

UDK BROJEVI:
616.314-083.953.11-053.2DOI: <https://doi.org/10.5937/ZZ1904035M>**DOJENJE IZ UGLA DEČJEG STOMATOLOGA****BREASTFEEDING – THE PERSPECTIVE OF PAEDIATRIC DENTIST**Evgenija Marković¹, Dejan Marković², Rade Vuković³, Tamara Perić², Biljana Kilibarda⁴, Ana Vuković²**SAŽETAK**

Savremene preporuke Evropske i Američke akademije dečjih stomatologa i Međunarodnog udruženja dečjih stomatologa savetuju postepeni prekid dojenja nakon nicanja mlečnih zuba kako bi se smanjio rizik od nastanka karijesa ranog detinjstva (KRD). Sa druge strane, preporuke Svetske zdravstvene organizacije, preporuke Američke akademije pedijatarata i stručnjaka iz oblasti ishrane prepoznaju brojne kratkoročne i dugoročne pozitivne efekte dojenja i podržavaju isključivo dojenje do uzrasta od šest meseci, a zatim postepeno uvođenje čvrste hrane sa nastavkom dojenja uz neograničeno i dojenje na zahtev do druge godine deteta i duže. Cilj ovog preglednog rada je bio da se analiziraju savremeni podaci u literaturi o uticaju dojenja na nastanak KRD, kako bi se doprinelo formiranju jedinstvenog stava i pružila jasna informacija majkama kako prevenirati KRD. Na osnovu pretraživanja Pub Med baze podataka, uočava se da postoji povezanost između dojenja i KRD, ali nije dovoljno argumentovano koje su najbolje mere u prevenciji karijesa. Imajući u vidu poznate pozitivne efekte dojenja, smatra se da je preporučljivo pratiti savremene pedijatrijske preporuke koje savetuju neograničeno dojenje koliko god to uzajamno prija majci i detetu. Ipak, potrebno je imati u vidu neophodnost ranih preventivnih poseta dečjem stomatologu i edukacije zdravstvenih radnika radi adekvatnih i blagovremenih saveta o higijeni usne u duplje i ishrani kako bi se izbegao nastanak karijesa ranog detinjstva i omogućilo blagovremeno dijagnostikovnje inicijalnih lezija. Neophodna su dalja istraživanja u ovoj

SUMMARY

Current recommendations by the European Academy of Paediatric Dentistry, American Academy of Paediatric Dentistry, and International Association of Paediatric Dentistry advocate weaning from breast milk and avoiding unrestricted breastfeeding after the eruption of primary teeth in order to lower the risk of early childhood caries (ECC). However, World Health Organization, American Academy of Paediatrics and nutritional recommendations support exclusive breastfeeding up to six months of age, following continued breastfeeding along with appropriate complementary foods, favouring unrestricted and prolonged breastfeeding even beyond the age of two. The purpose of this review is to discuss current data in the literature regarding the association between breastfeeding and ECC in order to address this problem and to provide consistent recommendations. PubMed search revealed possible link between breastfeeding and ECC, however without evidence strong enough to establish the appropriate oral health preventive recommendation. Having in mind known benefits of breastfeeding, it is advisable to adhere to current paediatric guidelines which promote unrestricted breastfeeding as long as it is mutually desired by mother and child. This recommendation doesn't exclude but complements the prevention and timely treatment of ECC. Furthermore, there is a need to highlight the importance of education of parents and health care providers about the ECC risk factors, identification of initial lesions and consequences. Further research regarding this issue is

¹Klinika za ortopediju vilice, Stomatološki fakultet, Univerzitet u Beogradu, Gastona Gravijea 1, 11000 Beograd, Srbija / Department of Orthodontics, School of Dentistry, University of Belgrade, Dr Gastona Gravijea1, 11000 Belgrade, Serbia

²Klinika za dečju i preventivnu stomatologiju, Stomatološki fakultet, Univerzitet u Beogradu, Dr Subotića 11, 11000 Beograd, Srbija / Department of Paediatric and Preventive Dentistry, School of Dentistry, University of Belgrade, Dr Subotica 11, 11000 Belgrade, Serbia

