Original article

Factors Associated with Dental Caries among Hill Tribe Preschool Children in Doi Tung Development Project, Chiang Rai

Niwat Thanaboonyang[1], Pornpun Asvanit[1] and Busayarat Santiwong[1]

[1]Department of Pediatric Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

Abstract

Dental caries is one of the most common chronic diseases among preschool children in Thailand. The aim of this study was to investigate the factors associated with caries experience in the underserved Hill Tribe preschool children in Doi Tung Development Project, Chiang Rai. One hundred Hill Tribe preschool children aged 3 to 5 years old were invited to participate in the study. The children were examined for decayed, missing, and filled teeth (dmft) and simplified oral hygiene index (OHI-S). The primary caregivers of the children were interviewed with the structured questionnaire regarding their family demographics and socioeconomic background, the 24-hour dietary recall food record and the oral health habits of the children. The relationships between caries experience (dmft) and gender, initial age of toothbrushing, assisted toothbrushing, OHI-S, daily carbohydrate snacking, sugary drinks at bedtime, dental visit experience, caregiver education level, and caregiver employment were studied using a multiple linear regression method. Statistical significance was set at $p<0.05$. The prevalence of dental caries among the Hill Tribe preschool children was 84 %. The mean dmft score was 5.8±5.0. The prevalence of dental caries had a significant relationship with daily carbohydrate snacking >2 times and dental visit experience. The multiple linear regression analysis revealed that dmft was significantly associated with OHI-S ≥1 ($p=0.002$) and dental visit experience ($p=0.002$). Dental caries were highly prevalent among the Hill Tribe preschool children. Reported consumption of carbohydrate snacks and dental visit experience were related with the prevalence of dental caries, and caries experience was associated with oral hygiene and history of dental visit experience.

Keywords: Dental caries, Doi Tung Development Project, Hill Tribe preschool children, Oral hygiene

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Correspondence to:
Pornpun Asvanit, Department of Pediatric Dentistry, Faculty of Dentistry, Chulalongkorn University, 34 Henri Dunant Road, Pathum Wan, Bangkok 10330, Thailand. Tel: 02-218 8906 Fax: 02-218 8906 E-mail: pasvanit@yahoo.com

Introduction

Dental caries is one of the most common chronic diseases among preschool children. According to the report of the World Health Organization, dental caries prevalence in primary teeth was 36-85 % in Asian countries.[1] In Thailand, dental caries prevalence in preschool children was 52.9-75.6 %.[2] Untreated dental caries can lead to complications such as pain, sepsis, malnutrition, and deprived general health. According to the Dental Health Division report, more than 50 % of dental caries in preschool children in Thailand were left untreated.[2] The previous study revealed that 28 % of preschool children in Thailand with carious lesions experienced a high level of impact on their quality of life, mostly dental pain (58.3 %) and eating difficulties (45.9 %).[3]

Dental caries have complex multifactorial etiologies including bacteria in the plaque, carbohydrate diets and socioeconomic status. The study in Nigerian preschool children found that for every unit increase in the oral hygiene index (OHI-S), the odds for developing caries increased by 64 %.[4] In Thailand, the preschool children would have dental caries if their parents did not always clean the teeth of their children every time they bathed them or regularly examined the cleanliness of the teeth of their children.[5] A study in Belgium reported that the prevalence of caries experience of 5-year-old preschool children was associated with gender, presence of visible plaque accumulation, having drinks containing sugar in between meals. At the age of 3 years old, caries experience was significantly associated with having drinks at night. And also, the severity of the disease revealed significant associations with higher ages at the start of toothbrushing.[6] Unlike the longitudinal study of children in Thailand, no association was found between gender and dental caries.[7] Socio-economic background and parental education were the other associated factors being studied. In Norway, preschool children whose mother had a low education level had a 1.9 times higher chance of having dental caries than those who had a mother with a high education level.[8] Preschool children in Arizona, USA with parents in the lowest income group had dental caries prevalence four times as high as those with parents in the highest income group.[9] Peltzer *et al,* also reported that the lower household income was associated with caries increment.[7] Moreover, a study in Hong Kong reported that preschool children who had previously visited a dentist had a higher caries prevalence and dmft scores compared with those who had never visited a dentist.[10]

Doi Tung is a remote area located in the most northern hilly region of Thailand, 1,389 meters above sea level. Doi Tung Development Project covers an expansive area of 15,000 hectares and benefits approximately 11,000 people from 29 villages. The ethnic groups include Akha, Lahu, Tai Yai, Lua, Haw Chinese, Tai Lue, Native Northerners, Lisu, and others. Most of the population are engaged in agriculture and business, or work as governmental officers, or labourers. The average income was approximately 100,000 Thai baht (3,000 USD) per year. All of the Hill Tribe preschool children attended child development centers nearby their villages.[11] Dental caries is one of the health problems found among these children, but no prevalence and severity of dental caries were reported. Due to the differences of belief, traditional custom, myth and lifestyle, the risk factors of dental caries should be identified.

