of Prophet Muhammad. The Quran instructs its followers to breastfeed children for 2 complete years saying that “The mothers shall give suck to their offspring for two whole years for him who desires to complete the term. But he shall bear the cost of their food and clothing on equitable terms” (2:233). The World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) recommend that mothers should breastfeed babies exclusively for the first 6 months and then continue breastfeeding along with other weaning foods for up to 2 years or later. Mothers should slowly start introducing semisolid and solid foods soon after the infant completes 6 months of age. Numerous studies have been carried out in Saudi Arabia regarding infant feeding practices. The studies reported that infant feeding among mothers in the country is less than optimal.3 The research conducted at a University Hospital in western Saudi Arabia regarding infant feeding practices reported that breastfeeding rates were 90% for infants in the first 6 months of life but dropped to 72% soon after that. Mothers gave various justifications for such drastic drop in rates, such as inadequate milk supply (50%), their role as working mothers (12.7%), and lifestyle (10%), which prevented them from exclusively breastfeeding kids during the first 6 months. It was noted that the most common impediment to sustain breastfeeding through the recommended period was the general misconception among mothers regarding adequacy of milk supply.1 In another recent study (2014) regarding breastfeeding practices adopted by Saudi mothers, babies were mixed fed (introduction of feeding bottle)

Conclusion: Prevalence of dental caries was high in children who were fed during sleep and also in those kids using pacifiers containing sugar. Oral hygiene practices were also inadequate and positively associated with dental caries. These findings are suggestive of developing general and oral health interventions for children and also educating mothers on appropriate feeding practices.

Keywords: Bottle feeding, Breastfeeding, Dental caries, Oral hygiene.

International Journal of Clinical Pediatric Dentistry (2020): 10.5005/jp-journals-10005-1784

© The Author(s). 2020 Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and non-commercial reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.
Impact of Feeding Practices on Oral Health Status

Materials and Methods
A cross-sectional study was carried out in two villages namely Baish and Abu-Areesh of Jazan Province, Kingdom of Saudi Arabia. Before starting the study, ethical clearance was obtained from the Institutional Review Board (IRB). The sample size required for this study was estimated with a power of 80% and a 95% confidence interval for the prevalence of 50%. Thus, the sample size needed for this study was 330 subjects from both genders. Written informed consent was obtained from the willing participants and data required for the study were collected from the subjects’ moms through a face-to-face interview regarding feeding practices followed for their kids with the help of a self-administered structured questionnaire. Following this, the kids were subject to a complete dental examination with the help of a mouth mirror, a probe, and a flashlight.

The questionnaire consisted of three sections. The first section probed into the demographic details of the kid including the kid’s age and gender followed by the second section which included parent-related information. This consisted of in-depth information on the feeding practices and oral hygiene practices followed by mothers every time during/after a feed. The third section dealt with the dental caries status of the child.

The respective psychometric properties (validity and reliability) of the questionnaire were assessed. Content validity was evaluated by a panel of eight experts which included faculty members. The main purpose was to depict those items with a high degree of agreement among experts. Aiken’s V test was used to quantify the concordance between experts for each item and values higher than 0.88 were obtained for all the questions. The feasibility of the questionnaire was assessed by conducting a pilot study among patients attending the college’s dental clinic.

Intraoral examination was conducted using standard infection control protocol by four dental students who were trained and calibrated to assess the presence of dental caries in the Public Dental Health, division of Preventive Dental Science Department, College of Dentistry, Jazan University, Kingdom of Saudi Arabia.

Data were entered and analyzed using SPSS version 21 (IBM Corporation, Armonk, New York, USA). Since all variables described in the questionnaire are categorical variables, data were summarized as proportions. Descriptive statistics was calculated; the chi-square test was used to compare demographic data with the feeding practices and oral hygiene practices; and $p < 0.05$ was considered as statistically significant.

Results
In the present study, a total of 330 filled questionnaires were analyzed and the response rate was 100.

