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Original Article

Early Childhood Caries and its Association with Maternal Caries Status: A Cross-sectional Study in Mathura District

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Abstract

Background: There is a wide range of etiological and predisposing factors that contribute to the state of oral health, each of which plays a different role in causing disease. There is, however, little information available on how maternal factors affect oral health throughout childhood.

Aim: The aim of the study was to evaluate early childhood caries and its association with maternal caries status in Mathura District.

Materials and Methods: Children ages 24–72 months and their mothers visiting the department were included in the study. A total of 150 child–mother pairs participated in the study. The maternal risk factors were assessed by a pretested questionnaire. After obtaining consent, the mother and their children were clinically examined for dental caries using the DMFT index. Results were analyzed using the Statistical Package for Social Science 20.0.

Results: Significant correlation was found in the mother's caries activity, brushing frequency, the diet of the mother, and their child's caries experience.

Conclusion: Children's dental caries status was significantly related to maternal factors, according to the study. To limit and control dental caries, raising awareness among mothers is crucial.

Key words: Awareness, Bottle feeding, Dental caries, Preventive dentistry

INTRODUCTION

Many societies worldwide experience oral health problems, including dental caries, which affect people of all ages. Dental caries is a common and major public health oral disease that hampers the attainment and protection of oral health in different age groups.[1,2] The prevalence pattern and severity of dental caries vary with age, sex, race, sociodemographic characteristics, economic status, geographical location, food practice, and oral hygiene habits within the same country or region in various parts of the world.[3] It affects 60–90% of the children living in industrialized nations. According to the Centers for Disease Control and Prevention caries is perhaps the most prevalent infectious disease among children.[4]

During the last few decades, the incidence of microbial diseases has amplified drastically. Microorganisms are the superbug agent responsible for causing dental caries. Many facultatively and obligately anaerobic bacteria dominate the microbial community of dental caries.[2] However, the most important etiological agent of dental caries is *Streptococcus mutans*.[3] Tooth decay takes place when a vulnerable tooth surface is colonized with cariogenic microbes and dietary sources of sucrose or refined sugar. Fermentation of carbohydrates leads to the production of lactic acid by the action of bacteria which melts the hydroxyapatite crystal structure of the tooth, which grounds caries.[5,6]

The etiology of early childhood caries (ECC) is multifactorial and heterogeneous and is heavily influenced

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by excessive bottle feeding with sugar-contained liquids; breastfeeding on demand, nursing beyond the mandatory age for weaning, increased intake of sugar-rich food, and an unbalanced diet. Other factors associated with ECC include genetic predisposition, parental education, nutritional, environmental, socioeconomic, and parental style factors. Those affected often suffer from a reduced oral health-related quality of life compared to their caries-free peers.[7]

ECC is a public health issue that affects very young children, and although it is not life-threatening, if left untreated, it can cause pain, bacteremia, weakened chewing ability, and the toxic overdose of analgesics (acetaminophen) in the early stages of their development, tooth malocclusion in their permanent dentition, phonetic issues, lower self-esteem, and a failure to thrive. In addition, it has been demonstrated that dental caries can slow down a child's ability to gain weight, which may be reversed after rehabilitating the teeth.[8] A correlation between the oral hygiene of the mother and child should be evaluated to evaluate these various aspects.

Thus, the aim of the study was to evaluate ECC and its association with maternal caries status in Mathura District.

MATERIALS AND METHODS

Ethical Considerations

This study was approved by the Committee of Ethics in Research of K.D. dental college and Hospital Mathura. Detailed information about the study was given to mothers. They were explained the procedure to be carried out on them and the children regarding the study. A written informed consent form was signed by the children's mother.

Source of Data/Sampling Method

A selection of 150 children from 24 to 72 months of age and their mothers was done from the set of patients visiting the Department of Pediatric and Preventive Dentistry of K.D. Dental College and Hospital Mathura.

Inclusion Criteria

- Children from 24 to 72 months of age, along with their mother.
- Children suffering from ECC.

Exclusion Criteria

- Children with special health care needs.
- Children with any systemic disease.
- Children with any skeletal and dental developmental disorders.

