

SURVEY

Evaluate Parent's Awareness about the Effect of Prolonged Exposure to Milk or Sugary Liquids during Bedtime in the Development of Rampant Caries in Preschool Children and Infants

Bader Fatani¹, Omar A Fatani², Rania Kalantan³

ABSTRACT

Aim and background: Nursing caries (NC) is a specific type of dental rampant caries with an infectious and transmissible potential that usually affect preschool children or infants that are still in the nursing phase. Prolonged exposure to milk or sugary liquids or other cariogenic substance during bedtime has shown to be the most common cause of rampant caries in preschool children and infants which contributes to lowering of both functional and cosmetic appearance.

Objective: This study aims to evaluate parent's awareness about the effect of prolonged exposure to milk or sugary liquids during bedtime in the development of rampant caries (NC) in preschool children and infants in Riyadh, Saudi Arabia.

Materials and methods: The research design is an observational quantitative cross-sectional with a sample size of 303 participants. The targeted subjects were Saudi parents' males and females, older than 20 and living in Riyadh, Saudi Arabia, and those under 20 years old, non-Saudi without children, and not living in Riyadh were excluded.

Results: A sample of 303 parents was analyzed. Comparison between NC knowledge and gender showed that a higher percentage of mothers (71.0%) knew that bottle-feeding during bedtime can increase the incidence of caries compared to the fathers (51.9%), p value 0.003. The relation between NC awareness and previously heard about NC showed that those who heard about NC before knew more about bottle feeding during bedtime can cause NC, p value < 0.001. Most of the parents (88.7%) who previously heard about NC also knew that oral hygiene follow-up is important in preschool children, p value < 0.001. A significant difference in knowledge existed between those who heard about NC and those who are not in terms of the proper time to follow-up with a child's oral hygiene (p value < 0.001), and the proper time to visit a dentist (p value 0.012).

Conclusion: Our study showed that the parents are significantly aware of the incidence of NC during childhood (90.4%). In addition to the significant awareness among the parents who have previously heard about NC. However, (61.7%) of the parents acknowledged the most common leading cause of early childhood caries.

Keywords: Baby bottle tooth decay, Bottle feeding, Infants, Nursing caries.

International Journal of Clinical Pediatric Dentistry (2021): 10.5005/jp-journals-10005-2029

INTRODUCTION

Early childhood caries or nursing caries (NC) is the incidences of one or more diseased (cavitated or non-cavitated lesions), missing (resulting from caries lesions) in the primary tooth of children under the age of 71 months particularly at nighttime or naptime which result in rapid destruction of normal teeth.¹⁻⁵ Early childhood caries contributes to a serious health problem around the world that results in early pain which could affect the direct and long-term quality of childhood life.⁶ Long-term effect of prolonged exposure to milk or sugary liquids during bedtime is associated with speech problems, orthodontic disorders, psychosocial worries, and otitis media.⁷ In addition to a high risk of developing caries in the permanent dentition in children with extensive early childhood caries.⁸ Nursing caries is a specific type of dental rampant caries with an infectious and transmissible potential that usually affect early children or infants that are still in the nursing phase.^{2,9-11} Baby bottle tooth decay, prolonged nursing-habit caries, bottle caries, rampant caries, and children caries are other terms that describe the same concept.^{2,12} A lot of studies have shown the relationship between feeding habits and the incidence of dental caries.¹ The overall features of NC include the presence of many teeth affected, rapid development, and location of the affected site.⁴ Diagnosis of

¹College of Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia

²College of Medicine, King Saud University, Riyadh, Kingdom of Saudi Arabia

³Department of Pedodontics Dental Center, Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia

Corresponding Author: Bader Fatani, College of Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia, Phone: +966563872802, e-mail: bfatani99@gmail.com

How to cite this article: Fatani B, Fatani OA, Kalantan R. Evaluate Parent's Awareness about the Effect of Prolonged Exposure to Milk or Sugary Liquids during Bedtime in the Development of Rampant Caries in Preschool Children and Infants. *Int J Clin Pediatr Dent* 2021;XX(X): 1-6.