Table 1 shows descriptive analysis of study variables.

| Study variable                  | Percentage | Frequency (N) |
|---------------------------------|------------|---------------|
| Gender                          |            |               |
| Male                            | 34.2       | 113           |
| Female                          | 65.8       | 217           |
| Type of feeding                 |            |               |
| Natural                         | 15.2       | 50            |
| Artificial                      | 9.4        | 31            |
| Both                            | 75.45      | 249           |
| Feeding during sleep            |            |               |
| Yes                             | 65.15      | 215           |
| No                              | 34.84      | 115           |
| Time of ceasing breastfeeding   |            |               |
| Less than a year                | 61.51      | 203           |
| Between 2 and 4 years           | 31.8       | 105           |
| Between 5 and 6 years           | 3.3        | 11            |
| More than 6 years               | 3.3        | 11            |
| Have you ever noticed a tooth decay in your child? | | |
| Yes                             | 26.66      | 88            |
| No                              | 13.33      | 44            |
| Don’t know                      | 60         | 198           |
| Do you brush your child’s teeth after feeding? | | |
| Yes                             | 34.84      | 115           |
| No                              | 65.15      | 215           |
| Do you add sugar while feeding? |            |               |
| Yes                             | 75.5       | 249           |
| No                              | 24.5       | 81            |
| Do you use a pacifier?          |            |               |
| Yes                             | 50.61      | 167           |
| No                              | 9.7        | 32            |
| Don’t know                      | 39.6       | 131           |
| Do you add sugar to the pacifier? |          |               |
| Yes                             | 78.4       | 259           |
| No                              | 16         | 53            |
| Don’t know                      | 5.4        | 18            |

N—Total number of respondents

When mothers were enquired about how long they continued to breastfeed their kids, surprisingly 203 (61.15%) mothers reported that they fed their children for less than a year, 105 (31.8%) of them reported that they fed for 2 to 4 years, and the remaining 22 (6.6%) of them responded that they fed for more than 4 years. An enquiry was also conducted among mothers if they had ever noticed tooth decay in their children for which only 88 (26.66%) of them responded as yes and 44 (13.33%) replied as no while a majority of them (198 which is 60%) were unsure about it.

Only 115 (34.84%) mothers reported that they brushed their child’s teeth after feeding and the remaining 215 (65.15%) mothers reported not following this practice.

A majority of 249 (75.15%) mothers reported that they added sugar to milk while feeding, whereas only 81 (24.5%) mothers clearly informed that they had never ever added sugar to milk before a feed. A total of 167 (50.61%) mothers used pacifiers, 32 (9.7%) mothers never used pacifiers, and 131 (39.6%) mothers were not aware of pacifiers. Two hundred and fifty-nine (78.4%) mothers...
reported using sugar with pacifiers, 53 (16%) of them did not use sugar with pacifiers, and 18 (5.4%) of them were unaware of pacifiers. Table 2 describes the association of gender with study variables.

A statistically significant difference was seen between the gender and feeding while sleeping with a \( p = 0.001 \), tooth decay with a \( p = 0.019 \), adding sugar while feeding with a \( p = 0.001 \), with the use of pacifier with a \( p = 0.001 \).

No statistically significant difference was seen between gender and type of feeding, duration of breastfeeding, brushing the child’s teeth after feeding, or adding sugar to milk while using a pacifier. Table 3 describes the relationship between feeding habits and tooth decay.

Kids suffered from increased tooth decay when they were fed using a combination of both natural and artificial methods of feeding but the results were not statistically significant. Increased incidence of caries was seen with a statistically significant difference in children who were fed during sleeping with a \( p \) value of 0.038, when child’s teeth were not brushed after feeding with a \( p \) value of 0.004, when sugar was added while feeding with a \( p \) value of 0.001, with the use of pacifier as well as adding sugar with pacifier with a \( p \) value of 0.001. It was also observed that there was an increase in tooth decay rates among kids when breastfeeding did not continue up to the child’s first birthday but this increase in rate was simply insignificant.

**DISCUSSION**

Breastfeeding is recognized as the optimal nutrition for infant health and development. World Health Organization recommends that women exclusively breastfeed their kids for a full 6 months and then continue breastfeeding them for at least 24 months and beyond along with introducing healthy solid and semisolid foods. In Saudi Arabia, the law is based on the Quran and the Hadiths, or the sayings of Prophet Muhammad. The holy book instructs its followers that breastfeeding must be performed until 2 years of age.