Procedural Steps

This procedure involved two rounds. In the first round, the mother and child were made to sit comfortably on a chair in a counseling room and a questionnaire was given to the mother regarding her and the child's oral hygiene status. In the second round, the child and mother were made to sit on a dental chair and an oral health examination was done.

Questionnaire

The questionnaire was presented and filled out by a trained pediatric dentist. All the required information needed to commence the study was collected. The proforma included two parts.

In the first part, a set of questions were asked from the mother regarding the child, and they were as follows:

- Type and frequency of dental visits
- His/her oral hygiene practice
- daily sugar consumption
- Feeding habit, i.e., if the child is on breastfeeding or bottle-feeding and its duration and frequency
- Any other oral habits, i.e., thumb sucking\nail biting\ tongue thrusting.

In the second part of the questionnaire, questions were asked of the mother regarding her oral health status. They were as follows:

- Personal data
- Daily sugar consumption
- Level of education
- Socioeconomic status
- Type of interaction with the child while playing or feeding.
- Any deleterious habits.

Clinical examination

Clinical examination was carried out using a plain mouth mirror and an explorer. The child was made to sit comfortably on the dental chair under natural light, then a proper examination of the oral cavity was done, and then similarly for the mother. DMFT index of both the child and mother was recorded.

Statistical Analysis

After completing the clinical trial, the obtained data were subjected to statistical analysis; the data were analyzed using a Statistical Package for Social Science version 20.0. The level of significance was set at 95% ($P = 0.05$).

$P > 0.05$ was non-significant and $P < 0.05$ was significant.

The data of the present study were subjected to statistical analysis to interpret the differences and significance

among groups. Chi-square was used for statistical analysis.

RESULTS

Table 1 shows the study was performed on 150 children and based on the percentage distribution of gender shows that males were more affected (56%) than females (44%). Results showed (52.6%) of children were breastfeeding, (2%) of children were bottle feeding, and (45.3%) of children were both (breast/bottle) feeding. The frequency of bottle feeding in the daytime was (52%) when done 2–3 times, (38%) when done 3–5 times, (8%) when done 5–6 times, whereas (2%) of children were spoon-fed. The frequency of bottle feeding at night time was (62%) when done 1–2 times, (26%) when done 2–3 times, and the remaining (12%) no feeding was done at night time. The result shows that (80%) of children fall asleep with the nipple in their mouth, whereas the remaining (20%) do not use it while sleeping. The sugar intake in bottle milk was recorded with (82%) of children having one teaspoon of sugar, (4%) with 2–3 teaspoons, whereas (14%) of children did not consume sugar in the bottle of milk. (96%) of children had a habit of snaking between the meals, whereas (4%) of children lacked [Table 1].

Table 1: Percentage distribution of the children's feeding and eating habits

Category	Frequency *n* (%)	
Gender		
Boys	84	(56.0)
Girls	66	(44.0)
Type of feeding		
Breast	79	(52.6)
Bottle	3	(2.0)
Combination	68	(45.3)
Frequency of bottle feeding in the daytime		
2–3 times	78	(52.0)
3–5 times	57	(38.0)
5–6 times	12	(8.0)
Spoon feed	3	(2.0)
Frequency of bottle feeding at night time		
0 times	18	(12.0)
1–2 times	93	(62.0)
2–3 times	39	(26.0)
Sugar intake in bottle milk		
No sugar	21	(14.0)
1 teaspoon	123	(82.0)
2–3 teaspoon	6	(4.0)
Fall asleep with a nipple in mouth		
Yes	120	(80.0)
No	30	(20.0)
Use of pacifiers		
Yes	3	(2.0)
No	147	(98.0)
Snacking behavior		
Yes	144	(96.0)
No	6	(4.0)

Table 2 the result shows that (84%) of children brush their teeth once a day, (6%) of them brush twice a day, and (10%) were not brushing at all. It was reported that (96%) of the mothers were uneducated regarding the baby's oral health maintenance, (53.3%) declined to help their children during brushing, whereas (46%) agreed to it. In addition to that, (42%) of mothers did not know when to start maintaining the baby's oral hygiene; (48%) were aware to start it as all teeth erupt in the mouth, whereas 10% of mothers were educated to start it as soon as the baby is born. In our study, (68%) of the mothers reported that they made their child's 1st dental visit when they complained of pain; (32%) made it when they noticed decayed teeth, whereas none went for a routine check-up (0.0).

