ORIGINAL ARTICLE
Volume 15 Issue 2 2020
DOI: 10.21315/aos2020.15.2.468
ARTICLE INFO
Submitted: 08/07/2020
Accepted: 28/10/2020
Online: 24/12/2020

Parents' Knowledge and Children's Feeding Patterns in Relation to Caries Experiences

Noor Nazahiah Bakri[a]*, Nusra Zakaria[a], Shareena Mohd Shaari[a], Nor Faezah Md Bohari[a], Ahmad Nadzri Mohamad[b]

[a]*Faculty of Dentistry, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, 47000 Sungai Buloh, Selangor, Malaysia*

[b]*Faculty of Information Management, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia*

*Corresponding author: nazahiahb@uitm.edu.my

To cite this article: Bakri NN, Zakaria N, Mohd Shaari S, Md Bohari NF, Mohamad AN (2020). Parents' knowledge and children's feeding patterns in relation to caries experiences. *Arch Orofac Sci*, **15**(2): 187–196. https://doi.org/10.21315/aos2020.15.2.468

To link to this article: https://doi.org/10.21315/aos2020.15.2.468

ABSTRACT

This study aims to assess the association of parents' knowledge, children's feeding pattern, and other contributing factors with caries experience of a child. This was a cross-sectional study using a validated questionnaire of 145 children aged two to eight years old attending the Faculty of Dentistry, Universiti Teknologi MARA (UiTM), Malaysia. The questionnaires were given to the parents during their children's dental visit in paediatric clinic and primary care. Dental caries was traced from the patient's record in the Integrated Dental Records Management System (IDERMS) and clinical examination was done for those who did not have the dental record. Charting was recorded using dentition status and treatment need based on the 1997 World Health Organization (WHO) criteria. Data were analysed using the independent *t*-test and one-way ANOVA to examine the association of dental caries with two and three or more categorical variables respectively using SPSS 23.0. The study participants were 74 (51%) boys and 71 (49%) girls. The mean dmft score of the participants was 3.31 (4.36). Caries experience was statistically significant with the reason for first dental visit ($p < 0.001$), the age of the children discontinues bottle-feeding ($p < 0.001$), habits of leaving bottle-feeding while sleeping ($p = 0.011$), children wake up for milk at night ($p = 0.050$) and knowledge of parents on the effect of leaving bottle while sleeping ($p = 0.037$). Children feeding patterns and parents' knowledge of the risk factors of dental caries were significantly associated with caries experience among children aged two to eight years old.

Keywords: *Bottle-feeding; breastfeeding; dental caries; feeding pattern; parents' knowledge*

INTRODUCTION

Dental caries is defined as a localised, post-eruptive pathological process of external origin that involves the softening of the hard tissue before resulting in cavitation formation (Harris *et al.*, 2004). The acid production from bacterial metabolism can reduce the pH in the oral environment and subsequently leads to the demineralisation of tooth structure over time. An early lesion often stays asymptomatic but advanced stages of dental caries may lead to dental pain, dental infections and abscesses. In the worst case scenario, dental caries may end up as sepsis (Ismail *et al.*, 2009). Despite various preventive measures such as water fluoridation, dental caries remains a common public health issue worldwide that inflicts all age groups (Frencken *et al.*, 2017). The problem is especially severe among inhabitants in socioeconomically disadvantaged areas (Arora *et al.*, 2011). Overall, the prevalence and severity of dental carious lesions among 5- and 12-year-olds appeared to have declined among the general population. However, the same could not be said among the socially-deprived population (Frencken *et al.*, 2017). Locally, the prevalence of dental caries is still considerably high among six-year-old children in Peninsular Malaysia (Mani *et al.*, 2010). However, in the past few decades, the prevalence of dental caries among five-year-old showed a reducing trend from 87.1% in 1995 to 76.5% in 2005 before further decreasing to 71.3% in 2015 (Oral Health Division, Ministry of Health Malaysia, 2010; Che Salleh *et al.*, 2017).