There are numerous studies that have elaborated that breastfeeding is not only beneficial for infants but also beneficial for mothers in various ways. The mom is at a reduced risk of diseases and could even enjoy blissful weight loss when she breastfeeds her infant. Breastfed children, on the contrary, receive ideal nutrition, are at a reduced risk of diseases, loaded with essential antibodies, promote normal weight distribution, and are at a minimal risk of obesity. Breast milk is rich in protein content but low in sugar content. Studies have shown that sugar-containing breast milk might be cariogenic causing tooth decay. Dental caries is a major oral health problem that affected more than 2.4 billion people (more than quarter of the world’s population) worldwide in the year 2010. A high prevalence of dental caries was evident among children in Saudi Arabia with an estimated prevalence of approximately 80%. Other areas that top

**Table 2:** Gender variation of the study variables

| Variable                        | Gender |  |  | p value |
|---------------------------------|--------|---|---|--------|
|                                 | Male   | Female |  |         |
| Type of feeding                 |        |        | 0.305 |         |
| Natural                         | 13     | 37     |      |         |
| Artificial                      | 13     | 18     |      |         |
| Both                            | 87     | 162    |      |         |
| Feeding while sleeping          |        |        | 0.001* |         |
| Yes                             | 97     | 118    |      |         |
| No                              | 16     | 99     |      |         |
| Time of ceasing breastfeeding   |        |        | 0.179 |         |
| Less than a year                | 64     | 139    |      |         |
| Between 2 and 4 years           | 44     | 61     |      |         |
| Between 5 and 6 years           | 3      | 8      |      |         |
| More than 6 years               | 2      | 9      |      |         |
| Have you noticed a tooth decay in your child? |        |        | 0.019* |         |
| Yes                             | 37     | 51     |      |         |
| No                              | 20     | 24     |      |         |
| Don’t know                      | 56     | 142    |      |         |
| Do you brush your child’s teeth after feeding? |        |        | 0.224 |         |
| Yes                             | 34     | 81     |      |         |
| No                              | 79     | 136    |      |         |
| Do you add sugar while feeding? |        |        | 0.001* |         |
| Yes                             | 104    | 145    |      |         |
| No                              | 9      | 72     |      |         |
| Do you use a pacifier?          |        |        | 0.001* |         |
| Yes                             | 38     | 129    |      |         |
| No                              | 10     | 22     |      |         |
| Don’t know                      | 65     | 66     |      |         |
| Do you add sugar to the pacifier? |        |        | 0.389 |         |
| Yes                             | 84     | 175    |      |         |
| No                              | 21     | 32     |      |         |
| Don’t know                      | 8      | 10     |      |         |

*Significant p value obtained using Chi-square analysis

**Table 3:** Relation of feeding habits with tooth decay

| Feeding habits | Tooth decay | p value |
|----------------|-------------|---------|
|                | Yes | No |   |
| Type of feeding |  |  | 0.268 |
| Natural         | 39  | 11 |   |
| Artificial      | 27  | 4  |   |
| Both            | 216 | 33 |   |
| Feeding while sleeping |  |  | 0.038* |
| Yes             | 162 | 44 |   |
| No              | 109 | 15 |   |
| Time of ceasing breastfeeding |  |  | 0.221 |
| Less than a year | 145 | 27 |   |
| Between 2 and 4 years | 94  | 11 |   |
| Between 5 and 6 years | 8  | 3  |   |
| More than 6 years | 8  | 3  |   |
| Do you brush your child’s teeth after feeding? |  |  | 0.004* |
| Yes             | 75  | 27 |   |
| No              | 199 | 29 |   |
| Do you add sugar while feeding? |  |  | 0.001* |
| Yes             | 134 | 68 |   |
| No              | 47  | 81 |   |
| Do you use a pacifier? |  |  | 0.001* |
| Yes             | 74  | 96 |   |
| No              | 18  | 14 |   |
| Don’t know      | 98  | 30 |   |
| Do you add sugar to the pacifier? |  |  | 0.001* |
| Yes             | 156 | 48 |   |
| No              | 49  | 13 |   |
| Don’t know      | 35  | 29 |   |

*Significant p value obtained using Chi-square analysis
Impact of Feeding Practices on Oral Health Status

the dental caries risk chart include Latin America, Middle East, and South Asia. The WHO emphasizes the need to reduce the global burden of dental caries to benefit from optimal health. Consequently, in the year 2003, WHO and Fédération Dentaire Internationale (FDI) World Dental Federation set global goals for achieving better oral health by 2020 for guide planners and policymakers requesting them to improve the oral health status in their respective population.