Table 3 shows the correlation between mothers' education and the DMFT score of children with a ($P = 0.088$), thereby depicting a non-significant difference between them [Graph 1].

Table 4 shows the correlation between the mother's caries experience and the child's caries experience; a significant positive correlation was found between the DMFT of the mother and DMFT of a child, with the *P*-value being (0.00), thereby showing a highly significant relationship between them [Graph 2].

Table 2: Percentage distribution of the children's oral hygiene habits

Category	Frequency *n* (%)	
Brushing		
No brushing	15	(10.0)
Once a day	126	(84.0)
Twice a day	9	(6.0)
Oral hygiene maintenance		
As soon as the baby born	15	(10.0)
When all the teeth erupt in the mouth	72	(48.0)
Don't know	63	(42.0)
Do you help your child in brushing?		
Yes	80	(53.3)
No	70	(46.0)
From where you get information for baby's oral health		
Don't know	144	(96.0)
From internet	6	(4.0)
From dentist	0	(0)
Does he/she sleep without brushing after a meal at night?		
Yes	139	(92.7)
No	11	(7.3)
When was your child's 1st visit to the dentist?		
For routine check-up	0	(0.0)
When noticed decayed teeth	48	(32.0)
When children complain about pain	102	(68.0)
Do you kiss your child on his/her lips?		
Yes	53	(35.3)
No	97	(64.7)

Table 3: Association between the education of the mother and the severity of decay

Education of mother	Child DMFT score								Chi-square	*P*-value	Inference
	Low		Moderate		High		Very High				
	n	%	*n*	%	*n*	%	*n*	%			
>10th pass	0	0.00	2	13.33	0	0.00	7	8.97	15.095	0.088	NS
10th pass	1	33.33	3	20.00	13	24.07	25	32.05			
12th pass	0	0.00	9	60.00	28	51.86	32	41.03			
Graduated	2	66.67	1	6.67	13	24.07	14	17.95			
Total	3	100.00	15	100.00	1	100.00	78	100.00			

Table 4: A significant correlation between DMFT of mothers and DMFT of children

Mother DMFT Score	Child DMFT score								Chi-square	*P*-value	Inference
	Low		Moderate		High		Very high				
	n	%	*n*	%	*n*	%	*n*	%			
Very low	3	100.00	0	0.00	3	5.60	3	3.80	71.556	0.000	HS
Low	0	0.00	3	20.00	3	5.60	18	23.10			
Moderate	0	0.00	9	60.00	39	72.10	48	61.60			
High	0	0.00	0	0.00	9	16.70	6	7.70			
Very high	0	0.00	3	20.00	0	0.00	3	3.80			
Total	3	100.00	15	100.00	54	100.00	78	100.00			

DISCUSSION

A variety of factors influence tooth decay, which is multifactorial in nature. The interaction of cariogenic microbes and suitable substrates, within a time frame, is influenced by broad social, economic, and cultural factors that contribute to the evolution of caries.[9]

Changing lifestyles and dietary patterns in developing countries like India have led to an increase in caries incidence. Mothers play a major role in promoting oral hygiene, as well as influencing the dietary habits and food preferences of their children. A pattern of behavior acquired during early childhood is deeply ingrained, and changes are difficult to introduce. As mothers play a crucial role in this area, thus, it can be assumed that increased knowledge of mothers will affect their self-care habits and dietary practices, leading to improvements in the dietary and oral hygiene habits of children, thereby improving their ability to prevent dental caries.[10]

In our study, males were more affected than females [Table 1]. Similar trends were reported by Al Hosani and Rugg-Gunn.[11] Studies conducted by O'Sullivan *et al.*[12] and Hattab *et al.*[13] reported no sex difference in caries prevalence.

