Original Article

Caries Status and Risk Factors in 18 – 36 -Month-Old Children Attended Well Baby Clinic at Bangkok Metropolitan Administration General Hospital

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Abstract

This research aimed to study caries status and risk factors between socioeconomic status, oral health care and dietary practices in 18-36-month-old children attended well baby clinic at Bangkok Metropolitan Administration General Hospital. Cross-sectional analytical study conducted by recording tooth status, mean debris score and enamel hypoplasia status of 320 children and interviewing their caregivers involving and socioeconomic status, oral health care and dietary practices. Chi-square and Multiple logistic regression analysis were used to analyze the data. Fifty four percent of children had dental caries. Mean dmft was 2.66 (± 0.21) teeth and mean decay was 2.7 (±3.8) per child. Mean debris score 1.95 (± 0.8) and 39.7 % of children had enamel hypoplasia. The risk factors according to Chi-square analysis were education levels and employment status of caregivers, age giving birth of mothers, media consumption of caregivers and child medical welfare, oral cleaning, type of milk, feeding pattern, types of snacks between meals, frequency of taking snacks and enamel hypoplasia. Multiple logistic regression showed that enamel hypoplasia was the most significantly associated with dental caries, followed by mean debris score.

Key words: Caries, Debris score, Risk factors, Well baby clinic

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Introduction

Dental caries still remained main oral problem in Asia[1] including Thailand. The National oral health survey in Thailand had been conducted every 5 years.[2] The 7th National oral health survey in 2012 revealed the improvement of oral health status both in city and rural areas contrary to Bangkok where caries in primary teeth rose in both 3 years and 5 years of age.[2] Forty six percents of 3-year-old-child and 82.8 % of 5-year-old-child

in Bangkok were self-brushed. About fifty one percent of 3-year-old-child and 50.2 % of 5-year-old-child still drank sweetened milk and yogurt at home despite plain milk was provided at school. Bottle fed behaviour was found up to 39.5 % and 12.9 % in 3 year-old-child and 5-year-old child respectively.[2] Large proportion of carious children was found in oral examination in routine Well Baby Clinic visit at Bangkok Metropolitan Administration General Hospital with various characteristics including carious cavity and white lesion in 0-3 years of age which represented high caries risk.[3] Enamel hypoplasia with and without carious lesions were also found in many children in the oral examination at Well Baby Clinic.

Dental caries is bacterial infection[4] with cavity or white spot appearance.[3-5] Factors involving in caries including acidogenic bacteria in dental plaque[5-10] in which Streptococcus mutans played the major role. Children derived this bacteria from their primary caregivers mostly their mothers.[11] Frequency and type of fermentable carbohydrate consumption, tooth surface structure, salivary proteins, demineralization and remineralization process over period of time[4,6,11] were found to be significantly associated with early childhood caries (ECC).[5,12] Feeding behavior[3,13] type of milk[6,13-15] bottle-feeding during sleeping time[3,15] on demand breast-fed[16] sweetened beverage and between-meal snack consumption of child[12-15], caregiver and child oral health care and socioeconomic status[13,16-18,20-24] were found to be related with caries status in several studies, but yet these factors still be some controversy in various aspects. Children with enamel hypoplasia[3,20,25] were more vulnerable to development of caries.[20] Surface irregularities from enamel hypoplasia promoted the colonization of mutans streptococci (MS).[25]

It was interesting to study dental caries and related factors in early childhood stage at Well Baby Clinic according to screening accessibility with child routine health checkup and vaccination service, which provided opportunistic availability of oral health screening in early childhood stage. This research aimed to study caries status and related risk factors in socioeconomic status, oral health care and dietary practices in 18-36-month-old children attended Well Baby Clinic at Bangkok Metropolitan Administration General Hospital.

Materials and Methods

Cross – sectional analytical study was conducted in 320 children with 18-36-month-old and their caregivers who attended Well Baby Clinic at Bangkok Metropolitan Administration General Hospital from January to September 2016. The study was approved by Bangkok Metropolitan Administration Ethical Committee according to Declaration of Helsinki, Belmont Report Guideline and ICH-GCP Guideline. Who could not cooperate with oral examination or whose caregivers did not consent were excluded from this study.

