EARLY CHILDHOOD CARIES AND RELATED FACTORS IN VIENTIANE, LAO PDR

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Abstract. The objectives of this study were to determine the prevalence of early childhood caries and the oral health status in children aged 36-47 months in Vientiane, the capital city of Lao PDR. This study also aimed to assess the feeding practices, snack consumption, oral hygiene practices, and dental visits of children at this age. A total of 400 children were selected for oral examination and their caretakers were interviewed. The results showed the prevalence of dental caries was 82% with mean decayed, missing and filled teeth (dmft) ± SD 5.5±4.3 teeth. No missing teeth were found (mt=0), and the mean filled teeth (ft) was only 0.02. The teeth most affected by dental caries were the upper right and left central incisors, followed by the upper right and left lateral incisors, lower molars, upper molars, upper canines, lower canines and lower central incisors. The least affected were the lower right and left lateral incisors. Factors that affected dmft were tooth brushing frequency, brushing with parental assistance or supervision, time brushing started, feeding pattern, and the type of milk, candy and sweet beverages consumption. It can be concluded that children in the studied area had a high prevalence of caries and a high level of severity. Thus, oral health care programs should be promoted in Vientiane.

Key words: early childhood caries, feeding, oral hygiene, Lao PDR

INTRODUCTION

Dental caries remains a major dental health problem in Southeast Asian countries (Koloway and Kailis, 1992; Carino *et al*, 2003; Department of Health, 2007). However, limited data on dental caries of primary teeth exists. At the global level, patterns of oral diseases in children have changed markedly over the past few decades. There has been a reduction in dental caries prevalence in children from industrialized countries, and an increase in several developing countries (Petersen, 2003). Dental caries in infants and toddlers is now collectively known as early childhood caries or ECC, which is the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger (American Academy Pediatric Dentistry, 2006). A study showed that young children who develop caries at an early age run a high risk for further caries development in permanent dentition

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(Al-Shalan *et al*, 1997). This type of dental caries is a reason for emergency visits and hospitalizations in infants and young children (Sheller *et al*, 1997). ECC is a factor in delayed development in children who have no other medical problems (Acs *et al*, 1992).

ECC is a multifactorial etiologic process and related to several factors, such as dietary habits and oral hygiene practices. Children who are bottle fed only have five times the risk for caries compared to children who are breast fed (Du *et al*, 2000). Children bottle fed beyond one year have higher dmft scores than those bottle fed for 6 to 12 months. Children who did not eat sweets have fewer caries (Lamis and Hamdan, 2002). Snack frequency was found to be significantly correlated with increased caries among 3-4-year-olds (Carino *et al*, 2003). Plaque removal by tooth brushing was negatively associated with caries prevalence. Once daily or less, twice daily, or more than twice daily tooth brushing were compared and found to be significantly related to caries experience. Higher tooth brushing frequency decreases caries incidence (Schou and Uitenbroek, 1995). Visible plaque on labial surfaces of maxillary incisors was found to be the best indicator for caries risk in primary teeth (Alaluusua and Malmivirta, 1994).

Similar to other Asian countries, dental caries is a major oral health problem in the Lao People's Democratic Republic (Lao PDR). According to the 1991 first National Oral Health Status Survey, of 6-year-old children 67.3% had dental caries in their primary teeth, and 44.5% had dental caries in their permanent teeth in 12-year-olds. The mean dmft were generally higher in low socio-economic groups (WHO, 1991). In order to plan preventive and oral health services for early childhood caries, information about younger age children is required. Until now, baseline data has been lacking for this age group. The objectives of this study were to determine the dental caries, oral health status and assess feeding practices, snack consumption, oral hygiene practices and dental visits for children.

MATERIALS AND METHODS

Study population

We carried out a cross-sectional study of 400 children aged 36 - 47 months at the time of survey in kindergartens in Vientiane, Lao PDR. The study areas were divided into three parts: municipal public schools, municipal private schools and non-municipal schools. Stratified cluster sampling procedures were used to select the subjects. The study was approved by the Committee on Human Rights related to Human Experimentation, Mahidol University, Thailand and the University of Health Sciences, Lao PDR. Children, who could not cooperate with oral examination or whose caretakers did not return permission forms, were excluded from this study.

Data collection

A researcher calibrated examination of ten patients at the Pediatric Dentistry Clinic, Mahidol University, prior to the study. The first examination was conducted one hour before the second examination. In cases of disagreement, the case was reevaluated. The final Cohen's Kappa at surface level was 0.95. Oral examination was carried out in the sitting position with natural light. All children were examined near a window of the classroom. Dental caries were recorded using WHO criteria and debris was scored by the simplified oral hygiene index (Greene and Vermillion, 1964). The questionnaire was admin-

Table 1
Demographic data of 400 children.