Source of support: Nil

Conflict of interest: None

NC usually depends on the affected site which frequently includes the buccal surface of the maxillary central incisor and the occlusal surface of the first deciduous molars, because of the accumulation

of bottle milk or liquid around the teeth. Lower incidence of NC in the lower incisor region is due to the flushing and buffering solution from the submandibular gland, in addition to the placement of the teat of the bottle head over the tongue and under the maxillary incisor. Deciduous first molars are the first posterior teeth to erupt usually at 12 months of age and are associated with the incidence of NC. Teeth and surface affected are determined by a combination of plaque buildup, eruption pattern, cariogenic diet, and oral anatomy. Involvement of canines, mandibular incisors, or second molars could indicate the presence of general rampant caries rather than NC.² Prolonged exposure to milk or sugary liquids or other cariogenic substance during bedtime have shown to be the most common cause of NC in preschool children and infants.^{3,4} However, the pathogenesis depends on oral physiology, genetic predisposition, the pattern of eruption, and cariogenic feeding habit.^{4,13} Milk has been considered non-cariogenic since it contains lactose. However, prolonged feeding from a bottle that contacts the tooth surface has shown its ability to develop dental caries.¹⁴ Etiology of NC depends on three phases. The first phase is the starting of the mutant's streptococci infection. The second phase, when prolonged exposure to the cariogenic substance increases the level of pathogenicity. The third phase is the demineralization phase which involves rapid destruction in enamel causing dental rampant caries.⁹ Factors determining disease progression are related to the early infection of the primary teeth.¹⁵ Nursing caries requires multiple factors in the treatment process which includes the dental team, parents, and the child.⁴ Studies have shown that many mothers are aware of the factors that contribute to NC development. However, they persist to allow prolonged exposure to milk or sugary liquids.¹⁶ This study aims to evaluate parent's awareness about the effect of prolonged exposure to milk or sugary liquids in the development of rampant caries (NC) in preschool children and infants based on a questionnaire in Riyadh, Saudi Arabia which involves 303 parents.

MATERIALS AND METHODS

The research design is observational quantitative cross-sectional with a sample size of 303 participants. Permission from the Research Ethics Committee of King Khaled University Hospital (KKUH) was taken, and the data were collected from parents living in Riyadh, Saudi Arabia. Information about the research was explained and the consent form was approved by each participant. The study was conducted from November 2020 to March 2021. The targeted subjects were Saudi parents' males and females, older than 20 years old with children and living in Riyadh, and those under 20 years old, non-Saudi without children, and not living in Riyadh were excluded. The sampling process was done by multiple methods: (1) Simple random sampling electronic questionnaire was distributed *via* e-mail to parents who worked at King Khaled University Hospital (KKUH), and the questionnaire was clearly explained to those who are incapable of reading. (2) A random sampling through face-to-face interviews with parents living in Riyadh.

Statistical analysis

The research data were checked for completeness and correctness. All variables were categorical and therefore were presented as frequencies and percentages in tables. The relationship between all variables assessing knowledge regarding NC, and gender, and previous knowledge about NC were assessed by Chi-square test.

The analysis was performed in a 95% confidence interval using the Statistical Package for Social Science (SPSS), version 24.0 (IBM, Armonk, NY, USA).

RESULTS

This study had a total of 303 respondents (parents) and among them 276 (91.1%) were mothers. The most frequent age-group was 40–49 years old which constitute 105 (34.7%) of the respondents. Most of the respondents were housewives (unemployed), 156 (51.5%). Among those who were employed, the most common occupation was teacher, 54 (17.8%). The knowledge about NC was good among them as 274 (90.4%) of parents heard about NC before (Table 1).

Most of the parents, (61.7%) knew that high sugar intake is the most common cause of early childhood caries. About half, 153 (50.5%) of the parents believed that early childhood caries affects permanent teeth in the future. More parents (69.3%) knew that bottle-feeding children (milk or sugary liquid) during bedtime can increase the incidence of caries development. The knowledge about the proper time to follow up for the child's oral hygiene and the proper time to visit a dentist was not so good because the majority of the parents could not answer these questions correctly. The respective frequencies and percentages were presented in Table 2.