Apart from the various clinical implications, dental caries can also affect an individual's general health, quality of life, and well-being (Tang *et al.*, 2013). Caries in young children aged below 72 months is a rapidly progressive disease that can result in childhood distress, weight loss and impaired school performances (Arora *et al.*, 2011). Pain and discomfort from untreated dental caries in older children may impair their educational, social and psychological development. Activity restriction, absence from school, diminished ability to learn, sleep disturbance, reduced confidence to speak and increased hospitalisation are among the reported consequences of dental caries (Tang *et al.*, 2013). In addition, dental caries can affect the children's dietary intake, thus resulting in unintended weight loss and malnourishment (Lakshman *et al.*, 2011). Apart from that, pulpitis and chronic dental abscess can induce the release of cytokines and other inflammatory factors from the damaged tissues. These agents have been shown to suppress erythropoiesis and the synthesis of haemoglobin, leading to iron deficiency-related anaemia (Lanting *et al.*, 2005). The parents are also affected by the burden of dental caries in children as they need to take time off from work to bring their children for treatment besides bearing the high cost of dental treatment (Lanting *et al.*, 2005).

In a previous study, Acs *et al.* (1999) highlighted that routine oral hygiene practices such as tooth brushing before sleep, parental supervision during brushing, the use of a fluoridated toothpaste and dietary intake are closely related to the prevention of dental caries. Previous studies also reported that early detection of dental caries by frequent dental visits may help in reducing the severity of the lesion (Senesombath *et al.*, 2010; Dye *et al.*, 2015). The distal predictors of dental caries included low parental/maternal education, parental occupation, disadvantaged neighbourhood, low family income, a high number of children per family, single mother, presence of oral bacteria flora, cultural differences, child temperament and low levels of oral health knowledge among parents (Acs *et al.*, 1999; Ramos-Gomez *et al.*, 2002; Ismail *et al.*, 2009). Furthermore, Arora *et al.* (2011) highlighted that the dietary and feeding patterns of the children are also closely related to dental caries. Breastfeeding is commonly promoted to new mothers by medical practitioners in view of the associated health benefits. On the other hand, the clinical consensus among dental

practitioners is that prolonged and nocturnal breastfeeding may be associated with an increased risk of early childhood caries (ECC). However, the evidence for such an association is limited and inconsistent because it is primarily based on cross-sectional studies that relied on retrospective recall of infant feeding practices (Arora *et al.*, 2011).

In general, family members especially mothers represent the first role models that influence a child's behaviour and development. The mother's nutritional knowledge was found to exert a positive influence on children's eating habits (World Health Organization, 2017). Therefore, it is important to explore the association of children's feeding patterns and parents' knowledge in relation to dental caries experience as well as to identify other associated factors of dental caries among children.

MATERIALS AND METHODS

This was a cross-sectional study to examine the association of children's feeding patterns, parents' knowledge and awareness, and other factors with dental caries. The dentition status and treatment need were measured based on the 1997 World Health Organization (WHO) criteria (World Health Organization, 2013). Ethical approval was obtained from the Universiti Teknologi MARA (UiTM) Ethics Committee on 13 July 2018 (Ref No: 600-IRMI (5/1/6).

The study was divided into two phases whereby Phase 1 involved the construction and modification of the questionnaire adapted from a previous study (Lakshman *et al.*, 2011). Content and face validation by three experts in the field were performed. The modification was made to the questionnaire based on comments and feedback from the experts. The questionnaire was then used in a pre-test among 15 children who shared similar inclusion criteria as the study population. Phase 2 involved the actual data collection among 145 children aged two to eight years old from the Faculty of Dentistry, UiTM. The sample size was calculated (Naing *et al.*, 2006) based on the prevalence of dental caries (74.5%) among six years old children in the National Oral Health Survey of School Children (NOHSS) 2007 (OHD-MOH, 2010).

All children with deciduous and mixed dentition who attended the Dental Clinic at the Faculty of Dentistry, UiTM from August to September 2018 were included in this study. Children with special needs or with all permanent dentition were excluded from this study. Prior to data collection, parents or guardians were contacted to obtain their permission to include their children as study participants. Their permission was sought before accessing the children's dental records or performing a dental examination for those without dental records.