³Institut za zdravstvenu zaštitu majke i deteta „Dr Vukan Čupić”, Beograd, Radoja Dakića 8, 11000 Beograd, Srbija / Mother and Child Health Care Institute of Serbia “Dr Vukan Cupic”, Belgrade, Radoja Dakica 8, 11000 Belgrade, Serbia

⁴Institut za javno zdravlje Republike Srbije „Dr Milovan Jovanović Batut”, Beograd, Dr Subotića 5, 11000 Beograd, Srbija / Institute of Public Health of Serbia “Dr Milovan Jovanovic Batut”, Belgrade, Dr Subotica 5, 11000 Belgrade, Serbia

oblasti.

Ključne reči: dojenje, karijes ranog detinjstva, odojčice.

needed.

Keywords: breastfeeding, dental caries, infant.

Introduction

Breastfeeding brings numerous benefits to both mothers and children, but it has social and economic effects on families and societies, too (1). Breastfeeding positively affects mothers' health improving healing of childbirth trauma and lowering the risk of obesity, osteoporosis, breast and ovarian cancer, etc. (2). Furthermore, breastfeeding improves infant's emotional and psychological development, wellbeing, and general health (decreasing the risk of acute and chronic diseases such as asthma, pneumonia, bronchiolitis, acute otitis media, allergies, diarrhoea, gastroenteritis, diabetes mellitus, leukaemia, atopic dermatitis and sudden infant death syndrome) (3). In addition, evidences from the research indicate that breastfed babies are less likely to become obese in adulthood (4).

World Health Organization, American Academy of Paediatrics and nutritional recommendations regarding breastfeeding are clear – starting breastfeeding within the first hour of life, supporting exclusive breastfeeding up to six months of age, followed by continued breastfeeding along with appropriate complementary foods, favouring unrestricted and prolonged breastfeeding even beyond the age of two (5-7).

However, paediatric dental recommendations suggest that prolonged, unrestricted, and frequent breastfeeding (more than 7 times a day) after the first birthday, especially night feedings, affect oral health and favour the development of early childhood caries (ECC) (8-12). Some studies also identified sleeping with the nipple in the mouth as a risk factor for ECC (13). Accordingly, gradual weaning and avoiding unrestricted breastfeeding after the eruption of the first primary teeth by 12th to 14th month of age is recommended (9).

ECC represents one of the most common diseases in paediatric population (14,15) leading to reduced quality of life due to pain, impaired eating, social skills, loss of sleep, causing distress, altered behaviour and disturbances in child's nutritional status and development (16). Likewise, ECC might cause repeated prescription of antibiotics, emergency room visits and even hospitalization (17).

Globally present and traditionally opposing opinions between paediatricians and paediatric dentists result in confusion, since nursing mothers are unable to get clear and

straightforward guidelines (18). Therefore, there is a strong need to clarify the association between breastfeeding practices and the occurrence of ECC. The aim of this review was to analyze the results from currently available studies discussing breastfeeding effect on oral health.

Methods

A PubMed search using combinations of keywords related to infant breastfeeding pattern (breastfeeding, nursing, feeding, children, infant) and early childhood caries (early childhood caries, nursing caries, rampant caries, baby bottle caries, decay, etc.) was performed based on studies published in English before September 2019. All articles with available full text were analyzed; studies investigating the association of breastfeeding and ECC were selected and divided in two large groups based on positive or negative association between breastfeeding and ECC. Furthermore, articles were analyzed according to their study methodology.

Evidence suggesting a link between ECC and breastfeeding

Cariogenic potential of human breast milk was proposed when investigators observed higher levels of carbohydrates and lower levels of calcium, phosphorus and proteins compared to bovine milk (19-22). Incubation of human milk with saliva caused significant drop in pH level (from 6.44 to 4.57), suggesting possible occurrence of demineralization if contact with enamel lasted for 8 hours per night during 6-day immersions (23).