Two parts of collected data were conducted by a dentist, the researcher, who did the oral examination and a dental assistant who recorded the questionnaires. Questionnaires were created by the researcher and the content validity was read and approved by three experts, then be applied trial with 30 caregivers.[26] Cronbach's alpha Coefficient was 0.702.[27] Tooth status recording criteria was adjusted from the 7th National Oral Health Survey, Thailand 2012.[2] Debris was scored from all erupted teeth by simplified oral hygiene index (Greene and Vermillion, 1964).[28] The researcher calibrated oral examination of fifteen children at Child Center, Bangkok Metropolitan Administration General Hospital, Cohen's Kappa was 0.9. Blunt explorer and plane mouth mirror were used in oral examination in the knee-to-knee position with Light Emitting Diode torch.

The data were analysed with statistical package. Chi-square and Multiple logistic regression Analysis[27,29] were used to asses differences in caries status among factors at a significance level of 0.05.

Results

320 participating children with 6 to 20 teeth erupted. Table 1 illustrated dental caries status, mean debris score and enamel Hypoplasia. More than half of

participants had dental caries with mean debris score 1.95 (±0.8). More than one third of children had enamel hypoplasia, affected tooth per child was 1 tooth to 12 teeth with mean 1.63 (±2.3).

Socioeconomic status of children and their caregivers were shown in table 2 and 3. Participating children were 168 (52.5 %) males with mean age 23.4 (±5.5) months old and 152 (47.5 %) females with mean age 24.1 (±6.4) months old. Both nationality and ethnicity of children mostly were Thai (90 %, 89.1 %), followed by Myanmar (23 %, 23 %), and others (2.8 %, 3.8 %) respectively. Most medical welfare was self-pay (71.6 %), followed by universal coverage (17.8 %) and government enterprise officer (10.6 %). More than half of participants (56.9 %) were first child of the family, the left were second child (32.8 %) and up from third child (10.3 %) in the sibling rank.

Caregivers were 25 (7.8 %) male with mean age 40.04 (±3.18) years old and 295 (92.2 %) female with mean age 37.57 (±0.71) years old. Similar to participating children, major group of nationality and ethnicity of caregivers were Thai (84.1 %, 82.5 %), followed by Myanmar (8.8 %, 7.8 %) and others (7.2 %, 9.7 %) respectively. Educational level of caregivers mainly were primary school (35.6 %), followed by secondary school (31.9 %), university (16.9 %). Only 1.6 % had education level less than primary school. More than half (54.4 %) of caregivers stayed at home taking care of children, 5.9 % were government officers or state enterprise employees, 2.8 % were business owners and the least group had agriculture as career. More than half of caregivers (58.1 %) worked less than 40 hours per week, 35 % worked more than 40 hours, and 6.9 % worked 40 hours per week. Mostly, family incomes were between 5,001-50,000 bath per month. The least group had income 2,001- 5,000 bath per month.

Table 1 Oral health status of children

Oral health status	n (%)	Mean (±SD)	
Dental caries	174 (54.4)	dmft	2.66 (± 3.8)
Debris	320 (100)	Debris score	1.95 (± 0.8)
Enamel hypoplasia	133 (41.6)	Enamel hypoplasia tooth/ child	1.63 (± 2.3)

Table 2 Demographic data of 320 children

Characteristics			Frequency (%)
Age	Male	Mean (±SD)	23.4 (± 5.5)
	Female	Mean (±SD)	24.1 (± 6.4)
Gender	Male		168 (52.5)
	Female		152 (47.5)
Nationality	Thai		288 (90)
	Myanmar		23 (7.2)
	Others		9 (2.8)
Ethnicity	Thai		285 (89.1)
	Myanmar		23 (7.2)
	Others		12 (3.8)
Medical welfare	Universal Coverage		57 (17.8)
	Self- pay		299 (71.6)
	Government Enterprise Officer		34 (10.6)
Sibling rank	1		182 (56.9)
	2		105 (32.8)
	≥ 3		33 (10.3%)