This study aimed to investigate the factors associated with caries experience (dmft) among 3- to 5-year-old Hill Tribe preschool children attending child development centers in Doi Tung Development Project, Chiang Rai. If the risk factors of caries development could be identified, customized preventive measures to control dental caries for these underserved Hill Tribe preschool children could be developed and implemented.

Materials and Methods

Ethics Statement

This cross-sectional study was conducted between November to December 2018 with approval from the Ethics Committees of Chiang Rai Provincial Health Office (CRPPHO 45/2561) and Faculty of Dentistry, Chulalongkorn

University (HREC-DCU 2018-026). Written consent was obtained from the primary caregivers of all children included in the study.

Participants and Sample Selection

There are ten child development centers in the Doi Tung Development Project. All 306 Hill Tribe preschool children aged between 3 to 5 years old attend the child development centers nearby their villages. The fluoride concentration in the drinking water is around 0.02-0.54 part per million (ppm). Water fluoridation, fluoridated milk and other systemic uses of fluoride are not available. Topical use of 5 % sodium fluoride varnish is implemented twice per year for all the preschool children in child development centers. The inclusion criteria of this study were (i) Hill Tribe preschool children aged 3 to 5 years old with written parental consent, (ii) complete primary dentition, (iii) generally healthy children (ASA class I), (iv) the primary caregivers were able to be interviewed with structured questionnaires. Hill Tribe preschool children with special health care needs or severe chronic diseases were excluded from the study.

The sample size estimation was based on the previous study evaluating the effect of the number of events per variable (EPV) analyzed in regression analysis.[12] This study aimed to address the association of caries experience (dmft) with nine factors including gender, initial age of toothbrushing, assisted toothbrushing, OHI-S, daily carbohydrate snacking, sugary drinks at bedtime, dental visit experience, caregiver education level, and caregiver employment. The sample size required was 90. Considering a dropout rate of 10 %, 100 preschool children were invited to participate in this study. The proportional stratified random sampling at each child development center was adopted for sampling technique.

Questionnaire and Nutritional Recording

At baseline, the primary caregivers were interviewed with a structured questionnaire by one dentist. The questionnaire featured five sections: (i) demographic data: gender, age, health status, parenthood status; (ii) socioeconomic status: caregiver education level and employment; (iii) oral health behavior: initial age of toothbrushing, tooth brushing habit, dental visit experience; (iv) eating behavior (24-hour dietary recall food record): daily carbohydrate snacking such as crispy snacks, Thai traditional snacks, and sugary drinks between main meals, sugary drinks at bedtime such as sweetened milk, cultured milk, sweetened fruit juice, and carbonated soft drinks, and (v) parent's attitude, belief, and oral health cognition.

The 24-hour dietary recall food record was selected for describing the previous weekday dietary intakes. In this study, the nutritional record was conducted on Tuesday to Friday. Missing and unclear answers were checked and confirmed by telephone.

Oral Examination

One trained dentist conducted the clinical oral examination in a field setting. The children were positioned supine on small tables in each child development center. The clinical examination was conducted using a ball-ended WHO Community Periodontal Index (CPI) probe and a dental mirror with an LED flashlight.

Dental caries was diagnosed at the tooth level. Caries status was assessed by using the diagnostic criteria of the World Health Organization.[13] A tooth was recorded as decayed when a dentine carious lesion had a cavity or when both a dentine carious lesion and a restoration were present. A tooth was recorded as missing when it was extracted as a result of caries. A tooth was recorded as filled when a permanent filling without caries was present. No dental radiographs were taken.