Epidemiological cross-sectional studies reported higher occurrence of caries in breastfed children and the necessity to educate parents to stop breastfeeding after 12th to 18th month (24-28). Positive association between breastfeeding and caries was confirmed by observation of infants who were breastfed for more than 13 months (29), more than 18 months (30-32) and more than 24 months (33). Furthermore, follow up of a cohort who was still breastfed at 18th and at 24th month of age showed higher frequency of ECC in breastfeeding-on-demand group (34). Another cohort study that involved Southeast Asian

participants aged 25 to 30 months showed that prevalence of ECC was higher in a group of children who were breastfed more than twice during the night (35). Peres et al. stated that “breastfeeding between 13 and 23 months had no effect on dental caries, but breastfeeding after 24 months of age increased risk for severe ECC at the age of five” (36), but there is “caution needed over breastfeeding advice” (37) especially considering that almost half of the cohort sample was bottle fed at the age of five and that oral behaviours were not analyzed.

Breastfeeding beyond 12 months of age and bottle feedings on demand with any carbohydrate beverages including human milk are considered ECC risk factors because frequent or prolonged contact with dental surfaces may contribute to evolution of lesions (12,38-40). In Lancet series on breastfeeding, caries was described as the only poor health outcome in prolonged breastfeeding after first birthday (41).

Evidence opposing a link between ECC and breastfeeding

Experimental studies demonstrated that human breast milk contains several components involved in neonatal host defence (lysozyme, lactoferrin, oligosaccharides and IgA antibodies) that prevents infections during early infancy and interfere with cariogenic streptococcal colonization of oral cavity (42). Furthermore, the presence of phosphate and proteins in human breast milk enables light buffering capacity. Interestingly, the experimental results confirmed acid neutralization potential of human milk even after primary teeth were soaked in it for 12 weeks – on the other hand, when 10% sucrose was added, demineralization occurred after 3.2 weeks (43).

Having in mind the physiological mechanism of suckling that involves using intraoral vacuum, expressing the milk at the edge of transition of soft palate into hard palate, and constant moving of fluid towards pharynx without stagnation – prolonged exposure of dental surfaces is almost impossible (44). On the other hand, during the bottle-feeding, artificial nipple releases the milk or formula into the frontal parts of the mouth and enables pooling of liquid in the mouth and exposure of the dental surfaces which favours occurrence of ECC.

Epidemiological research involving children breastfed up to 21.5 months showed

low rates of ECC (45-47). On the other hand, sugary snacks between meals were strongly related to poor oral health (48,49). Follow up of the cohort from birth to nine years highlighted breastfeeding shorter than 6 months as a significant risk factor for ECC, due to bottle feeding (48,50). The largest randomized trial in the field (involving 13,889 children followed from the postpartum hospital stay until the end of the first year of life), showed the absence of association between prolonged and exclusive breastfeeding and ECC (51).

Studies that involved nationally representative samples in the USA with strong methods using regression model, adjusting for confounding variables and categorizing breastfeeding duration and type, could not determine any association between length of breastfeeding and ECC (52,53). Furthermore, matching for age, race, gender, and social class in 109 children with ECC with 109 healthy children confirmed that ECC occurrence was unrelated to length or type of feeding (46). Considering complicated aetiology of ECC, applying hierarchical approach in order to eliminate potential confounders showed no association of breastfeeding with poor oral health, even with longer breastfeeding exposure (54).

Some studies confirmed that up to 24 months breastfeeding did not affected oral health, but others showed less association between breastfeeding longer than 24 months of age and risk for ECC (55).

Advantages and disadvantages of different types of studies

Current literature data revealed possible link between breastfeeding and ECC, however without evidence strong enough for the appropriate oral health preventive recommendation to be provided.

Multi causal aetiology of ECC that involves plethora of micro, meso and macro level factors makes research of the association between ECC and breastfeeding inconclusive. Therefore, the use of adjustment for confounding variables related to ECC development brings needed strong research evidence (18,53,54). The use of multivariate risk model makes precise predictions related to ECC risk, but the analysis that involves only one factor such as the relationship with breast or bottle-feeding showed poor accuracy and limited strength of evidence (56).

When analyzing how breastfeeding affects oral health, it is important to consider

and understand differences between the following forms of breastfeeding: exclusive (breastfeeding excluding any other drinks or foods, except vitamins, oral rehydration solution, supplements and medicines) , unrestricted (on-demand or ad-libitum or on cue –baby is breastfed whenever in need) (57), predominant (receiving water, tea or fruit juice besides breast milk) (58), or partial (some meals are breast milk, and some are solids) (58).