Unfortunately, knowledge gaps concerning the availability of baseline data on oral health and population-specific key modifiable factors for dental caries restrict the ability of many developing nations and semi-developed countries, including Saudi Arabia, to achieve the goals set by WHO. Most importantly, caries affecting deciduous tooth is known as early childhood caries (ECC). This is one of the major concerning factors regarding the oral health of growing kids. The causative factors of ECC include prolonged feeding habits and bottle feeding. Pediatric dentistry organizations, such as the American Academy of Paediatric Dentistry and the Japanese Society of Paediatric Dentistry, referred to breastfeeding as a potential risk for ECC in their policy statements. Whereas, reviews of epidemiological studies have found the relationship between breastfeeding and ECC to be inconclusive. A few studies suggest that breastfeeding may promote dental caries while other studies have not found any association. Therefore, we sought to examine the association between breastfeeding and feeding practices, and their effect on dental caries.

**Feeding Practices in Infants**

Most mothers included in our study fed their kids naturally as well as artificially. The results here were similar to the survey conducted by Abdulaziz et al., who observed that 68.4% mothers used mixed feedings. Mothers who used mixed feedings informed that they fed their kids artificially during daytime and naturally during nighttime. Such characteristics of partial breastfeeding was also seen in the study performed by Ogbeide et al., but none of the studies including ours could ascertain the amount of time an infant was fed naturally (breastfed) or artificially (infant formula) and the rate of breastfeeding initiation. It was very clear that, a greater number of children were fed during sleeping. This was in stark contrast with a survey conducted in Australia which showed that breastfeeding moms slept by their infant's side to facilitate easy nighttime feedings compared to those who formula-fed their children.

A majority of mothers stopped breastfeeding by the child's first year of age which reinstates the importance of breastfeeding even more than before. Human milk should be the standard and exclusive method of infant feeding during the first part of an infant's life for healthy upbringing of children. But this practice is not even close to WHO recommendations. Our study results were similar to the study results of Al-Jassir et al., who observed that mothers continued to breastfeed beyond the recommended 6 months. The primary reason for ceasing breastfeeding beyond 1 year was mainly due to insufficient milk supply from the breastfeeding mom.

Our study clearly showed that breastfeeding mothers were unaware of the simple ways of maintaining their child's teeth after feeding or were not even close to realizing the presence of a decay in their baby's teeth. This might be mainly due to certain factors, such as socioeconomic status, parents' education levels, and access to proper dental care facilities. Motivating and educating new mothers to follow oral hygiene care practices soon after every feed is the need of the hour. Most mothers who added sugar while feeding followed mixed feeding habits. Previous study results showed that 40% kids were on mixed feeding practices (breast as well as bottle feeding) and 5% were fed on bottle during their first month of life. The habit of using pacifiers and adding sugar with pacifiers was a common occurrence in our study. The sad fact here is that mothers are often not advised to refrain from using pacifiers until after breastfeeding has been well-established. The importance of using pacifiers and its effects on the infant's oral healthcare must be clearly explained to every new mother. The use of pacifiers might be a marker of various difficulties faced during breastfeeding including reduced stimulation during breastfeeding rather than being simply a cause for early introduction of top feeding. The primary disadvantage of using pacifiers includes early cessation of breastfeeding. A study conducted by Pineda et al. revealed that it was the low-socioeconomic status group that had higher usage of pacifiers.

**Feeding Habits and Dental Caries**

We observed dental decay in kids who were fed naturally as well as artificially and, also in those children, who were fed during sleeping. This may be due to milk formula supplementation and fluids alongside the concentration of sugar in such supplements. Prolonged bottle feeding or breastfeeding during nighttime, contact of milk to the tooth surface for a longer time than needed and improper oral hygiene practices are few important factors that contribute to the development of carious lesions. The first eruption of primary tooth occurs around 6 months of age and is at a serious risk of exposure to bovine milk or supplements. Such continuous exposure and pooling of milk around the tooth are primary contributors toward dental caries.

Many studies have shown no relationship between natural feeding (breastfeeding) and dental caries. Recent studies in the UK and US have shown that human and bovine milk can cause dental caries, but the prevalence rate is very less. This might be because of both breast or bottle feeding during daytime and nighttime that prolonged for a continuous period of until at least 24 months. In our study, the prevalence of dental caries was predominantly seen in those children who were breastfed for 1 year continuously. The results were similar to a survey conducted by Kato et al., who observed that exclusively/partially breastfed infants for a period of atleast 6 to 7 months were at an elevated risk of dental caries. But the same results are in complete contrast with studies performed by Kramer et al., Nunes et al., and Iida et al. who proved that breastfeeding history (exclusive, partial, or mixed) had nothing to do with early childhood dental caries. Quite a few other studies by Tham et al., Benjamin et al., Peres et al., and Tanaka and Miyake showed that breastfeeding continuously for >18 months was associated with an increased risk of caries.