Dental plaque deposition on teeth was recorded using Greene and Vermillion's simplified oral hygiene index (OHI-S).[14] The presence of visible plaque on the buccal and lingual surfaces of the six index teeth: maxillary right second molar, maxillary right central incisor, maxillary left first molar, mandibular left second molar, mandibular left central incisor and mandibular right first molar was evaluated. The amount of plaque was recorded based on a three-level score: the absence of visible plaque (score 0), the presence of visible plaque covering not more than one third of the tooth surface (score 1), the presence

of visible plaque covering more than one third but not more than two thirds of the tooth surface (score 2), and the presence of visible plaque covering more than two thirds of tooth surface (score 3). The final score was then calculated as the mean score of the surfaces examined, raging form 0-3.

Twenty percent of the study participants were re-examined on the same day. The duplicate examinations were conducted after at least 60 minutes, so that the examiner could not remember the first scoring.

After the oral examination, the oral health of an individual child was reported to the primary caregiver. Parents were advised to seek free dental service at Doi Tung Health Center Commemorate 60th Birthday of Nawaminthi Queen, if necessary.

Statistical Analysis

Data was analyzed by using IBM SPSS Statistics for Windows, version 22.0 (SPSS Inc., Chicago, Illinois, USA). The intra-examiner agreement was assessed using Cohen's kappa statistics. A chi-square test and Fisher's exact test were used to test the association of caries prevalence among different factors. The Kolmogorov–Smirnov test was performed to test distribution of decayed, missing or filled primary tooth (dmft). The Kruskal–Wallis H-test or Mann-Whitney U test was employed to study the distribution of dmft score versus the variable factors studied.

All independent variables studied were analyzed as covariates in the univariate linear regression analysis. The final multiple linear regression model contained only the remaining variables with $p<0.05$. The level of statistical significance for all tests was set at $p<0.05$.

Results

A total of 100 Hill Tribe preschool children from ten child development centers in Doi Tung Development Project were invited to participate in this study. The response rate was 100 %. The intra-examiner reliability (Cohen's kappa value) for dental caries and dental plaque were 0.98 and 0.83, respectively. Among 100 Hill Tribe preschool children, 58 (58 %) were boys, and the mean age (±SD) was 40.4 (±7.5) months. The Hill Tribes included in this study were the Akha (58 %), the Lahu (19 %), the Tai Yai (12 %), the Haw Chinese (7 %), and others (4 %). Primary caregivers of participants were mothers (55 %), fathers (18 %), grandparents (23%), and other relatives (4 %).

Table 1 *Number of Hill Tribe preschool children, mean dmft and dmfs*

Child development centers	N	n	Mean dmft (±SD)	Mean dmfs (±SD)
Ban Akha Pa Kluay	62	20	4.0±4.2	8.0±10.6
Ban Huay Nam Khun	68	22	6.0±5.4	13.2±15.0
Ban Huay Num Rin	37	12	5.3±5.1	13.0±15.3
Ban Ja Lor	29	9	7.7±4.4	15.3±11.7
Ban Pa Sang Na Ngoen	21	7	7.1±6.4	15.1±16.0
Ban Pha Hee	21	7	8.0±6.0	15.3±11.7
Ban Pha Hee Lahu	12	4	7.3±6.1	16.8±20.0
Ban Pha Mee	28	9	4.3±3.9	8.3±9.4
Ban Sa Mak Khi Kao	16	5	5.4±4.8	9.0±9.0
Ban Suan Pa	12	4	5.0±3.4	11.6±9.6
Total	306	100	5.8±5.0	12.2±13.1

N: total number of children in the center
n: number of children included in this study

The prevalence of dental caries among the Hill Tribe preschool children was 84 %. The mean dmft and dmfs were 5.8±5.0 and 12.2±13.1, respectively (Table 1). Fifty percent of the preschoolers had five or more teeth with caries experience. Untreated decay constituted 87.5 % of the dmft score. Maxillary incisors had the highest caries prevalence (76 %), whereas mandibular incisors had the lowest caries prevalence (16 %). However, maxillary molars had a lower caries prevalence compared with mandibular molars. Eighty-three percent of the children brushed their teeth at least twice a day, and 52 % of preschoolers began toothbrushing before one year of age. However, assisted toothbrushing was performed for 74 % of the children. Mean OHI-S of assisted toothbrushing and non-assisted toothbrushing were 1.08 and 1.15, respectively. Seventy-six Hill Tribe preschool children had no sugary drinks at bedtime but 28 % of them still engaged in bottle feeding. Regarding oral health literacy, all parents perceived that primary teeth had an important role in mastication and needed to be treated. Nevertheless, only 42 % of primary caregivers took their children for dental treatment to alleviate their children's dental pain.