Following that, the validated questionnaire was passed to the parents and guardians. The questionnaire was divided into three sections, namely (i) sociodemographic background, (ii) children's feeding pattern, and (iii) parents'/guardian's knowledge and awareness of dental health. The variables under each category are presented in Table 1. The dental caries status was retrieved from the patient's record in the Integrated Dental Records Management System (IDERMS) and recorded using dentition status and treatment needs based on the 1997 WHO criteria (World Health Organization, 2013). The codes for deciduous dentition status included "d" for decayed, "m" for missing because of dental caries, and "f" for filled teeth due to dental caries. The dmft score was calculated by the summation of decayed (d), missing (m), and filled (f) teeth score. Filling and missing for reasons other than dental caries would not be included in the calculation of the dmft score. The two researchers involved in the dental examination were calibrated by the UiTM International Caries Detection and Assessment System (ICDAS) task force in 2016, with a kappa value of at least 0.6.

Data analysis was conducted with SPSS 23.0 (IBM Company, Malaysia). The normality of the data was checked via a histogram plot. The data were found to be approximately normally distributed. Independent *t*-test was used to examine the association of dental caries with two categorical variables while one-way ANOVA and post-hoc (Tukey) were applied to examine the association of dental caries with three and more categorical variables. Statistical significance was set at $p \leq 0.05$.

Table 1 The association of sociodemographic background of the patient with the dmft score of the children

Variable	*n* = 145 (%)	Mean (SD)	*p*-value
Level of parent's highest education			0.748
Sijil Pelajaran Malaysia (Malaysian Certificate of Education)	23 (15.9)	3.91 (5.03)	
Diploma	33 (22.8)	3.91 (4.82)	
Degree	71 (49.0)	3.04 (4.01)	
Master/PHD	15 (10.3)	2.53 (4.27)	
Missing	3 (2.1)	–	
Household income			0.359
<RM2,500	13 (9.0)	3.15 (2.85)	
RM2,500–RM5,000	45 (31.0)	4.24 (5.21)	
RM5,000–RM10,000	65 (44.8)	2.97 (3.90)	
>RM10,000	22 (15.2)	2.50 (4.42)	
Child's medical problem			0.068
Yes	129 (89.0)	3.08 (4.26)	
No	16 (11.0)	5.19 (4.86)	

Note: Significant value was set at $p \leq 0.05$.

RESULTS

A total of 145 children aged two to eight years old were included in this study. The study participants comprised of 74 boys (51%) and 71 girls (49%). Table 1 shows the association of the sociodemographic factors with the dmft score. All sociodemographic factors were not significantly associated with the dmft score.

Table 2 shows the association of oral health care with the dmft score of the children. Among the various factors, the reason for the current dental visit ($p < 0.001$) and the reason for the first dental visit ($p < 0.001$) were statistically significant with the dmft score of the children. The pair of the mean dmft scores for restoration with dental check-up and toothache with dental check-up was statistically significant using post-hoc comparison Tukey test. The mean (SD) dmft scores of restoration and toothache were [5.86 (3.64)] and [8.38 (7.82)], respectively. However, other pairs of the reason for the current dental visit were not statistically significant.

With regard to the reason for the first dental visit, the pair of the mean (SD) dmft scores for restoration with dental check-up and scaling with dental check-up were statistically significant using the post-hoc comparison Tukey test. The mean (SD) dmft scores of restoration and scaling were [6.88 (3.00)] and [7.00 (6.38)], respectively. However, the use of fluoridated toothpaste ($p = 0.993$), observing/supervising children while brushing ($p = 0.910$), and brushing before sleep ($p = 0.414$) were not statistically significant with the dmft score.

Table 3 shows the association of the children's feeding patterns with the dmft

score of the children. Age of stopping bottle-feeding (p = 0.003), children who slept with a bottle during bedtime (p = 0.011), and children who woke up at night for milk feeding (p = 0.050) were statistically significant with the dmft score. The pair of the mean (SD) dmft scores for children who stopped bottle-feeding aged zero to two years with aged two to four years old, aged four to six years old, and more than six years old were statistically significant using the post-hoc comparison Tukey test.

Furthermore, children who slept with a bottle during bedtime reported a higher mean dmft (SD) score of [5.18 (5.59)] compared to those who did not [2.86 (3.91)]. Similarly, children who woke up at night for milk feeding reported a higher mean (SD) dmft score of [4.08 (4.96)] than those who did not [2.67 (3.70)]. However, the frequency of consuming sugary food/drink (p = 0.679), history of breastfeeding (p = 0.469), exclusive breastfeeding for the first six months of life (p = 0.620), age of children stopped breastfeeding (p = 0.356), the frequency of bottle-feeding per day (p = 0.086), and the duration of bottle-feeding (p = 0.782) were all not statistically significant.