In our study, most mothers reported that their children breastfeed to sleep during the night. Hattab *et al.*[13] and Dini *et al.*[14] in a study stated that children who were breastfed for a longer duration demonstrated a higher prevalence of caries. The American Academy of pediatric dentistry (AAPD)[15] considers breastfeeding on demand after tooth eruption to be a risk factor for the development of caries disease, which is in agreement with other studies.[16-18] However, it should be considered that the relationship between prolonged breastfeeding and the emergence of caries is complex and may be confused by other factors such as age, sucrose consumption between main meals, and quality of oral hygiene.[19]

In our study, the severity of decay was found to be higher among the children who showed an increased frequency of feeding than among the children who had a low frequency of feeding. Similarly reported by Retnakumari and Cyriac.[20] The severity of decay was higher among the children who fell asleep with nipples in their mouths than in those without. This corroborates with the findings of the study of AL-HSussyne and AL-Sadan.[21] In support of this study, Febres *et al.*[22] also stated that the incidence of caries was higher in children who slept with bottles than in those who did not.

In our study, the addition of sugar into the bottle of milk, as reported by the mothers [Table 1], are risk factors for ECC. A similar result was found in a study done by Corrêa-Faria *et al.*[23] Regarding children's diet, in the present study, it was found that most children have the habit of snacking between meals. A study done by Skafida and Chambers[24] stated that the frequent consumption of sugar-rich foods was associated with dental decay in children under 5. Lack of parental control over the number of sweets or chocolate that children consume also predicted dental decay.[24]

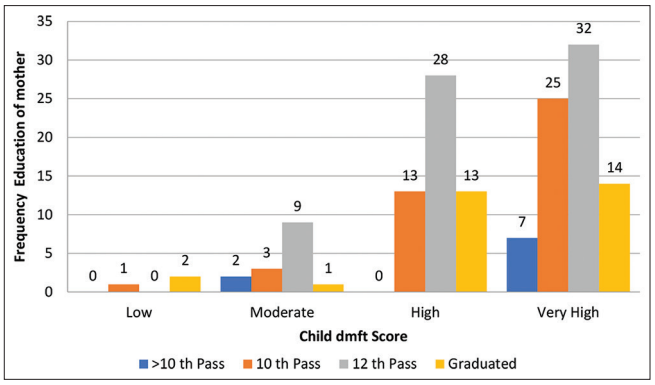
The age at which oral hygiene measures are commenced is of importance in establishing and maintaining the oral health of children. It is generally recommended to commence the tooth brushing as soon as the first tooth erupts. Melhado *et al.*[25] found that the application of dental care from the 1st year of life, mainly emphasizing the educational and preventive aspects, provides an important, if not the most important, means for an individual to reduce the possibility of contracting dental caries.

In our study, the severity of decay was found to be higher among the children in whom tooth brushing was started after 24 months of age, and the severity of dental caries was found to be lesser among the children who were brushed twice daily than among the children in whom brushing was done once daily [Table 1]. These findings are in conformity with the results of studies conducted by Mazhari *et al.*[26]

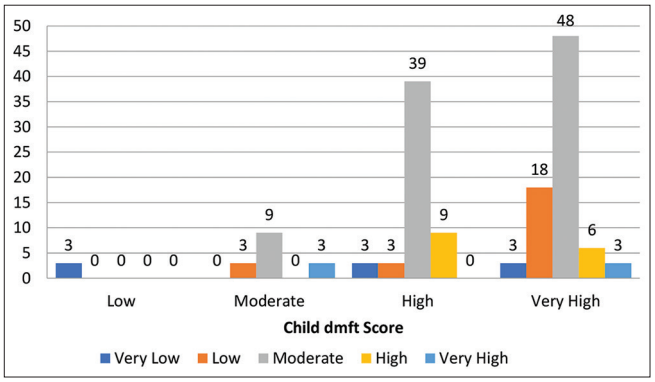
In our study, most of the mothers did not help their kids with brushing [Table 2]. In addition to that, mothers don't know when to start the baby's oral hygiene or when to visit the dentist for the 1st time [Table 2]. Studies prove the effectiveness of information in the fight against tooth decay since family knowledge about tooth decay is a protection factor against ECC. The AAPD recommends that the best time to start dental care is between the ages of 6 and 12 months.[15] In a study by Suresh *et al.*,[27] where most parents felt that they should brush their child's teeth when all the primary teeth have erupted. Similarly, Hallet and O'Rourke found that children who commenced tooth brushing earlier (age 12 months) had significantly lower ECC experience compared to children who commenced tooth brushing later.[28] Similarly, a study done at the University of Sao Paulo showed orientation/prevention as the predominant reason for seeking dental care; the second most common reason was caries/treatment, followed by dental trauma.[29]

In our study, the correlation between the education of the mother and the severity of decay was found to be non-significant ($P = 0.088$) [Table 3 and Graph 1]. Similar to the result of our study Brandão *et al.* also claimed that there was no relationship between the education of the mother and the severity of the decay.[30] Contrary to this, Elena and Petr[31] stated that mothers with a background of high education have more positive dental knowledge and attitudes.