All variables assessing knowledge of NC were compared with gender. The results showed that a higher percentage of mothers (71.0%) knew that bottle-feeding during bedtime can increase the incidence of caries compared to the fathers (51.9%), *p* value 0.003. The knowledge regarding proper time to follow-up with child's oral hygiene was also significantly higher among the mothers than the fathers, *p* value 0.002. However, for other variables mentioned in Table 3, significant knowledge difference did not exist between fathers and mothers, *p* values > 0.050 (Table 3).

Table 4 shows the comparison between NC awareness and previously heard or not heard about NC. The parents who previously heard about NC had more knowledge than others

Table 1: Socio-demographic characteristics of all respondents (*n* = 303)

Characteristics	Attributes	N	(%)
Gender	Male	27	8.9
	Female	276	91.1
Age, years	20–29	57	18.8
	30–39	80	26.4
	40–49	105	34.7
	50–59	43	14.2
	>60	18	5.9
Occupation	Unemployed/ housewife	156	51.5
	Teacher	54	17.8
	Retired	11	3.6
	Physician	10	3.3
	Pharmacist	8	2.6
	Nurse	5	1.7
	Specialist	5	1.7
	Other	54	17.8
Heard about nursing caries	Yes	274	90.4
	No	29	9.6

Table 2: Distribution of all respondents by their knowledge regarding nursing caries

Questions	Answers	N	(%)
What do you think is the most common cause of early childhood caries?	• High sugar intake	187	61.7
	• Improper oral hygiene	73	24.1
	• Congenital factors	26	8.6
	• Decrease salivary flow	8	2.6
	• Abnormal eruption of the primary teeth	7	2.3
	• All the above	2	.7
	From your point of view can early childhood caries affect permanent teeth in the future?	• Yes	153
• Maybe		76	25.1
• I don't know		35	11.6
• No		39	12.9
Do you think that bottle-feeding children (milk or sugary liquid) during bedtime can increase the incidence of caries development?	• Yes	210	69.3
	• Maybe	45	14.9
	• I don't know	14	4.6
	• No	34	11.2
Do you think oral hygiene follow-up is important in preschool children or infants?	• Yes	210	69.3
	• Maybe	45	14.9
	• I don't know	14	4.6
	• No	34	11.2
When do you think is the proper time to follow up with your children's oral hygiene?	• <1 year	100	33.0
	• 1–2 years	79	26.1
	• 2–3 years	45	14.9
	• 3–4 years	40	13.2
	• 4–5 years	22	7.3
	• 5–6 years	7	2.3
	• >6 years	10	3.3
When do you think is the proper time for your child to visit a dentist?	• <1 year	20	6.6
	• 1–2 years	55	18.2
	• 2–3 years	67	22.1
	• 3–4 years	30	9.9
	• 4–5 years	28	9.2
	• 5–6 years	19	6.3
	• >6 years	24	7.9
	• When needed	60	19.8

who did not hear about NC. Sixty-five percent of parents who previously heard about NC could identify the main cause of early childhood caries, which is high sugar intake. In contrast, only 31% of parents who did not hear about NC could identify this cause, *p* value 0.001. The knowledge about early childhood caries affecting permanent teeth was higher among those who heard about NC (52.6 vs 31.0%), *p* value 0.003. Similarly, those who heard about NC (73.0 vs 34.5%) knew more about bottle feeding during bedtime can cause NC, *p* value < 0.001. Most of the parents (88.7%) who previously heard about NC also knew that oral hygiene follow-up is important in preschool children, *p* value < 0.001. A significant difference in knowledge existed between those who heard about NC and those who are not in terms of proper time to follow-up with child's oral hygiene (*p* value < 0.001), and proper time to visit a dentist (*p* value 0.012). The respective percentages were presented in Table 4.