Table 2 *Caries prevalence and mean dmft of independent factors*

Factors	n	Caries prevalence (dmft ≥ 1) (%)	*p*-value	Mean dmft (±SD)	*p*-value
All	100	84 (84.0)		5.8±5.0	
Gender					
Boy	58	46 (79.3)	0.133[a]	6.1±5.3	0.713[b]
Girl	42	38 (90.5)		5.4±4.4	
Ethnic Group					
Akha	58	51 (87.9)	0.235[a]	5.8±4.9	0.837[c]
Lahu	19	15 (78.9)		5.6±5.7	
Tai Yai	12	11 (91.7)		6.9±6.1	
Haw Chinese	7	4 (57.1)		5.7±5.9	
Etc.	4	3 (75.0)		3.3±2.5	
Presence of dental plaque					
OHI-S < 1	36	28 (77.8)	0.203[a]	3.8±3.2	0.009[b]
OHI-S ≥ 1	64	56 (87.5)		6.9±5.5	
Initial age of toothbrushing					
< 12 months	52	45 (86.5)	0.471[a]	5.8±4.4	0.556[b]
≥ 12 months	48	39 (81.3)		5.7±5.6	
Assisted toothbrushing					
Assisted	74	62 (83.8)	1.000[d]	5.6±4.6	0.740[b]
Non-assisted	26	22 (84.6)		6.4±6.0	
Frequency of toothbrushing					
< 2 times/day	17	13 (76.5)	0.465[d]	6.5±5.7	0.682[b]
≥ 2 times/day	83	71 (85.5)		5.6±4.8	
Daily carbohydrate snacking					
≤ 2 times	81	65 (80.2)	0.037[d]	5.6±5.0	0.334[b]
> 2 times	19	19 (100.0)		6.5±4.8	

Table 2 *Caries prevalence and mean dmft of independent factors (cont.)*

Factors	n	Caries prevalence (dmft ≥ 1) (%)	*p*-value	Mean dmft (±SD)	*p*-value
Sugary drinks at bedtime					
No	76	62 (81.6)	0.345[d]	5.8±5.0	0.900[b]
Yes	24	22 (91.7)		5.8±5.1	
Dental visit experience					
No	58	43 (74.1)	0.002[d]	4.6±4.9	0.001[b]
Yes	42	41 (97.6)		7.5±4.7	
Caregiver education level					
< grade 9	70	57 (81.4)	0.379[d]	5.8±5.2	0.734[b]
≥ grade 9	30	27 (90.0)		5.8±4.6	
Caregiver employment					
Unemployed	55	47 (85.5)	0.661[d]	6.1±5.0	0.480[b]
Employed	45	37 (82.2)		5.4±5.0	

a: Chi-square test
b: Mann–Whitney U-test
c: Kruskal–Wallis H test
d: Fisher's exact test

Our findings revealed that Hill Tribe preschool children who had daily carbohydrate snacking >2 times had a statistically significantly higher caries prevalence than those who had daily carbohydrate snacking ≤2 times (p=0.037). Hill Tribe preschool children with a history of dental visit experience also had a statistically significantly higher caries prevalence compared with those who had never visited a dentist (p=0.002) (Table 2).

Among 100 children, the mean OHI-S was 1.1. Sixty-four (64 %) preschool children with OHI-S ≥1 had a statistically significant higher mean dmft than those with OHI-S <1 (p=0.009). Hill Tribe preschool children with a history of dental visit experience had a statistically significantly higher mean dmft compared with those who had never visited a dentist (p=0.001) (Table 2).

Univariate linear regression analysis demonstrated that children with OHI-S ≥1 were statistically significantly associated with dmft (p=0.003, 95% CI: 1.093-5.046). Children with dental visit experience were also statistically significantly associated with dmft (p=0.004, 95% CI: 0.973-4.828). The children who had OHI-S ≥1 or dental visit experience had a greater potential of having dental caries than those with OHI-S <1 or than those who had never visited a dentist (Table 3).

For the final multivariate linear regression model, OHI-S ≥1 and dental visit experience were statistically significantly predicted caries experience (dmft) (p=0.002 and p=0.002, respectively) accounting for 17.1 % of the variation in dmft with adjusted R2=15.4 %. An OHI-S ≥1 leads to a 3.054 (95% CI: 1.159-4.950) teeth per individual increase in dmft. While dental caries experience leads to a 2.886 (95% CI: 1.042-4.729) teeth per individual increase in dmft (Table 4).