Table 3 *Characteristics of main caregivers*

Characteristics			Frequency (%)
Age	Male	Mean (±SD)	40.04 (± 3.18)
	Female	Mean (±SD)	37.57 (± 0.71.)
Gender	Male		25 (7.8)
	Female		295 (92.2)
Nationality	Thai		269 (84.1)
	Myanmar		28 (8.8)
	Others		23 (7.2)
Ethnicity	Thai		264 (82.5)
	Myanmar		25 (7.8)
	Others		31 (9.7)
Marital status	Single		13 (4.1)
	Married		302 (94.4)
	Others (divorced, not informed)		5 (1.6)
Education level	< Primary school		12 (3.8)
	Primary school		114 (35.6)
	Secondary school		102 (31.9)
	University		54 (16.9)
	Others (Vocational certificate, High vocational certificate)		38 (11.9)
Career	Government official/State enterprise employee		19 (5.9)
	Shop staff		29 (9.1)
	Merchant		62 (19.4)
	Manual work		22 (6.9)
	Agriculture		5 (1.6)
	Business owner		9 (2.8)
	Other (stay at home taking care of children)		174 (54.4)
Maternal age	< 25 yrs		112 (35)
	≥ 25 yrs		208 (65)
Main media watched	Traditional		208 (65)
	Internet		112 (35)
Working hour / week	< 40		186 (58.1)
(hours)	40		22 (6.9)
	> 40		112 (35)
Family income per month	2,001 – 5,000		3 (0.9)
(Baht)	5,001 – 15,000		93 (29.1)
	15,001 – 30,000		124 (38.8)
	30,001 – 50,000		64 (20)
	> 50,000		36 (11.3)

Factors significantly related to caries status in participating children were illustrated in table 4. According to original socioeconomic status categories (table 2, 3), educational level, career of caregivers, child medical welfare were not significantly related to caries status. But results from regrouped categories (table 4) revealed that educational level (< university Versus ≥ University), career (government employee Versus not government

employee), child medical welfare (universal coverage, self-paid Versus government or state enterprise) were statistical significantly related to child dental caries (p = .012, p = .040, p = .046 respectively).

Mean debris score was considered in two dimensions based on debris covering tooth surface. Mean DS 1 was categorized into two groups (≤ 1/3 of tooth surface Versus >1/3 of tooth surface), and mean DS 2 was categorized into two groups (≤ 2/3 of tooth surface Versus > 2/3 of tooth surface). Both dimensions of mean debris score were statistical significantly related to child dental caries (p = .000; p = .000 respectively). Enamel hypoplasia was also related to child dental caries statistical significantly (p = .000).

Table 4 Factors related caries status

Factors		No caries n (%)	Caries n (%)	X^2	p-value
Education level	< University	113 (35.3)	153 (47.8)	6.280	.012*
	> University	33 (10.3)	21 (6.6)		
Career	Yes [2]	13 (4.1)	6 (1.9)	4.231	.040*
(Gov. employ [1])	No [3]	133 (41.6)	168 (52.5)		
Maternal age [4]	< 25 yrs	40 (12.5)	72 (22.5)	6.822	.009**
	> 25 yrs	106 (33.1)	102 (31.9)		
Main media watched	Traditional [5]	82 (25.6)	126 (39.3)	9.214	.002**
	Internet	64 (20)	48 (15)		
Medical welfare	Not claim [6]	125 (39.1)	161 (50.3)	3.994	.046*
	Claimed [7]	21 (6.6)	13 (4.1)		
Type of milk	Breast milk	31 (9.7)	58 (18.1)	7.067	.029*
	Non-flavored [8]	51 (15.9)	43 (13.4)		
	Flavored [9]	64 (20)	73 (22.8)		
Feeding pattern	Breast	32 (10)	58 (18.1)	6.930	.031*
	Bottle	93 (29.1)	102 (31.9)		
	Others [10]	21 (6.6)	14 (4.3)		
Oral cleaning	Caregiver brush	114 (35.6)	118 (36.9)	4.197	.041*
	Others [11]	32 (10)	56 (17.5)		
Type of snack	Non-cariogenic [12]>cariogenic	64 (20)	47 (14.7)	11.931	.003**
	Non-cariogenic = cariogenic	61 (19.1)	105 (32.8)		
	Cariogenic [13]> Non-cariogenic	21 (6.6)	22 (6.9)		
Frequency snack / 3 days	0 – 6 times	124 (38.8)	128 (40)	6.131	.013*
	> 7 times	22 (6.9)	46 (14.4)		
Mean DS 1 [14]	≤ 1	42 (13.1)	5 (1.6)	42.479	.000***
	>1	104 (32.5)	169 (52.8)		
Mean DS 2 [14]	≤ 2	122 (38.1)	67 (20.9)	66.653	.000***
	>2	24 (7.5)	107 (33.4)		
Enamel hypoplasia	No	122 (38.1)	71 (22.2)	60.633	.000***
	Yes	24 (7.5)	103 (32.2)		