DISCUSSION

In correlation with other studies which proved that parents are aware of bad feeding habits. However, they persist in these feeding habits.¹⁶ Our study showed that the parents are significantly aware of NC during early childhood, although they are not sure about the proper time to follow-up with the dentist which could make it difficult for them to make the proper interfere in the appropriate time. A similar study to midwives showed that 86.0% of employed and self-employed midwives knew the term early childhood caries.¹⁷ Also that 90% of midwives knew the role of carbohydrates in early childhood caries development.¹⁷ A study conducted in Amman showed that only 12% of mothers knew that the first dental visit for a child should be at an age of one.¹⁸ Similarly, another study in Kuwait proved that only 8% of women from one maternity hospital knew that 6–12 months is the recommended age for the first dental visit.¹⁹ In association, our study explained that 18.2% of parents consider

Table 3: Association between nursing caries knowledge and gender

Questions	Answers	Male (%)	Female (%)	p value
What do you think is the most common cause of early childhood caries?	• High sugar intake	66.7	61.2	0.937
	• Improper oral hygiene	18.5	24.6	
	• Congenital factors	7.4	8.7	
	• Decrease salivary flow	3.7	2.5	
	• Abnormal eruption of the primary teeth	3.7	2.2	
	• All the above	0.0	0.7	
From your point of view can early childhood caries affect permanent teeth in the future?	• Yes	59.3	49.6	0.140
	• Maybe	11.1	26.4	
	• I don't know	7.4	12.0	
	• No	22.2	12.0	
Do you think that bottle-feeding children (milk or sugary liquid) during bedtime can increase the incidence of caries development?	• Yes	51.9	71.0	0.003
	• Maybe	40.7	12.3	
	• I don't know	0.0	5.1	
	• No	7.4	11.6	
Do you think oral hygiene follow-up is important in preschool children or infants?	• Yes	81.5	84.4	0.552
	• Maybe	14.8	8.3	
	• I don't know	0.0	1.8	
	• No	3.7	5.4	
When do you think is the proper time to follow up with your children's oral hygiene?	• <1 year	3.7	35.9	0.002
	• 1–2 years	48.1	23.9	
	• 2–3 years	18.5	14.5	
	• 3–4 years	14.8	13.0	
	• 4–5 years	7.4	7.2	
	• 5–6 years	7.4	1.8	
	• >6 years	0.0	3.6	
When do you think is the proper time for your child to visit a dentist?	• <1 year	0.0	7.2	0.116
	• 1–2 years	14.8	18.5	
	• 2–3 years	14.8	22.8	
	• 3–4 years	18.5	9.1	
	• 4–5 years	18.5	8.3	
	• 5–6 years	7.4	6.2	
	• >6 years	14.8	7.2	
	• When needed	11.1	20.7	

the proper time for a child to visit a dentist is between ages 1 year and 2 years. As recognized, infancy is a critical time to develop both good or bad habits which could significantly affect the children's oral health in the future.²⁰ A previous study was conducted in Mangaluru to assess parent's knowledge about oral hygiene for their children, the study showed that parents faced challenges in applying proper home oral hygiene and the lack of knowledge about the type of toothbrush and toothpaste for their children.²¹ In our study, we demonstrated that 33% of parents believe that the follow-up with the children oral hygiene should start before the age of 1 year and 26.1% of parents believe that the follow-up should start at age of 1–2 years. Regarding parent's knowledge, a study conducted at three governmental and university pediatric dentistry clinics showed that 57.1% of mothers implemented nighttime bottle feeding for their children.²² However, in our study, 69.3% of the parents knew about the bad effect of bottle-feeding children's sugary liquid during bedtime. Another study was done among pregnant mothers from low socioeconomic status showed a

significant improvement in the knowledge and attitude about early childhood caries after giving anticipatory guidance.²³ On this scale, we assume that increasing parent's education about the disease could significantly alter the future outcomes.