Table 4 shows the association of parents' knowledge with the dmft score of the children. Parents' knowledge about the effect of bottle-feeding while sleeping on the development of dental caries (p = 0.037) was statistically significant with the mean dmft score. The mean (SD) dmft score [2.99 (4.16)] was lower among parents who were aware of the effect of sleeping with a bottle on the development of dental caries compared to those who did not know [5.00 (5.08)]. Nevertheless, parents' knowledge on the presence of sugar in the formulated milk (p = 0.666), types of food that can cause caries (p = 0.461), the impact of dental caries towards children's behaviour and daily activity (p = 0.372), and the impact of dental caries towards the caregiver's life (p = 0.422) did not show any statistical significance.

Table 2 The association of oral health care with the dmft score of the children

Variable	*n* = 145 (%)	Mean (SD)	*p*-value
Reason for the current dental visit			< 0.001*
Dental check-up	100 (69.0)	2.31 (3.60)	
Restoration	21 (14.5)	5.86 (3.64)**	
Toothache	8 (5.5)	8.38 (7.82)**	
Trauma	14 (9.0)	4.23 (4.95)	
Scaling	3 (2.1)	2.00 (1.41)	
Reasons the child came for the first dental visit			<0.001*
Dental check-up	18 (12.4)	1.00 (1.65)	
Restoration	8 (5.5)	6.88 (3.00)**	
Toothache	21 (14.5)	5.52 (5.29)	
Trauma	94 (64.8)	2.80 (4.10)	
Scaling	4 (2.8)	7.00 (6.38)**	
Child use fluoridated toothpaste			0.993
Yes	107 (73.8)	3.31 (3.90)	
No	38 (26.2)	3.32 (5.51)	
Observe your child while he/she brushes his/her teeth			0.910
Yes	134 (92.4)	3.30 (4.51)	
No	11 (7.6)	3.45 (1.86)	

(*continued on next page*)

Table 2 (*continued*)

Variable	*n* = 145 (%)	Mean (SD)	*p*-value
Clean your child teeth before sleep			0.414
Yes	102 (70.3)	3.12 (4.26)	
No	43 (29.7)	3.77 (4.61)	

Note: *Significant value was set at $p \leq 0.05$.
**One-way ANOVA test was applied followed by post-hoc comparison Tukey test.

Table 3 The association of children feeding pattern with dmft score of the children

Variable	*n* =145 (%)	Mean (SD)	*p*-value
Frequency eat sugary food/day			0.679
<3 times/day	77 (53.1)	3.00 (4.12)	
4–5 times/day	60 (41.4)	3.90 (4.69)	
>5 times/day	8 (5.5)	1.88 (3.80)	
Child breastfed			0.469
Yes	143 (98.6)	3.34 (4.38)	
No	2 (1.4)	1.00 (1.41)	
Child exclusively breast milk for the first six months			0.620
Yes	95 (65.5)	3.44 (4.61)	
No	50 (34.5)	3.06 (3.86)	
Age of the child stop breastfed			0.356
0–6 months	38 (26.2)	4.18 (5.52)	
6–12 months	28 (19.3)	2.93 (4.47)	
>12 months	79 (54.5)	3.03 (3.63)	
Age of the child stop bottle-fed			0.003*
0–2 years old	32 (22.1)	0.84 (2.17)	
2–4 years old	40 (27.6)	3.95 (4.85)**	
4–6 years old	58 (40.0)	3.93 (4.50)**	
>6 years old	15 (10.3)	4.47 (4.34)**	
Frequency of bottle-feeding per day			0.086
<3 times/day	83 (57.2)	3.07 (3.95)	
4–5 times /day	49 (33.8)	2.94 (4.13)	
>5 times/day	13 (9.0)	6.23 (6.55)	
Duration to finish bottle-fed			0.782
0–10 min	90 (62.1)	3.18 (4.13)	
11–30 min	48 (33.1)	3.65(5.02)	
>30 min	7 (4.8)	2.71(1.98)	
Child always sleep with bottle in their mouth during night			0.011*
Yes	28 (19.3)	5.18(5.59)	
No	117 (80.7)	2.86(3.91)	

(*continued on next page*)

Table 3 (*continued*)

Variable	*n* =145 (%)	Mean (SD)	*p*-value
Child wake up at night for milk			0.050*
Yes	66 (45.5)	4.08(4.96)	
No	79 (54.5)	2.67(3.70)	

Note: *Significant value was set at $p \leq 0.05$.
**One-way ANOVA test was applied followed by post-hoc comparison Tukey test.