1 = Government works; 2 = Government /State Enterprise employee; 3 = Shop, Merchant, Manual, Agriculture, Owner, not work ; 4 = Maternal age gave birth ; 5 = Radio, TV, Newspaper, Magazine ; 6 = UC, Self-paid ; 7 = Government or State Enterprise ; 8 = Cow milk formula1 / 2, Goat milk, Plain UHT ; 9 = Cow milk formula 3 /4, Soy milk, Medical milk, Yogurt, Sweet / chocolate ; 10 = Box, cup, spoon ; 11 = Self-brush, wipe, gargle, no clean ; 12 = Beans / Cheese, Fruits, Fresh / plain milk, Sausage/ Meat ball; 13 = Chocolate /Carbohydrate snacks, fruit juice, Favored milk / Yogurt, Vit C, Soft drink, Candy, Soy milk / Ice cream, Multivitamin + Ferrous, Supplementary food ; 14 = Mean Debris score
* p ≤ 0.05; ** p ≤ 0.001; *** p ≤ 0.0001

The factors were analyzed with Simple logistic regression and Multiple logistic regression. Possible predictors of child dental caries status (Simple logistic regression) were shown in table 5. Children whose caregivers had educational level up from university likely to have 50 % less caries than whose caregivers had lower educational levels (OR = 0.5, 95% CI, p = .013). Children whose caregivers did not work as government or state enterprise employees had 2.7 times greater likelihood of caries than ones whose caregivers worked as government or state enterprise employees (OR = 2.7, 95% CI, p = .047). Children whose mothers gave birth at age up from 25 years old likely to have 50 % less caries than ones whose mothers gave birth less than 25 years of age (OR = 0.5, 95% CI, p = .009). Caregivers who mainly watched internet, their children likely to have 50 % less caries than ones whose caregivers mainly watched traditional medias (OR = 0.5, 95% CI, p = .003). Child with claimed medical welfare was half as likely to have caries as child with not-claimed medical welfare (OR = 0.5, 95% CI, p = .046).

For dietary factors, Children in breast milk group were 2.2 times as likely to have caries as children who drank non-flavored milk (OR = 2.3, 95% CI, p = .007), but not statistically significant between children who drank flavored-milk and children who drank non-flavored milk (OR = 1.4, 95% CI, p = .209). When compare to other feeding patterns (box, cup, spoon), children with breast-fed were likely to have 2.7 times greater likelihood of caries (OR = 2.7, 95% CI, p = .015), ones with bottle-fed although trended to have more caries, but not statistically significant (OR = 1.6, 95% CI, p = .183). Children who had more non-cariogenic snack than cariogenic snack likely to have 40 % less caries than ones who ate equally non- cariogenic snack and cariogenic snack (OR = 0.4, 95% CI, p = .001). The result showed that children who had more cariogenic snack than non-cariogenic snack also trend to have less caries when compare to ones who ate equally non-cariogenic snack and cariogenic snack, but not statistically significant (OR = 0.6, 95% CI, p = .150). Children who had snacks up from seven times in three days likely to have twice greater likelihood of caries than ones who had less frequencies of snacking (OR = 2.0, 95% CI, p = .014).

Children whose their caregivers cleaned their child's oral cavity with other means trended to have more caries than children whose their caregivers brushed their teeth nearly statistically significant (OR = 1.6, 95 % CI, p = .058). Children who had mean debris score more than one third of tooth surface likely to have 13.7 times greater likelihood of caries than ones who had less debris score (OR = 13.7, 95% CI, p < .001). Children who had mean debris score more than two third of tooth surface likely to have 8.5 times greater likelihood of caries than ones who had less debris score (OR = 8.5, 95% CI, p < .001).

The result for enamel hypoplasia showed that children who had enamel hypoplasia were likely to have 51.9 times greater likelihood of caries than ones who did not have (OR = 51.9, 95% CI, p < .001).