Other factors including gender, initial age of toothbrushing, assisted toothbrushing and sugary drinks at bedtime were not associated with caries prevalence and caries experience (Table 2, 3).

Table 3 *Analysis of caries experience (dmft) as dependent factor and independent factors in univariate linear regression*

Factors	Unstandardized coefficients		β	*t*	*p*-value	95% CI for B	
	B	SE				Lower bound	Upper bound
Boy	-0.712	1.012	-0.071	-0.703	0.484	-2.720	1.297
Initial age of toothbrushing ≥ 12 months	-0.079	1.002	-0.008	-0.078	0.938	-2.068	1.911
Non-assisted toothbrushing	-0.831	1.139	-0.073	-0.729	0.467	-3.090	1.429
OHI-S ≥ 1	3.069	0.996	0.297	3.081	0.003*	1.093	5.046
Daily carbohydrate snacking >2 times	0.934	1.273	0.074	0.733	0.465	-1.593	3.460
Had sugary drinks at bedtime	0.029	1.173	0.002	0.024	0.981	-2.298	2.355
Dental visit experience	2.901	0.971	0.289	2.986	0.004*	0.973	4.828
Caregiver education level ≥ grade 9	0.043	1.093	0.004	0.039	0.969	-2.126	2.211
Un-employed caregiver	-0.673	1.004	-0.068	-0.670	0.505	-2.666	1.320

** Statistically significant difference at p<0.05*

Table 4 *Analysis of caries experience (dmft) as dependent factor and independent factors in multiple linear regression*

Factors	Unstandardized coefficients		β	t	*p*-value	95% CI for B	
	B	SE				Lower bound	Upper bound
Constant	2.603	0.856		3.040	0.003	0.904	4.303
OHI-S ≥ 1	3.054	0.955	0.296	3.199	0.002*	1.159	4.950
Dental visit experience	2.886	0.929	0.287	3.107	0.002*	1.042	4.729

R = 0.413, R-squared = 0.171, Adjusted R-squared = 0.154,
Standard error of the estimated (SE) = 4.583, F = 9.994, p<0.001
** Statistically significant difference at p<0.05*

Discussion

Oral health is an inseparable part of general health and well-being.[15] The World Health Organization set a goal for oral health status that more than half of children should have no caries prevalence.[16] In this study, dental caries affected 84 % of the Hill Tribe preschoolers with the average dmft 5.8. Untreated decay constituted 87.5 % of the dmft score. The prevalence was higher than that of the Thai national oral health survey which was 52.9-75.6 %.[2] And also, the caries prevalence of Indian tribal preschool children was 76.3 %.[17] So, the dental caries among Thai Hill Tribe preschool children in Doi Tung need urgent interventions.

Dental caries is a multifactorial disease. To be able to prevent the disease, causal factors should be identified. In the present study, reported consumption of carbohydrate snacks and dental visit experiences were related to the

prevalence of dental caries. And the caries experience (dmft) was associated with visible plaque and dental visit experiences. Similar to the study of 3- to 5-year-old Flemish preschool children that dental caries experience was significantly associated with the presence of dental plaque.[6] A study about Nigerian preschool children found that every unit increase in oral hygiene index (OHI-S), the odds for developing caries increased by 64 %.[4] Dental plaque harbors the microorganisms that produce glucan from dietary carbohydrate promoting additional plaque and bacterial accumulation.[18] A long exposure to a low pH leads to a relative increase in the number of virulent acid-tolerant bacteria that increase demineralization of the enamel surface.[19] Although, 83 % of Hill Tribe preschoolers reported brushing their teeth twice daily, cleanliness was not achieved. Due to the limited psychomotor and cognitive skills of preschoolers, parents should brush their children's teeth or at least supervise toothbrushing until the age of primary school.[20,21] From the questionnaire, 74 % of caregivers reported that they brush their child's teeth. There was no difference in OHI-S between the assisted toothbrushing group and the non-assisted toothbrushing group. This might be the result of inadequate assisted toothbrushing. To enhance the skills of caregivers to an adequate level, they should be trained by hands-on toothbrushing sessions. The Akha in Doi Tung believed that toothbrushing is one of their children's self-care tasks. And also, based on the traditional lifestyle of the Akha, they brush their teeth just for the social function.[22] Narksawat *et al,* reported that Thai preschool children would have dental caries if their parents did not regularly clean children's teeth every time they bathed them, or regularly examine the cleanliness of the teeth of their children.[5]