Table 4 The association of the parents' knowledge with the dmft score of the children

Variable	*n* = 145 (%)	Mean (SD)	*p*-value
The presence of sugar in formulated milk			0.666
Yes	133 (91.7)	3.26 (4.44)	
No	12 (8.3)	3.83 (3.41)	
The type of foods that can lead to dental caries			0.461
Yes	111 (76.6)	3.16 (4.05)	
No	34 (23.4)	3.79 (5.27)	
The effect of sleeping with a bottle on the development of dental caries			0.037*
Yes	123 (84.8)	2.99 (4.16)	
No	22 (15.2)	5.09 (5.08)	
The effect of dental caries on the children's behaviour and daily activities			0.372
Yes	120 (82.8)	3.46 (4.57)	
No	25 (17.2)	2.60 (3.14)	
The impact of dental caries on parents' quality of life			0.422
Yes	117 (80.7)	3.45 (4.57)	
No	28 (19.3)	2.71 (3.37)	

Note: *Significant value was set at $p \leq 0.05$.

DISCUSSION

The present study aimed to assess the association of parents' knowledge, children's feeding patterns and other contributing factors of caries experience in a child. It was found that children who stopped bottle-feeding between the ages of zero to two years old have a lower risk of developing dental caries as compared to children who stopped later at the age of two to four years old, four to six years old, and above six years old. Previous studies have shown that prolonged and frequent use of bottle-feeding were predictors of ECC in young children (Sankeshwari *et al.*, 2012). Apart from that, infant feeding habits such as breastfeeding, prolonged and nocturnal breastfeeding, prolonged daytime and nocturnal use of bottle-feeding that contained fermentable liquids, continued use of sweetened pacifiers and certain diets are also common risk factors of ECC (Olatosi and Sote, 2014; Feldens *et al.*, 2018). It was observed in the present study that the earlier the baby stopped breastfeeding, the higher the dmft score. However, the result was not statistically significant. The earlier the baby stopped breastfeeding, the sooner they would be introduced to formulated milk that contains different compositions and concentrations of sugar in comparison to breast milk (Ferreira *et al.*, 1998). Furthermore, the study findings also showed that caries development was statistically significant with the age at which children stopped bottle-feeding. This was in agreement with the suggestion by Public

Health England to introduce sippy cups at six months old and to discourage bottle-feeding after one year old to lower the risk of dental caries (Davies and Davies, 2008).

Apart from that, we also found that children who woke up at night to feed or slept with a bottle in the mouth during bedtime reported a higher dmft score compared to those who did not. Olatosi and Sote (2014) concluded that bottle-feeding at night was the most important determinant for ECC development, particularly for those who continued the habit for a longer duration. Shrutha *et al.* (2013) observed that children with longer feeding time, night-time feeding during, those falling asleep with a bottle, and those fed with additional sugar in milk are associated with higher dental caries experience. During sleep, the salivary flow is slowed down. Thus, the salivary buffering system is less effective and this leads to the build-up of a longer acidic environment in the oral cavity (Turner and Ship, 2007). Therefore, this explains why night feeding and keeping a bottle during sleeping will lead to the demineralisation of tooth structure and subsequent progression to dental caries.

With regard to the pattern of dental clinic attendance, it was noted that children who came for a routine dental check-up at the time of study and those who were on the first dental visit had a lower dmft score compared to those who came in for treatment such as restoration, scaling and toothache. Al-Shalan *et al.* (2002) concluded that the main reason for late dental visits was the lack of perceived need by the parents, especially when the children did not appear to be in pain. Demineralisation of tooth structure often starts in the enamel outer layer. At this stage, it is usually asymptomatic in children and usually undetected by the parents. By the time dental caries has encroached into the dentin, the child will start to feel the pain. However, more complex and expensive dental treatment will be required by then. In the worst case scenario, it may result in the early loss of teeth (Murshid, 2016). Moreover, untreated tooth decay may actively prevent children from eating, sleeping and enjoying daily activities. Therefore, early and regular dental visits are vital to detect any early lesions and to evaluate the craniofacial and dental development of the child (Meera *et al.*, 2008).