Table 5 Possible predictors of child dental caries status: Simple Logistic Regression Analysis

Risk factors	n (%) child dental caries status		OR (95% CI)	*P*-value
	Yes (n=174)	No (n=146)		
Education level				
< University[@]	153 (87.9)	113 (77.4)	1	
≥ University	21 (12.1)	33 (22.6)		0.013*
total	174 (100)	146 (100)	0.5 (0.3-0.9)	
Career (Gov. employ)				
Yes[@]	6 (3.5)	13 (8.9)	1	
No	168 (96.6)	133 (91.1)		0.047*
total	174 (100.0)	146 (100.0)	2.7 (1.0-7.4)	

Table 5 *Possible predictors of child dental caries status: Simple Logistic Regression Analysis (cont.)*

Risk factors	n (%) child dental caries status		OR (95% CI)	*P*-value
	Yes (n=174)	No (n=146)		
Maternal age				
< 25 yrs[@]	72 (41.4)	40 (27.4)	1	
≥ 25 yrs	102 (58.6)	106 (72.6)	0.5 (0.3-0.9)	0.009*
total	174 (100.0)	146 (100.0)		
Main media watched				
Traditional[@]	126 (72.4)	82 (56.2)	1	
Internet	48 (27.6)	64 (43.8)	0.5 (0.3-0.8)	0.003*
total	174 (100.0)	146 (100.0)		
Medical welfare				
Not claim[@]	161 (92.5)	125 (85.6)	1	
Claimed	13 (7.5)	21 (14.4)	0.5 (0.2-0.9)	0.046*
total	174 (100.0)	146 (100.0)		
Type of milk				
Brest milk	58 (33.3)	31 (21.2)	2.3 (1.2-4.1)	0.007*
Non-flavored[@]	43 (24.7)	52 (35.6)	1	
Flavored	73 (42.0)	63 (43.2)	1.4 (0.8-2.3)	0.209
total	174 (100.0)	146 (100.0)		
Feeding pattern				
Breast	58 (33.3)	32 (21.9)	2.7 (1.2-6.1)	0.015*
Bottle	102 (58.6)	93 (63.7)	1.6 (0.4-1.0)	0.183
Others[@]	14 (8.1)	21 (14.4)	1	
total	174 (100.0)	146 (100.0)		
Oral cleaning				
Caregiver brush[@]	118 (67.8)	113 (77.4)	1	
Others	56 (32.2)	33 (22.6)	1.6 (1.0-2.7)	0.058
total	174 (100.0)	146 (100.0)		
Type of snack				
Non-cariogenic >cariogenic	47 (27.0)	64 (43.8)	0.4 (0.3-0.7)	0.001*
Non-cariogenic = cariogenic[@]	105 (60.3)	61 (41.8)	1	
Cariogenic > Non-cariogenic	22 (12.7)	21 (14.4)	0.6 (0.3-1.2)	0.150
total	174 (100.0)	146 (100.0)		
Frequency snack / 3 days				
0 – 6 times[@]	128 (73.6)	124 (84.9)	1	
≥ 7 times	46 (26.4)	22 (15.1)	2.0 (1.2-3.6)	0.014*
total	174 (100.0)	146 (100.0)		
Mean_ds_1				
≤ 1[@]	5 (2.9)	42 (28.8)	1	<0.001*
>1	169 (97.1)	104 (71.2)	13.7 (5.2-35.6)	
total	174 (100.0)	146 (100.0)		
Mean_ds_2				
≤ 2[@]	65 (37.4)	122 (83.6)	1	
>2	109 (62.6)	24 (16.4)	8.5 (5.0-14.6)	<0.001**
total	174 (100.0)	146 (100.0)		
Enamel hypoplasia				
No[@]	9 (7.8)	119 (81.5)	1	
Yes	106 (92.2)	27 (18.5)	51.9 (23.4-115.4)	<0.001**
total	115 (100)	146 (100)		

[@] = reference category; Mean_ds_1 = Mean Debris score

* $p ≤ 0.05$; ** $p ≤ 0.001$

OR, odds ratio; CI, confidence interval

The data was further analyzed with Multiple logistic regression, with either Type of milk or feeding pattern in the logistic equation. The results were illustrated in table 6-1 and table 6-2

According to result from Multiple logistic regression illustrated in table 6-1 (with milk type in the logistic equation), None of Socioeconomic status factors were significantly associated with dental caries. For oral health care and dietary practices, predictive factor was mean debris score founded on child's tooth surface with 3.2-to 3.9-fold increases in odds. Enamel hypoplasia in child was the most significantly associated with dental caries, showing 50-fold increase in odds.