The results of this study revealed that Hill Tribe preschool children who had visited a dentist had a higher chance of having caries prevalence and dmft score compared with those without dental visit experience. Thirty five percent of caregivers reported that they took their children to a dentist when their children encountered dental pain. In addition, the Akha believed that dental caries in primary dentition is a natural phenomenon, so they won't seek dental restoration for tooth decay.[22] So, the preschool children who are seeking dental care should have more serious caries advancement than those who had no experience.

High frequency of carbohydrate exposure has been recognized as a risk factor related to dental caries.[23] From Fisher's exact test, the frequency of daily carbohydrate exposure was significantly related to caries prevalence. However, in linear regression analysis, frequency of carbohydrate exposure ≥2 times was not associated with dental caries experience. Narksawat *et al* found that Thai preschool children were more likely to have dental caries if they ate snacks more than three times a day.[5] Declerck *et al,* reported that the dental caries in 3-year-old Flemish children was not significantly associated with carbohydrate exposure while the significant association was found at the age of 5 years.[6] In the contrary, the study in Hong Kong reported that preschool children who ate sugary snacks twice or more daily were associated with dmft.[10,24] In our study, the dietary data obtained from 24-hour recall memory that could not reflect the duration of each meal. Mealtimes longer than 20 minutes should be counted as another mealtime. The authors suggested that further study should collect daily dietary eating and duration of each meal to study the relationship between carbohydrate exposure and caries experience. In addition, the longitudinal study is essential to define risk factors of dental caries in Hill Tribe preschool children.

Our results showed that initial age of toothbrushing, assisted toothbrushing, gender of the preschool children, sugary drinks at bedtime, caregiver education level, and caregiver employment were not the factors associated with dmft. In contrast to another study, being boys and the education level of caregiver were associated with dental caries.[10,25] And also, the caries experience was significantly associated with having sugary drinks at night.[6] Moreover, the severity of disease revealed significant associations with higher age at the start of toothbrushing.[6]

Due to the limited oral health care knowledge in the Thai school curriculum, a higher level of education may not represent better oral health knowledge.

The results from this study showed that dental caries among tribal preschool children was related to oral health behavior (oral hygiene) and lifestyle (daily carbohydrate snacking and decision to seek dental care). Oral health education and social force are the key important factors for changes in behaviors and lifestyles.[26,27] Dental education and dental care should be set up to enhance the opportunity for a child to be caries-free. To achieve this goal, dentists, physicians, nurses and community organizations should work together.[28] Almost all of the children aged one year old have a physical visit for vaccination, so the dental profession should incorporate oral screening, hands-on toothbrushing practice, dental health education and counseling to medical health care sessions. In addition, the village health volunteers should facilitate the home dental care for mothers and caregivers of the preschool children in their villages.

The oral health programs in child development centers should be set up to improve the oral health of the preschoolers. Programs should be launched to help children and their caregivers establish good oral health care and proper eating habits. The dental health professions should organize the oral health activities including dental screening, fluoride varnish application, referral of the child with cavitation for dental treatment and dental education for caregivers. Each child development center should provide post-lunch toothbrushing with fluoride toothpaste and control the frequency of snacking.

Moreover, the vertical transmission of cariogenic pathogens from mothers to their children is well established.[29] So, health promotion during pregnancy can lead to long-term improvement of their child's oral health.[30,31] High school students who expect to be parents should have good oral health and dental literacy. To achieve this goal, dental education, oral health promotion and dental services should be organized in high schools before students drop out. To achieve 50 % caries free in the next generation, the expected parents should be able to maintain good oral health and have dental knowledge (selfcare plus neonatal health care). Timely delivery of educational information and dental services play the important factors for cost-effectiveness programs.

Conclusions

Dental caries is a significant public health problem among Doi Tung Hill Tribe preschool children. Eight out of 10 preschoolers suffered from this preventable disease. The caries experience (dmft) was associated with oral hygiene and dental visit experience. To improve oral health, dental education and preventive programs should be integrated into general health services, child development center activities and community social workforce activities. In addition, oral health education in the school curriculum should play an important role for good oral health and attitude.

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