Further findings from the present study revealed a significant association between the parents' knowledge of the effect of bottle-feeding while sleeping with the dmft score of the children. Similar findings were reported in India. It was found that a lack of knowledge among parents resulted in poor dental care among the children and a higher prevalence of dental caries (Shrutha *et al.*, 2013).

There are several limitations to the findings from the present study. Firstly, as a cross sectional study, the causality of the exposure to the occurrence of dental caries could not be confirmed. Therefore, the results from the analysis should be interpreted as an association rather than a real causality. Secondly, the study participants were recruited at the Faculty of Dentistry, UiTM. Therefore, the findings are only representative of children near the study area and not be generalisable to the whole Malaysian population. Lastly, the outcome variable, the dmft scores, were traced from the IDERMS at the Faculty of Dentistry, UiTM. Thus, the scores recorded relied on the first dental officer who examined the children. However, all the clinicians at the Faculty of Dentistry have been calibrated by the UiTM ICDAS task force. In view of the limitations, like-minded researchers are recommended to conduct a cohort study to explore the causality of the mentioned factors and to examine the role of feeding pattern in a bigger sampling population.

CONCLUSION

In summary, this study showed that children's first dental visit, children's feeding pattern and parents' knowledge on the

risk factors of dental caries are important predictors for caries experience among children aged two to eight years old.

ACKNOWLEDGEMENTS

The researchers wish to thank Research Management Institute, Universiti Teknologi MARA, Malaysia for funding this research project through the Lestari Grant Scheme (600-IRMI/Dana KCM 5/3/LESTARI (208/2017).

REFERENCES

Acs G, Shulman R, Ng MW, Chussid S (1999). The effect of dental rehabilitation on the body weight of children with early childhood caries. *Pediatr Dent*, **21**(2): 109–113.

Al-Shalan TA, Al-Musa BA, Al-Khamis AM (2002). Parents' attitude towards children's first dental visit in the College of Dentistry, Riyadh, Saudi Arabia. *Saudi Med J*, **23**(9): 1110–1114.

Arora A, Scott JA, Bhole S, Do L, Schwarz E, Blinkhorn AS (2011). Early childhood feeding practices and dental caries in preschool children: A multi-centre birth cohort study. *BMC Public Health*, **11**: 28. https://doi.org/10.1186/1471-2458-11-28

Che Salleh N, Yaw SL, Abd Muttalib K, Ab Rahman J (2017). *National Oral Health Survey of Preschool Children 2015 (NOHPS 2015), Vol. I: Oral Health Status and Caries Treatment Needs of 5-Year-Old Children. Project Report*. Putrajaya: Oral Health Division, Ministry of Health Malaysia.

Davies GM, Davies RM (2008). Delivering better oral health – an evidence-based toolkit for prevention: A review. *Dent Update*, **35**(7): 460–462. https://doi.org/10.12968/denu.2008.35.7.460

Dye BA, Thornton-Evans G, Li X, Iafolla TJ (2015). Dental caries and sealant prevalence in children and adolescents in the United States, 2011–2012. *NCHS Data Brief*, (191): 1–8.

Feldens CA, Rodrigues PH, de Anastácio G, Vítolo MR, Chaffee BW (2018). Feeding frequency in infancy and dental caries in childhood: A prospective cohort study. *Int Dent J*, **68**(2): 113–121. https://doi.org/10.1111/idj.12333

Ferreira IMPLVO, Gomes AMP, Ferreira MA (1998). Determination of sugars, and some other compounds in infant formulae, follow-up milks and human milk by HPLC-UV/RI. *Carbohydr Polym*, **37**(3): 225–229. https://doi.org/10.1016/S0144-8617(98)00064-2

Frencken JE, Sharma P, Stenhouse L, Green D, Laverty D, Dietrich T (2017). Global epidemiology of dental caries and severe periodontitis: A comprehensive review. *J Clin Periodontol*, **44**(Supp.18): S94–S105. https://doi.org/10.1111/jcpe.12677

Harris R, Nicoll AD, Adair PM, Pine CM (2004). Risk factors for dental caries in young children: A systematic review of the literature. *Community Dent Health*, **21**(Supp.1): 71–85.