CONCLUSION AND RECOMMENDATION

Overall the awareness about the incidence of NC in the population is highly significant (90.4%). However, (61.7%) of the population acknowledged the most common leading cause of early childhood caries. The findings showed that the mothers are slightly more aware of the high risk of prolonged exposure to sugary liquids than fathers. In addition to the significant awareness among the parents who have previously heard about NC compared to the parents who did not hear about NC. Regarding the significant parent's awareness about NC, we assume that increasing parent's education about children's oral health, preventive measures, and the importance of following up with the dentist can highly affect the incidences of NC

Table 4: Association between nursing caries awareness and previously heard about nursing caries

Questions	Answers	Heard about nursing caries (%)	Did not heard about nursing caries (%)	p value
What do you think is the most common cause of early childhood caries?	High sugar intake	65.0	31.0	0.001
	Improper oral hygiene	23.7	27.6	
	Congenital factors	7.3	20.7	
	Decrease salivary flow	1.8	10.3	
	Abnormal eruption of the primary teeth	1.5	10.3	
	All the above	0.7	0.0	
From your point of view can early childhood caries affect permanent teeth in the future?	Yes	52.6	31.0	0.003
	Maybe	25.5	20.7	
	I don't know	11.7	10.3	
	No	10.2	37.9	
Do you think that bottle-feeding children (milk or sugary liquid) during bedtime can increase the incidence of caries development?	Yes	73.0	34.5	<0.001
	Maybe	15.0	13.8	
	I don't know	4.7	3.4	
	No	7.3	48.3	
Do you think oral hygiene follow-up is important in preschool children or infants?	Yes	88.7	41.4	<0.001
	Maybe	8.0	17.2	
	I don't know	1.1	6.9	
	No	2.2	34.5	
When do you think is the proper time to follow up with your children's oral hygiene?	<1 year	35.0	13.8	<0.001
	1–2 years	27.4	13.8	
	2–3 years	15.0	13.8	
	3–4 years	12.0	24.1	
	4–5 years	7.3	6.9	
	5–6 years	1.8	6.9	
	>6 years	1.5	20.7	
When do you think is the proper time for your child to visit a dentist?	<1 year	3.4	6.9	0.012
	1–2 years	10.3	19.0	
	2–3 years	17.2	22.6	
	3–4 years	27.6	8.0	
	4–5 years	6.9	9.5	
	5–6 years	6.9	6.2	
	>6 years	6.9	21.2	
	When needed	20.7	6.6	

among children. In the future, we recommend inspecting parents' probable motivations for neglecting preventive measures and the possible reasons for continuing these bad habits.

ACKNOWLEDGMENTS

We would like to thank our participants for their time and contribution to the study.

REFERENCES

- Avila WM, Pordeus IA, Paiva SM, et al. Breast and bottle feeding as risk factors for dental caries: a systematic review and meta-analysis. *PLoS ONE* 2015;10(11):e0142922. DOI: 10.1371/journal.pone.0142922.
- Curzon ME, Preston AJ. Risk groups: nursing bottle caries/caries in the elderly. *Caries Res* 2004;38(Suppl 1):24–33. DOI: 10.1159/000074359.
- Milnes AR. Description and epidemiology of nursing caries. *J Public Health Dent* 1996;56(1):38–50. DOI: 10.1111/j.1752-7325.1996.tb02394.x.
- Johnston T, Messer LB. Nursing caries: literature review and report of a case managed under local anaesthesia. *Aust Dent J* 1994;39(6):373–381. DOI: 10.1111/j.1834-7819.1994.tb03110.x.
- Colombo S, Gallus S, Beretta M, et al. Prevalence and determinants of early childhood caries in Italy. *Eur J Paediatr Dent* 2019;20(4):267–273. DOI: 10.23804/ejpd.2019.20.04.02.
- Kraljevic I, Filippi C, Filippi A. Risk indicators of early childhood caries (ECC) in children with high treatment needs. *Swiss Dent J* 2017;127(5):398–410. English, German.
- Kelly M, Bruerd B. The prevalence of baby bottle tooth decay among two native American populations. *J Public Health Dent* 1987;47(2):94–97. DOI: 10.1111/j.1752-7325.1987.tb01983.x.
- Meyer F, Enax J. Early childhood caries: epidemiology, aetiology, and prevention. *Int J Dent* 2018;2018:1415873. DOI: 10.1155/2018/1415873.