**Pacifier and Dental Caries**

Studies have shown that the use of pacifiers for a prolonged period may cause dental caries, and some confusion exists whether sweetened milk or sweet substance applied to the pacifier leads to dental caries. A study conducted by Peressini does not prove a stable association between pacifier use and ECC. Our research showed that the risk of caries occurrence was greater when mothers used pacifiers with/without sugar applied on it. Some other studies conducted by Petti et al. and Serwint et al. observed that use of sweetened pacifiers increased the risk of dental caries. We could not establish the time of application, the duration of use of pacifiers, and also whether the pacifier was used during nighttime or daytime. Some of these factors need to be studied thoroughly and results fetched accurately to arrive at a conclusion whether or not pacifiers are involved in the occurrence of dental caries.
Limitations
As feeding history was obtained retrospectively from mothers in a face-to-face interview, there is a constant possibility of a recall bias which is a primary limitation. Other factors that certainly could affect oral health status include socioeconomic status and general health of the mother during lactation period. Oral hygiene and dietary practices of children can have a lasting impact on their dental caries experience.

Conclusion
In the present study, it was noticed that most mothers preferred both artificial feed and natural feed methods. It was also observed that feeding practices continued for a maximum period between 1 year to 6 years. Highest occurrence of dental caries was seen in those kids who were fed during sleep and also in children who were fed with pacifiers containing sugar. Children, or mothers of these kids, did not adhere to suggested oral hygiene practices and hence, a greater number of kids suffered from dental caries. These findings suggest that it is better to develop general and oral health interventions for such children with utmost emphasis given on educating mothers on appropriate feeding practices.

Further studies with more elaborate breastfeeding assessment methods are essential to determine the cariogenic nature of breastfeeding. Meanwhile, given the numerous benefits of breastfeeding, mothers should definitely be encouraged to breastfeed their infants.

Acknowledgment
We would like to thank Dr Fatima El-Hassan for her guidance during the study.