Ismail AI, Sohn W, Lim S, Willem JM (2009). Predictors of dental caries progression in primary teeth. *J Dent Res*, **88**(3): 270–275. https://doi.org/10.1177/0022034508331011

Lakshman RR, Landsbaugh JR, Schiff A, Hardeman W, Ong KK, Griffin SJ (2011). Development of a questionnaire to assess maternal attitudes towards infant growth and milk feeding practices. *Int J Behav Nutr Phys Act*, **8**: 35. https://doi.org/10.1186/1479-5868-8-35

Lanting CI, Van Wouwe JP, Reijneveld SA (2005). Infant milk feeding practices in the Netherlands and associated factors. *Acta Paediatr*, **94**(7): 935–942. https://doi.org/10.1111/j.1651-2227.2005.tb02014.x

Mani SA, Aziz AA, John J, Ismail NM (2010). Knowledge, attitude and practice of oral health promoting factors among caretakers of children attending day-care centers in Kubang Kerian, Malaysia: A preliminary study. *J Indian Soc Pedod Prev Dent*, **28**(2): 78–83. https://doi.org/10.4103/0970-4388.66741

Meera R, Muthu MS, Phanibabu M, Rathnaprabhu V (2008). First dental visit of a child. *J Indian Soc Pedod Prev Dent*, **26**(6): 68–71.

Murshid EZ (2016). Children's ages and reasons for receiving their first dental visit in a Saudi community. *Saudi Dent J*, **28**(3): 142–147. https://doi.org/10.1016/j.sdentj.2015.12.003

Naing L, Winn T, Rusli BN (2006). Practical issues in calculating the sample size for prevalence studies. *Arch Orofac Sci*, **1**: 9–14.

Olatosi OO, Sote EO (2014). Association of early childhood caries with breastfeeding and bottle feeding in Southwestern Nigerian children of preschool age. *J West Afr Coll Surg*, **4**(1): 31–53.

Oral Health Division, Ministry of Health Malaysia (OHD-MOH) (2010). *National Oral Health Survey of Schoolchildren 2007 (NOHSS 2007)*. Putrajaya: Oral Health Division, Ministry of Health Malaysia.

Ramos-Gomez FJ, Weintraub JA, Gansky SA, Hoover CI, Featherstone JD (2002). Bacterial, behavioral and environmental factors associated with early childhood caries. *J Clin Pediatr Dent*, **26**(2): 165–173. https://doi.org/10.17796/jcpd.26.2.t6601j3618675326

Sankeshwari RM, Ankola AV, Tangade PS, Hebbal MI (2012). Feeding habits and oral hygiene practices as determinants of early childhood caries in 3- to 5-year-old children of Belgaum City, India. *Oral Health Prev Dent*, **10**(3): 283–290. https://doi.org/10.3290/j.ohpd.a28525

Senesombath S, Nakornchai S, Banditsing P, Lexomboon D (2010). Early childhood caries and related factors in Vientiane, Lao PDR. *Southeast Asian J Trop Med Public Health*, **41**(3): 717–725.

Shrutha SP, Vinit GBG, Giri KY, Alam S (2013). Feeding practices and early childhood caries: A cross-sectional study of preschool children in Kanpur District, India. *ISRN Dent*, **2013**: 275193. https://doi.org/10.1155/2013/275193

Tang RS, Huang MC, Huang ST (2013). Relationship between dental caries status and anemia in children with severe early childhood caries. *Kaohsiung J Med Sci*, **29**(6): 330–336. https://doi.org/10.1016/j.kjms.2012.10.003

Turner MD, Ship JA (2007). Dry mouth and its effects on the oral health of elderly people. *J Am Dent Assoc*, **138**(Supp.1): S15–S20. https://doi.org/10.14219/jada.archive.2007.0358

World Health Organization (2013). *Oral Health Surveys: Basic Methods*, 5th edn. Geneva: World Health Organization.

World Health Organization (2017). *Sugars and Dental Caries* (No. WHO/NMH/NHD/17.12). Geneva: World Health Organization.