In our study, a highly significant correlation was found between the DMFT of mothers' DMFT of children. ($P = 0.00$) [Table 4 and Graph 2]. The results of the study indicated a diminutive relationship between oral hygiene practices and the occurrence of dental caries. This corroborates with the findings of the study by Zanata *et al.*[32] who reported a strong positive association between



Graph 1: Association between the education of mother and severity of decay



Graph 2: Correlation between DMFT of mothers and DMFT of children

caries activity in mother-child couples. In the present study, a two-tailed correlation indicated that the mother's DMFT score was an impact factor for the caries experience.

Even though the multifactorial aspect of the etiology of ECC is now well established, the question of why its risk of occurrence is highest among some groups is unanswered. When considering possible explanations, dietary habits and sweetened food intake frequency may be likely contributing factors.

CONCLUSION

A high DMFS score as well as low socioeconomic factors were strong indicators of predisposition to caries for children.

There is a significant direct relationship between ECC severity and a child's feeding habits, such as frequency, type of feeding, falling asleep with nipples in their mouths, eating at night, in-between meal snacking, and duration of breastfeeding.

Despite being the main agents of transmission, most mothers are unaware of early caries disease and its risk

factors. It is, therefore, necessary to establish awareness programs for oral health in maternal-infant health units.

This study will help pediatric dentists to enhance their knowledge and understand the correlation of ECC in children with respect to their mothers. It will be of great importance to rule out the etiology for this majorly occurring disease in children nowadays and to find the possible cause and preventive measures for the ECC.