The term “prolonged breastfeeding” has been differently defined – from up to six months (59), to more than one year (46, 51, 60), 18 months (30-32) or 24 months (33). There is a strong need for the use of the Index of Breastfeeding Status (61) in oral health research in the future, since this index was created in order to precisely determine the effect of breastfeeding on health outcomes, so the use of this tool is required for the analysis of oral health outcomes, too.

Frequent breastfeeds after 12 to 18 months of age might favour the development of inadequate dietary habits, such as prolonged, frequent and in-between-meal consumption of sugary snacks or drinks, thus increasing ECC risk (62). Considering the importance of dietary habits (63), it would be more than beneficial to use adequate dietary questionnaire in studies analyzing oral health, as it has been shown that sugar rich diet favours cariogenic potential of human breast milk (43).

Although oral hygiene has one of the most important roles in maintaining oral health, less than one third (28%) of investigated papers addressed frequency of tooth brushing, use of fluorides, duration of brushing and who is brushing child’s teeth (18).

Prevention of ECC

Both dental care professionals and paediatricians should have evidence-based knowledge regarding guidelines and potential health risks and be able to provide an adequate and clear information to nursing mothers. We recommend adhering to current paediatric guidelines which promote unrestricted breastfeeding until it is desired by both mother and child.

However, prevention and timely treatment of ECC must also be addressed. There is a need for better education of parents and health care providers about the risk factors, identification of initial lesions and consequences of early childhood caries. Oral health recommendations include avoiding free

sugars when introducing solid foods to infant and using fluoridated toothpaste (at least 1000 ppm) and soft toothbrush twice daily, as well as timely consultation with oral health professional (64-66). It is important to inform dental professionals about the importance of breastfeeding and to update their knowledge to enable them to take active role in encouraging breastfeeding in mothers. Taken together, oral and general health care providers should establish a consensus regarding information for parents regarding breastfeeding and prevention of early childhood caries.

Conclusion

Based on presented currently available data, the association between breastfeeding and ECC is contradictory, complex and contains many confounding variables. Taken together, oral and general health care providers should establish a consensus regarding information for parents regarding breastfeeding and prevention of early childhood caries. Further research in this field is needed, especially meta-analyses.

Acknowledgement

Publication of this paper was supported by the project “Oral Health Improvement in Serbian Children and Youth” (approved by the Government of Serbia, Ministry of Health, project number 4015, programme 1802).

References

1. Breastfeeding Initiatives: American Academy of Pediatrics; 2013 [Available from: <http://www2.aap.org/breastfeeding/sectionOnBreastfeeding.html>].
2. Child health - breastfeeding: World Health Organization; 2013 [Available from: http://www.who.int/maternal_child_adolescent/topics/child/nutrition/breastfeeding/en/index.html].
3. Salone LR, Vann WF, Jr., Dee DL. Breastfeeding: an overview of oral and general health benefits. *J Am Dent Assoc* 2013; 144(2):143-51.
4. Michaels KB, Willett WC, Graubard BI, Vaidya RL, Cantwell MM, Sansbury LB, et al. A longitudinal study of infant feeding and obesity through life course. *Int J Obes* 2007; 31:1078-85.
5. Kramer M, Kakuma R. Optimal duration of