Table 6-1   *Possible predictors of child dental caries status: Multiple Logistic Regression Analysis (with milk type)*

Risk factors	Unadjusted			Adjusted		
	OR	95% CI	*P*-value	OR	95% CI	*P*-value
Education level >University	0.5	0.3- 0.9	0.013*	0.30	0.09- 1.0	0.051
Career (Not Government /State Enterprise employee)	2.7	1.0-7.4	0.047*	4.8	0.19- 119.1	0.341
Maternal age > 25 yrs	0.5	0.3-0.9	0.009*	0.57	0.2- 1.4	0.224
Main media watched (Internet)	0.5	0.3-0.8	0.003*	0.5	0.2- 1.3	0.148
Medical welfare (Claimed)	0.5	0.2-0.9	0.046*	1.7	0.3- 10.7	0.561
Type of milk						
Brest milk compared to Non-flavored	2.3	1.2-4.1	0.007*	2.0	0.7- 6.3	0.208
Flavored compared to Non-flavored	1.4	0.8-2.3	0.209	0.7	0.3- 2.0	0.526
Oral cleaning with other means (Self-brush, wipe, gargle, no clean) compared to Caregiver brush	1.6	1.0-2.7	0.058	1.4	0.6- 3.7	0.444
Type of snack						
Non-cariogenic >cariogenic taken (compared to Non-cariogenic = cariogenic)	0.4	0.3-0.7	0.001*	1.0	0.3- 3.7	0.997
Cariogenic > Non-cariogenic taken (compared to Non-cariogenic = cariogenic)	0.6	0.3-1.2	0.150	0.7	0.2- 2.4	0.547
Frequency snack ≥ 7 times in 3 days	2.0	1.2-3.6	0.014*	2.4	0.8- 7.6	0.128
Mean debris score > 1/3 of tooth surface	13.7	1.09, 16.67	<0.001**	3.9	1.0, 15.0	0.046*
Mean debris score > 2/3 of tooth surface	8.5	5.0, 14.6	<0.001**	3.2	1.3, 7.8	0.012*
Tooth with enamel hypoplasia	51.9	23.4, 115.4	<0.001**	50.0	18.5, 129.4	<0.001**

* p ≤ 0.05; ** p ≤ 0.001

OR, odds ratio; CI, confidence interval

Table 6-2   *Possible predictors of child dental caries status: Multiple Logistic Regression Analysis (with feeding pattern)*

Risk factors	Unadjusted			Adjusted		
	OR	95% CI	*P*-value	OR	95% CI	*P*-value
Education level ≥University	0.5	0.3- 0.9	0.013*	0.3	0.1- 1.0	0.044*
Career (Not Government /State Enterprise employee)	2.7	1.0-7.4	0.047*	5.2	0.2- 136.2	0.320

Table 6-2 *Possible Predictors of child dental caries status: Multiple Logistic Regression Analysis (with feeding pattern) (cont.)*

Risk factors	Unadjusted			Adjusted		
	OR	95% CI	*P*-value	OR	95% CI	*P*-value
Maternal age ≥ 25 yrs	0.5	0.3-0.9	0.009*	0.6	0.2- 1.5	0.252
Main media watched (Internet)	0.5	0.3-0.8	0.003*	0.5	0.2- 1.3	0.143
Medical welfare (Claimed)	0.5	0.2-0.9	0.046*	1.6	0.3- 9.9	0.606
Feeding pattern						
Brest-fed compared to others (Box, cup, spoon)	2.7	1.2-6.1	0.015*	3.1	0.5- 17.5	0.203
Bottle compared to others (Box, cup, spoon)	1.6	0.4-1.0	0.183	1.6	0.3- 8-4	0.589
Oral cleaning with other means (Self-brush, wipe, gargle, no clean) compared to Caregiver brush	1.6	1.0-2.7	0.058	1.3	0.5- 3.4	0.533
Type of snack						
Non-cariogenic >cariogenic taken (compared to Non-cariogenic = cariogenic)	0.4	0.3-0.7	0.001*	0.9	0.3- 3.4	0.919
Cariogenic > Non-cariogenic taken (compared to Non-cariogenic = cariogenic)	0.6	0.3-1.2	0.150	0.7	0.2- 2.3	0.515
Frequency snack ≥ 7 times in 3 days	2.0	1.2-3.6	0.014*	2.5	0.8- 7.8	0.115
Mean debris score > 1/3 of tooth surface	13.7	1.09, 16.67	<0.001**	4.4	1.1, 16.7	0.032*
Mean debris score > 2/3 of tooth surface	8.5	5.0, 14.6	<0.001**	3.0	1.2, 7.5	0.017*
Tooth with enamel hypoplasia	51.9	23.4, 115.4	<0.001**	45.9	17.8, 118.0	<0.001**