References
1. Innocenti declaration. Geneva, World Health Organization and United Nations Children’s Fund; 1990.
2. Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding. Results of a systematic review. Geneva, World Health Organization, Department of Nutrition for Health and Development and Department of Child and Adolescent Health and Development, 2001 (WHO/NHD/01.08 and WHO/FCH/CAH/01.23).
3. Al Jassir MS, El-Bashir BM, Moizuddin SK, et al. Infant feeding in Saudi Arabia: mothers’ attitudes and practices. Nutrit Health 17(2):123–130.
4. Shahbar A, Factors associated with breastfeeding in western of Saudi Arabia. A thesis presented in partial fulfilment of the requirements for the degree of master’s in human nutrition at Massey University Palmerston North, New Zealand.
5. Avila WM, Pordeus IA, Paiva SM, et al. Breast and bottle feeding as risk factors for dental caries: a systematic review and meta-analysis. 2015. PLoS ONE 10(11):e0142922. DOI: 10.1371/journal.pone.
6. Agili DE. A systematic review of population-based dental caries studies among children in Saudi Arabia. Saudi Dent J 2013;25(1):3–11. DOI: 10.1016/j.sdentj.2012.10.002.
7. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century—the approach of the WHO global oral health programme. Commum Dent Oral Epidemiol 2003;31(Suppl) 1–3–23. DOI: 10.1046/j.2003.com122.x.
8. Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequela of 289 diseases and injuries 1990-2010: a systematic analysis for the global burden of disease study 2010. Lancet 2012:380(9859):2163–2196. DOI: 10.1016/S0140-6736(12)61729-2.
9. Hobdell M, Petersen PE, Clarkson J, et al. Global goals for oral health 2020. Int Dent J 2003;53(5):285–288. DOI: 10.1111/j.1875-595x.2003.tb00761.x.
10. Alhabdan YA, Albeshr AG, Yenugadhatiand N, et al. Prevalence of dental caries and associated factors among primary school children: a population-based cross-sectional study in Riyadh, Saudi Arabia. Environ Health Prevent Med Envir Health Prev Med 2018;23(1):60. DOI: 10.1186/s12199-018-0750-z.
11. El Mouzan MI, Al Omar AA, Al Salloum AA, et al. Trends in infant nutrition in Saudi Arabia: compliance with WHO recommendations. Ann Saudi Med 2009;29(1):20–23. DOI: 10.4103/0256-4947.51812.
12. Reilly JJ, Wells JCK. Duration of exclusive breastfeeding: introduction of complementary food may be necessary before 6 months of age. Br J Nutr 2005;94(6):869–872. DOI: 10.1079/bjn20051601.
13. Fewtrell MS, Morgan JB, Duggan C, et al. Optimal duration of breastfeeding: what is the evidence to support current recommendations? Am J Clin Nutr 2007;85(Suppl):635S–638S. DOI: 10.1093/ajcn/85.2.635S.
14. Nair NM, Pillai R, Pethiyagoda R, et al. Prevalence of early childhood caries in Japanese children. J Epidemiol 2012;22(1):72–77. DOI: 10.1159/000448145.
15. Baginska J, Stokowska W. Dietary habits and early childhood caries among young children. Wiad Lek 2006;59(1–2):5–9.
16. Hallett KB, O’Rourke PK. Pattern and severity of early childhood caries. Community Dent Oral Epidemiol 2006;34(1):25–35. DOI: 10.1111/j.1600-0528.2006.00246.x.
17. Al-Othaimeen AI, Villanueva BP. The effects of prolonged breastfeeding: nutritional status of Saudi Arabian children. Ann Saudi Med 1988;8(2):97–102. DOI: 10.1544/0256-4947.1988.97.
18. Ogbeide DO, Siddiqi S, Al Khalifa IM, et al. Breastfeeding in a Saudi Arabian community. Profile of parents and influencing factors.Saudi Med J 2004;25(5):580–584.
19. Al-Mazrou YY, Aziz Trop, Khalil M. Breastfeeding and weaning practices in Saudi Arabia. J Trop Pediatr 1994;40(5):267–271. DOI: 10.1093/ tropmed/40.5.267.
20. Pineda R, Luong A, Ryckman J, et al. Pacifier use in newborns: related to socioeconomic status but not to early feeding performance. Acta Paediatr 2018;107(5):806–810. DOI: 10.1111/apa.14253.
21. Kato T, Yoriufit, Yamakawa M, et al. Association of breast feeding with early childhood dental caries: Japanese population-based study. BMJ Open 2015;5(3):e006982. DOI: 10.1136/bmjopen-2014-006982.
22. Kramer MS, Vanilovich I, Matush L, et al. The effect of prolonged and exclusive breastfeeding on dental caries in early school-age children. New evidence from a large randomized trial. Caries Res 2007;41(6):484–488. DOI: 10.1159/000108596.
23. Nunes AM, Alves CM, Borba de Araújo F, et al. Association between prolonged breast feeding and early childhood caries: a hierarchical approach. Community Dent Oral Epidemiol 2012;40(6):542–549. DOI: 10.1111/j.1600-0528.2012.00703.x.
24. Iida H, Auning P, Billings RJ, et al. Association between infant breastfeeding and early childhood caries in the United States. Pediatrics 2007;120(4):e944–e952. DOI: 10.1542/peds.2006-0124.
25. Tham R, Bowatte G, Dharmage SC, et al. Breastfeeding and the risk of dental caries: a systematic review and meta-analysis. Acta Paediatr 2015;104(467):62–84. DOI: 10.1111/apa.13118.
26. Chaffee BW, Vitol MR. Association of long-duration breastfeeding and dental caries estimated with marginal structural models. Ann Epidemiol 2014;24(6):448–454. DOI: 10.1016/j.annepidem.2014.01.013.
27. Peres KG, Nascimento G, Peres MA, et al. Impact of prolonged breastfeeding on dental caries: a population-based birth cohort study. 2017. Pediatrics 140(1):e20162943. DOI: 10.1542/peds.2016-2943.
28. Tanaka K, Miyake Y. Association between breastfeeding and dental caries in Japanese children. J Epidemiol 2012;22(1):72–77. DOI: 10.2188/jea.je20110042.
29. Peressini S. Pacifier use and early childhood caries: an evidence-based study of the literature. J Can Dent Assoc 2003;69(1):16–19.
30. Petti S, Cairella G, Taristani G. Rampant early childhood dental decay: an example from Italy. J Public Health Dent 2000;60(3):159–166. DOI: 10.1111/j.1757-7325.2000.tb0322x.x.
31. Serwint JR, Munro R, Negrete VF, et al. Child-rearing practices and nursing caries. Pediatrics 1993;92(2):233–237.