- exclusive breastfeeding (Review). *Cochrane Database Syst Rev* 2002; (1):CD003517.
6. Petrou SP. Incontinent ileovesicostomy in the management of neurogenic bladder dysfunction. *Int Braz J Urol* 2003;29(2):185-6.
 7. Matijevic D, Mladenovic Rankovic S, Kotevic A. Responsive feeding. *Zdravstvena zaštita (Health Care)* 2018; 1:2-11.
 8. Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies. *Pediatr Dent* 2017; 39(6):59-61.
 9. Policy on Dietary Recommendations for Infants, Children, and Adolescents. *Pediatr Dent* 2017; 39(6):64-6.
 10. Policy on Early Childhood Caries (ECC): Unique Challenges and Treatment Options. *Pediatr Dent* 2017; 39(6):62-3.
 11. Kuhnisch J, Ekstrand KR, Pretty I, Twetman S, van Loveren C, Gizani S, Spyridonos Loizidou M. Best clinical practice guidance for management of early caries lesions in children and young adults: an EAPD policy document. *Eur Arch Paediatr Dent* 2016; 17(1):3-12.
 12. Tinanoff N, Baez RJ, Diaz Guillory C, Donly KJ, Feldens CA, McGrath C, et al. Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: Global perspective. *Int J Paediatr Den* 2019; 29(3):238-48.
 13. Folayan MO, Sowole CA, Kola-Jebutu A, Owotade FJ. Risk factors for rampant caries in children from southwestern Nigeria. *Afr J Med Med Sci* 2012; 41(3):249-55.
 14. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380(9859):2163-96.
 15. El Tantawi M, Folayan MO, Mehaina M, Vukovic A, Castillo JL, Gaffar BO, et al. Prevalence and Data Availability of Early Childhood Caries in 193 United Nations Countries, 2007-2017. *Am J Public Health* 2018; 108(8):1066-72.
 16. Carevic M, Vulovic M, Sindolic M. Integrated Approach in Combating Early Childhood Caries. *Balk J Stom* 2009; 13:15-20.
 17. Milenkovic A, Markovic D, Zdravkovic D, Peric T, Milenkovic T, Vukovic R. Adrenal crisis provoked by dental infection: case report and review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010; 110(3):325-9.
 18. 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(6):411-7.
 19. Matee MI, Mikx FH, Maselle SY, Van Palenstein Helderma WH. Mutans streptococci and lactobacilli in breast-fed children with rampant caries. *Caries Res* 1992; 26(3):183-7.
 20. Peres RC, Coppi LC, Volpato MC, Groppo FC, Cury JA, Rosalen PL. Cariogenic potential of cows', human and infant formula milks and effect of fluoride supplementation. *Br J Nutr* 2009; 101(3):376-82.
 21. Bowen WH, Lawrence RA. Comparison of the cariogenicity of cola, honey, cow milk, human milk, and sucrose. *Pediatrics* 2005; 116(4):921-6.
 22. Prabhakar AR, Kurthukoti AJ, Gupta P. Cariogenicity and acidogenicity of human milk, plain and sweetened bovine milk: an in vitro study. *J Clin Pediatr Dent* 2010; 34(3):239-47.
 23. Thomson ME, Thomson CW, Chandler NP. In vitro and intra-oral investigations into the cariogenic potential of human milk. *Caries Res* 1996; 30(6):434-8.
 24. Azevedo TD, Bezerra AC, de Toledo OA. Feeding habits and severe early childhood caries in Brazilian preschool children. *Pediatr Dent* 2005; 27(1):28-33.
 25. Aida J, Ando Y, Oosaka M, Niimi K, Morita M. Contributions of social context to inequality in dental caries: a multilevel analysis of Japanese 3-year-old children. *Community Dent Oral Epidemiol* 2008; 36(2):149-56.
 26. Sakuma S, Nakamura M, Miyazaki H. Predictors of dental caries development in 1.5-year-old high-risk children in the Japanese public health service. *J Public Health Dent* 2007; 67(1):14-9.
 27. Tanaka K, Miyake Y. Association between breastfeeding and dental caries in Japanese children. *J Epidemiol* 2012; 22(1):72-7.
 28. Zhou Y, Lin HC, Lo EC, Wong MC. Risk indicators for early childhood caries in 2-year-old children in southern China. *Aust Dent J* 2011; 56(1):33-9.
 29. Campus G, Solinas G, Strohmenger L, Cagetti MG, Senna A, Minelli L, et al. National pathfinder survey on children's oral health in Italy: pattern and severity of caries disease in 4-year-olds. *Caries Res* 2009; 43(2):155-62.
 30. Folayan MO, Sowole CA, Owotade FJ, Sote E. Impact of infant feeding practices on caries experience of preschool children. *J Clin Pediatr Dent* 2010; 34(4):297-301.
 31. Hallett KB, O'Rourke PK. Early childhood caries and infant feeding practice. *Community*