The result from Multiple logistic regression illustrated in table 6-2 (with feeding pattern in the logistic equation), Socioeconomic status factor significantly associated with dental caries was education level of caregivers. Caregivers with university or higher educational group were 0.3-fold more likely to have dental caries in contrast to the group with lesser educational levels. For oral health care and dietary practices, predictive factor was mean debris score founded on child's tooth surface with 3-to 4.4-fold increases in odds. Children with enamel hypoplasia were 45.9 times more likely to have dental caries than those without enamel hypoplasia.

Distribution of caries in upper and lower arch was shown in Figure 1. Most carious teeth in participating children were upper central incisors (38.1 %), followed by upper left and right lateral teeth (37.8 %, 36.6 % respectively). For posterior teeth lower right and left first molars showed higher caries prevalence than upper first molars. The least carious teeth were upper right and left second molars (2.8 % and 2.5 %).
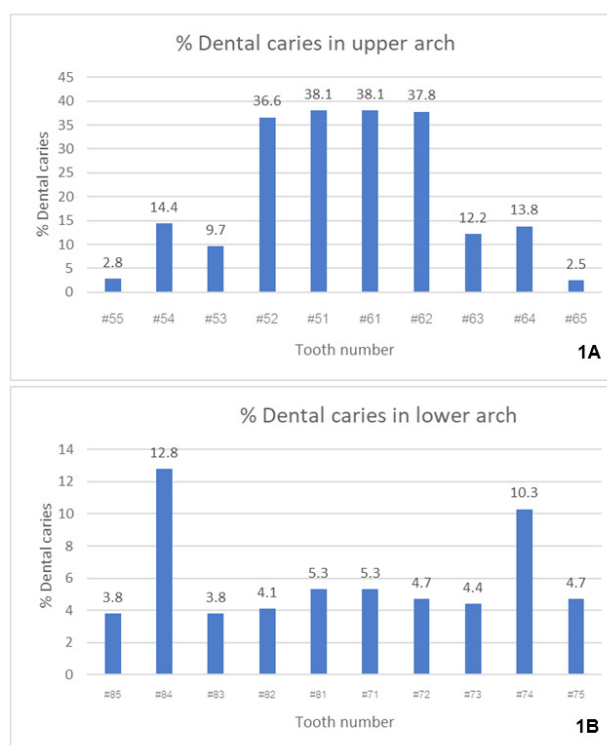
Figure 1 *Distribution of dental caries in upper teeth (1A) and lower teeth (1B)*

Discussion

18-36-month-old-child participated in this study attended Well Baby Clinic at Bangkok Metropolitan Administration General Hospital had high prevalence of dental caries (54.4 %). Upper incisors were the most affected teeth similar to the study of Senesombath, *et al*[13], but the least affected area was upper second molars, differed from the same study, which were lower second molars. This difference may be according to different age group of participating children.

Prevalence of dental caries in participating children in this study was 54.4 % with dmft 2.66, nearly the same prevalence in 3-year-old child in the 8th National Oral Health Survey (2017).[35] This study showed that 52.8 % of children with mean debris score more than 1 had caries with statistically significant difference compared to children who had mean debris score equal to or less than 1, the result was confirmed by the caries risk-indicated level of plaque accumulation on tooth surface in the 8th National Oral Health Survey (2017)[35] that children with one-third or more plaque covering tooth surface were in high caries risk group.[35]

The result showed no significant relationship between both children and caregivers Nationality and Ethnic and caries status in children, that may be according to few other Nationality and Ethnic attended in this study which unable to analyse the significant difference. But Bangkok was a big city with huge migration of population especially when ASEAN Economic Community: AEC arised. It was interesting to find out the outcome with more other Nationality and Ethnic proportion.