9. Berkowitz R. Etiology of nursing caries: a microbiologic perspective. *J Public Health Dent* 1996;56(1):51–54. DOI: 10.1111/j.1752-7325.1996.tb02395.x.
10. Berkowitz RJ, Turner J, Hughes C. Microbial characteristics of the human dental caries associated with prolonged bottle-feeding. *Arch Oral Biol* 1984;29(11):949–951. DOI: 10.1016/0003-9969(84)90097-9.
11. Barnes GP, Parker WA, Lyon TC, et al. Ethnicity, location, age, and fluoridation factors in baby bottle tooth decay and caries prevalence of Head Start children. *Public Health Rep* 1992;107(2):167–173.
12. Kaste LM, Gift HC. Inappropriate infant bottle feeding. Status of the Healthy People 2000 objective. *Arch Pediatr Adolesc Med* 1995;149(7):786–791. DOI: 10.1001/archpedi.1995.02170200076012.
13. Marino RV, Bomze K, Scholl TO, et al. Nursing bottle caries: characteristics of children at risk. *Clin Pediatr (Phila)* 1989;28(3):129–131. DOI: 10.1177/000992288902800305.
14. Freeman R, Stevens A. Nursing caries and buying time: an emerging theory of prolonged bottle feeding. *Community Dent Oral Epidemiol* 2008;36(5):425–433. DOI: 10.1111/j.1600-0528.2008.00425.x.
15. Yonezu T, Ushida N, Yakushiji M. Longitudinal study of prolonged breast- or bottle-feeding on dental caries in Japanese children. *Bull Tokyo Dent Coll* 2006;47(4):157–160. DOI: 10.2209/tdcpub.47.157.
16. Von Burg MM, Sanders BJ, Weddell JA. Baby bottle tooth decay: a concern for all mothers. *Pediatr Nurs* 1995;21(6):515–519. quiz 520-1.
17. Ehlers V, Callaway A, Azrak B, et al. Survey of midwives' knowledge of caries prevention in perinatal care. *MCN Am J Matern Child Nurs* 2014;39(4):253–259. DOI: 10.1097/NMC.000000000000045.
18. ElKarmi R, Aljafari A, Eldali H, et al. Do expectant mothers know how early childhood caries can be prevented? A cross-sectional study. *Eur Arch Paediatr Dent* 2019;20(6):595–601. DOI: 10.1007/s40368-019-00442-8.
19. Al-Sane M, Koerber A, Montero M, et al. Sociodemographic and behavioural determinants of early childhood caries knowledge among expectant mothers in Kuwait. *Eur Arch Paediatr Dent* 2020;22(3):449–458. DOI: 10.1007/s40368-020-00579-x.
20. Brecher EA, Lewis CW. Infant oral health. *Pediatr Clin North Am* 2018;65(5):909–921. DOI: 10.1016/j.pcl.2018.05.016.
21. Suprabha BS, D'Souza V, Shenoy R, et al. Early childhood caries and parents' challenges in implementing oral hygiene practices: a qualitative study. *Int J Paediatr Dent* 2021;31(1):106–114. DOI: 10.1111/ipd.12696.
22. Özen B, Van Strijp AJ, Özer L, et al. Evaluation of possible associated factors for early childhood caries and severe early childhood caries: a multicenter cross-sectional survey. *J Clin Pediatr Dent* 2016;40(2):118–123. DOI: 10.17796/1053-4628-40.2.118.
23. Rajan P, Krishnan R, Kumar S, et al. Knowledge and attitude about early childhood caries among pregnant mothers from low socioeconomic status: a questionnaire study. *J Pharm Bioallied Sci* 2017;9(Suppl 1):S85–S87. DOI: 10.4103/jpbs.JPBS_76_17.