- Dent Health 2002; 19(4):237-42.
32. Jigjid B, Ueno M, Shinada K, Kawaguchi Y. Early childhood caries and related risk factors in Mongolian children. *Community Dent Health* 2009; 26(2):121-8.
33. Chaffee BW, Feldens CA, Vitolo MR. Association of long-duration breastfeeding and dental caries estimated with marginal structural models. *Ann Epidemiol* 2014; 24(6):448-54.
34. Yonezu T, Yotsuya K, Yakushiji M. Characteristics of breast-fed children with nursing caries. *Bull Tokyo Dent Coll* 2006; 47(4):161-5.
35. van Palenstein Helderma WH, Soe W, van 't Hof MA. Risk factors of early childhood caries in a Southeast Asian population. *J Dent Res* 2006; 85(1):85-8.
36. Peres KG, Nascimento GG, Peres MA, Mittinty MN, Demarco FF, Santos IS, et al. Impact of Prolonged Breastfeeding on Dental Caries: A Population-Based Birth Cohort Study. *Pediatrics* 2017; 140(1). pii: e20162943.
37. Jones K. Caution needed over breastfeeding advice. *Br Dent J* 2018; 225(4):275.
38. Milnes AR. Description and epidemiology of nursing caries. *J Public Health Dent* 1996; 56(1):38-50.
39. Tinanoff N, Kanellis MJ, Vargas CM. Current understanding of the epidemiology mechanisms, and prevention of dental caries in preschool children. *Pediatr Dent* 2002; 24(6):543-51.
40. Tham R, Bowatte G, Dharmage SC, Tan DJ, Lau MX, Dai X, et al. Breastfeeding and the risk of dental caries: a systematic review and meta-analysis. *Acta Paediatr* 2015; 104(467):62-84.
41. Victora CG, Bahl R, Barros AJ, Franca GV, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* 2016; 387(10017):475-90.
42. LeBouder E, Rey-Nores JE, Raby AC, Affolter M, Vidal K, Thornton CA, et al. Modulation of neonatal microbial recognition: TLR-mediated innate immune responses are specifically and differentially modulated by human milk. *J Immunol* 2006; 176(6):3742-52.
43. Erickson PR, Mazhari E. Investigation of the role of human breast milk in caries development. *Pediatr Dent* 1999; 21(2):86-90.
44. Geddes DT, Kent JC, Mitoulas LR, Hartmann PE. Tongue movement and intra-oral vacuum in breastfeeding infants. *Early Hum Dev* 2008; 84(7):471-7.
45. Ribeiro NM, Ribeiro MA. Breastfeeding and early childhood caries: a critical review. *J Pediatr (Rio J)*. 2004; 80(5 Suppl):S199-210.
46. Roberts GJ, Cleaton-Jones PE, Fatti LP, Richardson BD, Sinwel RE, Hargreaves JA, et al. Patterns of breast and bottle feeding and their association with dental caries in 1- to 4-year-old South African children. 2. A case control study of children with nursing caries. *Community Dent Health* 1994; 11(1):38-41.
47. Weerheijm KL, Uyttendaele-Speybrouck BF, Euwe HC, Groen HJ. Prolonged demand breast-feeding and nursing caries. *Caries Res* 1998; 32(1):46-50.
48. Vignarajah S, Williams GA. Prevalence of dental caries and enamel defects in the primary dentition of Antiguan pre-school children aged 3-4 years including an assessment of their habits. *Community Dent Health* 1992; 9(4):349-60.
49. Rosenblatt A, Zarzar P. Breast-feeding and early childhood caries: an assessment among Brazilian infants. *Int J Paediatr Dent* 2004; 14(6):439-45.
50. Hong L, Levy SM, Warren JJ, Broffitt B. Infant breast-feeding and childhood caries: a nine-year study. *Pediatr Dent* 2014; 36(4):342-7.
51. Kramer MS, Vanilovich I, Matush L, Bogdanovich N, Zhang X, Shishko G, et al. The effect of prolonged and exclusive breast-feeding on dental caries in early school-age children. New evidence from a large randomized trial. *Caries Res* 2007; 41(6):484-8.
52. Dye BA, Shenkin JD, Ogden CL, Marchall TA, Levy SM, Kanellis MJ. The relationship between healthful eating practices and dental caries in children aged 2-5 years in the United States, 1988-1994. *Journal of American Dental Association* 2004; 135:55-66.
53. Iida H, Auinger P, Billings RJ, Weitzman M. Association between infant breastfeeding and early childhood caries in the United States. *Pediatrics* 2007; 120(4):e944-52.
54. Nunes AMM, Alves CMC, Araujo FB, Ortiz TML, Ribeiro MRC, Silva AAM, et al. Association between prolonged breast-feeding and early childhood caries: a hierarchical approach. *Community Dent Oral Epidemiol* 2012; 40:542-9.
55. Moynihan P, Tanner LM, Holmes RD, Hillier-Brown F, Mashayekhi A, Kelly SAM, et al. Systematic Review of Evidence Pertaining to Factors That Modify Risk of Early Childhood Caries. *JDR Clin Trans Res* 2019; 4(3):202-16.
56. Fontana M. The Clinical, Environmental, and Behavioral Factors That Foster Early