REFERENCES

1. Thean H, Wong ML, Koh H. The dental awareness of nursing home staff in Singapore-a pilot study. Gerodontology 2007;24:58-63.
2. Yadav K, Prakash S. Dental caries: A review. Asian J Biomed Pharm Sci 2017;6:1-7.
3. Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. Bull World Health Organ 2005;83:661-9.
4. AAP policy statement on dental home. A dental home by age one. Pediatr Dent 2003;25:4.
5. Yadav K, Prakash S, Yadav NP, Sah RS. Multi-drug resistance of bacterial isolates among dental caries patients. Janaki Med Coll J Med Sci 2015;3:37-44.
6. De Marchi RJ, Hugo FN, Padilha DM, Hilgert JB, Machado DB, Durgante PC, *et al*. Edentulism, use of dentures and consumption of fruit and vegetables in south Brazilian community-dwelling elderly. J Oral Rehabil 2011;38:533-40.
7. Mehta N, Ankola A, Chawla N, Rajpurohit L. Association of maternal oral health-related knowledge, attitude, and socioeconomic status with dental caries status of preschoolchildren in Belgaum city: A cross-sectional study. J Indian Assoc Public Health Dent 2019;17:186-91.
8. Bhat SS, Hegde S, Bhat V, Ramya KM, Jodalli P. Assessment of maternal risk factors and its relationship with early childhood caries among preschool children in Mangaluru city. J Indian Soc Pedod Prev Dent 2017;35:193-7.
9. Ndekero TS, Carneiro LC, Masumo RM. Prevalence of early childhood caries, risk factors and nutritional status among 3-5-year-old preschool children in Kisarawe, Tanzania. PLoS One 2021;16:e0247240.
10. Shrutha SP, Vinit GB, Giri KY, Alam S. Feeding practices and early childhood caries: A cross-sectional study of preschool children in Kanpur District, India. ISRN Dent 2013;2013:275193.
11. Al-Hosani E, Rugg-Gunn A. Combination of low parental educational attainment and high parental income related to high caries experience in pre-school children in Abu Dhabi. Community Dent Oral Epidemiol 1998;26:31-6.
12. O'Sullivan DM, Douglass JM, Champany R, Eberling S, Tetrev S, Tinanoff N. Dental caries prevalence and treatment among Navajo preschool children. J Public Health Dent 1994;54:139-44.
13. Hattab FN, Al-Omari MA, Angmar-Månsson B, Daoud N. The prevalence of nursing caries in one-to-four-year-old children in Jordan. ASDC J Dent Children 1999;66:53-8.
14. Dini EL, Holt RD, Bedi R. Caries and its association with infant feeding and oral health-related behaviours in 3-4-year-old Brazilian children. Community Dent Oral Epidemiol 2000;28:241-8.
15. de Souza PMDES, Proença MAM, Franco MM, Rodrigues VP, Costa JF, Costa EL. Association between early childhood caries and maternal caries status: A cross-section study in São Luís, Maranhão, Brazil. Eur J Dent 2015;9:122-6.
16. Mohebbi SZ, Virtanen JI, Vahid-Golpayegani M, Vehkalahti MM. Feeding habits as determinants of early childhood caries in a population where prolonged breastfeeding is the norm. Community Dent Oral Epidemiol 2008;36:363-9.
17. Slabsinskiene E, Milciuviene S, Narbutaite J, Vasiliauskiene I, Andruskeviciene V, Bendoraitiene EA, *et al*. Severe early childhood caries and behavioral risk factors among 3-year-old children in Lithuania. Medicine (Kaunas) 2010;46:135-41.
18. Folayan MO, Sowole CA, Owotade FJ, Suite E. Impact of infant feeding practices on caries experience of preschool children. J Clin Pediatr Dent 2010;34:297-301.
19. Nunes AM, Alves CM, de Araújo FB, Ortiz TM, Ribeiro MR, Silva AA, *et al*. Association between prolonged breast-feeding and early childhood caries: A hierarchical approach. Community Dent Oral Epidemiol 2012;40:542-9.
20. Retnakumari N, Cyriac G. Childhood caries as influenced by maternal and child characteristics in pre-school children of Kerala-an epidemiological study. Contemp Clin Dent 2012;3:2-8.
21. AL-HSussyne A, AL-Sadan SA. Feeding practices and behavior of Saudi children with early childhood caries and dental knowledge of their mothers. Saudi Dent J 2002;14:112-7.
22. Febres C, Echeverri EA, Keene HJ. Parental awareness, habits, and social factors and their relationship to baby bottle tooth decay. Pediatr Dent 1997;19:22-7.
23. 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.
24. Skafida V, Chambers S. Positive association between sugar consumption and dental decay prevalence independent of oral hygiene in pre-school children: A longitudinal prospective study. J Public Health (Oxf) 2018;40:e275-83.
25. Melhado FL, Cunha RF, Nery RS. Influence of dental care for infants on caries prevalence: A comparative study. J Dent Child (Chic) 2003;70:120-3.
26. Mazhari F, Boskabady M, Moeintaghavi A, Habibi A. The effect of toothbrushing and flossing sequence on interdental plaque reduction and fluoride retention: A randomized controlled clinical trial. J Periodontol 2018;89:824-32.
27. Suresh BS, Ravishankar TL, Chaitra TR, Mohapatra AK, Gupta V. Mother's knowledge about pre-school child's oral health. J Indian Soc Pedod Prev Dent 2010;28:282-7.
28. Hallett KB, O'Rourke PK. Pattern and severity of early childhood caries. Community Dent Oral Epidemiol 2006;34:25-35.
29. Volpato LE, Palti DG, Lima JE, Machado MA, Aranha AM, Bandeca MC, *et al*. When and why parents seek dental care for children under 36 months. J Int Oral Health 2013;5:21-5.
30. Brandão IM, Arcieri RM, Sundefeld ML, Moimaz SA. Early childhood caries: The influence of socio-behavioral variables and health locus of control in a group of children from Araraquara, São Paulo, Brazil. Cad Saude Publica 2006;22:1247-56.
31. Elena B, Petr L. Oral health and children's attitudes among mothers and school teachers in Belarus. Stomatol Baltic Dent Maxillofac J 2004;6:40-3.
32. Zanata RL, Navarro MF, Pereira JC, Franco EB, Lauris JR, Barbosa SH. Effect of caries preventive measures directed to expectant mothers on caries experience in their children. Braz Dent J 2003;14:75-81.

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