Socioeconomic status significantly associated with child dental caries in this study was education level of caregivers (when considering with feeding pattern), differed from the study of Jin B.H.,*et al*[30] which found no relationship between socioeconomic status and Early Childhood caries: ECC and Severe Early Childhood caries: SECC. This study showed that family incomes was not statistically significant related to caries, while the study of Jose B. and King N.M.[31] found that children whose caregivers had higher education level and higher incomes had lower incidence of dental caries. Gibson S. and Williams S.[32] found two-fold relationship between social class and caries status in children when compared with relationship between caries status in children and brushing data reported by their caregivers. Although the study of Sankeshwari R.M., *et al*[33] reported no relationship between social class and caries status in children, but yet found education level of mothers related with caries status in their children.

Maternal age in this study was divided to be two groups in data analysis which were less than 25 years of age and up from 25 years old, according to definition of United Nation for 'Youth' which was defined as 'person with 15 to 24 years of age.[34] This study revealed that children with maternal age less than 25 years had more dental caries, this was interesting to be further study.

For the oral health care and dietary practices, this study found that children in breast milk group had more caries than children who had other types of milk. This study also revealed that children with breast fed had more caries than children with other feeding behaviours, contrary to the study of Jin B.H., *et al*[30] which found that children who were bottle fed with sweeten beverage had more SECC than children who bottle fed with milk, but no relationship between feeding behavior, nocturnal bottle feeding, bottle weaning age and caries status, in spite of the study of Senesombath S., *et al*[13] which found both breast fed and bottle fed children had more caries than children who drank from cup or box. Senesombath S., *et al*[13] also found that type of milk did not relate to caries status in studied group.

The relationship between snacking behaviours both in type of snack and frequency of snack taken with dental caries had been studied in several aspects. This study found children who had cariogenic snacks more than non-cariogenic snacks had more caries than those who had more non-cariogenic snacks. Children with up from seven times of between-meal snacking in three days had more dental caries when compared with the ones who had less frequency of between-meal snacking. This result was corresponding to the study of Senesombath S., *et al*[13], Jose B. and King N.M.[31], Gibson S. and Williams S.[32] and Sankeshwari R.M., *et al* [33].

Children whose their teeth were brushed by their caregivers had less caries than ones with other means of oral cleaning. This corresponded with the study of Senesombath S.,

et al[13] and the study of Jose B. and King NM.[31] Child-tooth-brushing by child caregiver was very important according to lacking of efficiently ability in hand movement in this age group. Therefor reinforcing understanding and awareness of oral care still was relevant issue.

When considering each factor (table 4, 5), the factors statistical significantly related to caries were education level of caregivers, career of caregivers, maternal age, main media watched, medical welfare and caries status in participating children. But dental caries was multifactorial disease. The results from Multiple logistic regression (table 6) showed predictive factors of dental caries were educational level of caregiver, debris score and enamel hypoplasia. These three factors showed statistically significant association with dental caries from the analysis with Chi square, Simple logistic regression and Multiple logistic regression. Although means of oral cleaning were not statistically significant related to caries according to the result from Simple logistic regression and Multiple logistic regression analysis (0.058, 0.337 respectively), but p-value from analysis with Simple logistic regression was nearly statistically significant ($p \leq 0.05$) indicated that brushing child teeth by caregivers trended to reduce child dental caries.

According to the 8th National oral health survey in Thailand (2017)[35], high caries situation in 3 years of age was similar to this study and the previous survey.[2] Even though caries situation in 5 years of age was slightly improved, but still dental plaque found was indicated high caries risk in both age groups. Even more, the survey revealed that 3-year-old-child and 5-year-old-child were self-brushed up to 44.1 % and 80.4 % respectively. The National and local policies and strategies for dental health should emphasize and reinforce in household setting empowering caregivers to be able substantially practice in caring their own children.

There were difficulties in comparison among various studies according to different age groups of participating child. The age group of participating children might be depended on various purposes and settings of the studies. Therefore, Meta-analysis study of relationship between risk factors and caries status in children should be further proceeded.

In summary, caries prevalence in 18-36-month-old-child attended Well Baby clinic at Bangkok Metropolitan Administration General Hospital was 54.4 % with mean dmft 2.66 (±3.8). Socioeconomic status factors related to caries in this study were education level and career of caregivers, maternal age, main media watched, child medical welfare. Oral health care and dietary practices risk factors were main type of milk feeding, feeding pattern, child oral cleansing, type of snack taken, frequency of between-meal snacking. The most possible predictive factor of child dental caries status in this study was child enamel hypoplasia status, followed by child mean debris score and education level of caregivers respectively.

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