- Childhood Caries: Evidence for Caries Risk Assessment. *Pediatr Dent* 2015; 37(3):217-25.
57. Iwinski S, Gotsch G. Feeding On Cue. *New Beginnings* 2003; 20(4):126.
58. Vanore JV, Christensen JC, Kravitz SR, Schuberth JM, Thomas JL, Weil LS, et al. Diagnosis and treatment of first metatarsophalangeal joint disorders. Section 2: Hallux rigidus. *J Foot Ankle Surg* 2003; 42(3):124-36.
59. Derkson GD, Ponti P. Nursing bottle syndrome; prevalence and etiology in a non-fluoridated city. *J Can Dent Assoc* 1982; 48(6):389-93.
60. Williams SA, Hargreaves JA. An inquiry into the effects of health related behaviour on dental health among young Asian children resident in a fluoridated city in Canada. *Community Dent Health* 1990; 7:413-20.
61. Harmon Jones C. Duration, Intensity, and Exclusivity of Breastfeeding: Recent Research Confirms the Importance of these Variables. *Breastfeeding Abstracts* 2006; 25(3):17-20.
62. Hallonsten AL, Wendt LK, Mejare I, Birkhed D, Hakansson C, Lindvall AM, et al. Dental caries and prolonged breast-feeding in 18-month-old Swedish children. *Int J Paediatr Dent* 1995; 5(3):149-55.
63. Garcia R, Borrelli B, Dhar V, Douglass J, Gomez FR, Hieftje K, et al. Progress in Early Childhood Caries and Opportunities in Research, Policy, and Clinical Management. *Pediatr Dent* 2015; 37(3):294-9.
64. Peres KG, Chaffee BW, Feldens CA, Flores-Mir C, Moynihan P, Rugg-Gunn A. Breastfeeding and Oral Health: Evidence and Methodological Challenges. *J Dent Res* 2018; 97(3):251-8.
65. Early Childhood Caries: IAPD Bangkok Declaration. *Int J Paediatr Dent* 2019; 29(3):384-6.
66. Branger B, Camelot F, Droz D, Houbiers B, Marchalot A, Bruel H, et al. Breastfeeding and early childhood caries. Review of the literature, recommendations, and prevention. *Arch Pediatr* 2019; 26(8):497-503.
- Conflict of interest:** *None declared.*
Received (primljen): 24.11.2019.
Revised (revizija): 13.12.2019.
Accepted (prihvaćen): 16.12.2019.
Online first: 25.12.2019.

Kontakt: Vukovic Ana, Klinika za dečju i preventivnu stomatologiju, Stomatološki fakultet, Univerzitet u Beogradu, Dr Subotića 11, 11000 Beograd, Srbija; e-mail: ana.vukovic@stomf.bg.ac.rs

Correspondence to: Vukovic Ana, Department of Paediatric and Preventive Dentistry, School of Dentistry, University of Belgrade, Dr Subotica 11, 11000 Belgrade, Serbia; e-mail: ana.vukovic@stomf.bg.ac.rs