	Municipality no. (%)		Non-municipality no. (%)	Total
	Public school *n*= 70	Private school *n*=230	*n*=100	*n*=400
Age				
Mean±SD	43.6±3.4	41.2±3.6	41.6±3.7	41.7±3.7
Sex				
Male	32 (45.7)	112 (48.6)	52 (52.0)	196
Female	38 (54.3)	118 (51.4)	48 (48.0)	204
Sibling rank				
1	40 (57.1)	135 (58.7)	59 (59.0)	234
2	27 (38.6)	77 (33.5)	32 (32.0)	136
≥3	3 (4.3)	18 (7.8)	9 (9.0)	30

istrated by three interviewers who were trained before data collection. The process of data collection was conducted from July to August 2008.

Data analysis

The data were analyzed with the Statistical Package for Social Sciences (SPSS PC version 11.5). The Kruskal-Wallis and Mann-Whitney tests were used to assess differences in caries status among factors at a significance level of 0.05.

RESULTS

The demographic data of subjects and caretakers are shown in Tables 1 and 2. The prevalence of dental caries was 82.0%. The mean dmft was 5.5±4.3 (Table 3). Dental caries were more common in municipality public schools than in non-municipal schools (84.3% versus 80.0%, respectively), however, the difference was not significant. No missing teeth due to dental caries were found. The mean dt and ft scores were 5.5 and 0.02, respectively. Caries free status was found in 72 children (18.0%). The distribution of dental caries of upper and lower primary teeth are shown in Fig 1a and 1b. The teeth most affected by dental caries among all of the children were the upper right and left central incisors (70.2 and 70.0%, respectively), followed by the upper right and left lateral incisors (50.0% and 48.7%, respectively). For the posterior teeth, the lower right and left first and second molars showed higher caries prevalence than the upper teeth. The least affected were the lower right and left lateral incisors (2.5% and 3.0%).

Table 4 shows the debris scores for the upper right and lower left central incisors. A significant difference was found in dmft in debris scores of the lower left primary incisor but not the upper right primary incisor. Tooth brushing frequency, tooth brushing technique and time of brushing demonstrated significant difference in caries experiences. Analysis of milk consumption, feeding practices and types of milk, revealed significant differences in caries status, but not in the age bottle feeding

Table 2
Demographic data of caretakers.

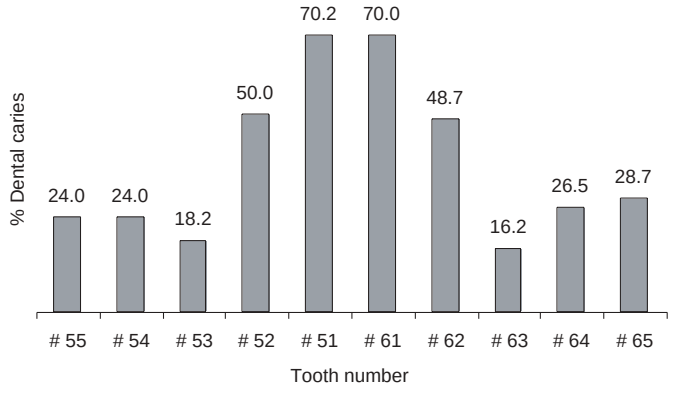
	Municipality, no. (%)		Non-municipality, no. (%)	Total
	Public school *n*= 70	Private school *n*=230	*n*=100	*n*=400
Sex				
Male	28 (40.0)	61 (26.5)	28 (28.0)	117
Female	42 (60.0)	169 (73.5)	72 (72.0)	283
Marital status				
Married	69 (98.6)	225 (97.8)	99 (99.0)	393
Separate	1 (0.4)	5 (2.2)	1 (1.0)	7
Education level				
Primary school	8 (11.4)	23 (10.0)	10 (10.0)	41
Secondary school	34 (48.6)	160 (69.6)	52 (52.0)	246
University	28 (40.0)	47 (20.4)	38 (38.0)	113
Occupation				
Government official	40 (57.1)	90 (39.1)	50 (50.0)	180
Worker	7 (10.0)	14 (6.1)	3 (3.0)	24
Housewife/husband	12 (17.2)	48 (20.9)	32 (32.0)	92
Business owner	11 (15.7)	78 (33.9)	15 (15.0)	104
Number of children				
1	28 (40.0)	88 (38.3)	39 (39.0)	155
2	36 (51.4)	111 (48.3)	45 (45.0)	192
≥3	6 (8.6)	31 (13.4)	16 (16.0)	53

stopped. The frequencies of candy and sweet beverage consumption were also significantly different (Table 5). We found no significant difference in caries experience in children whose caretaker received oral hygiene care education. However, analysis of dental visit data showed a significant difference in caries experience; the main reason for seeing a dentist was toothache. The children who saw a dentist for check-ups had fewer caries than the other children (Table 6).

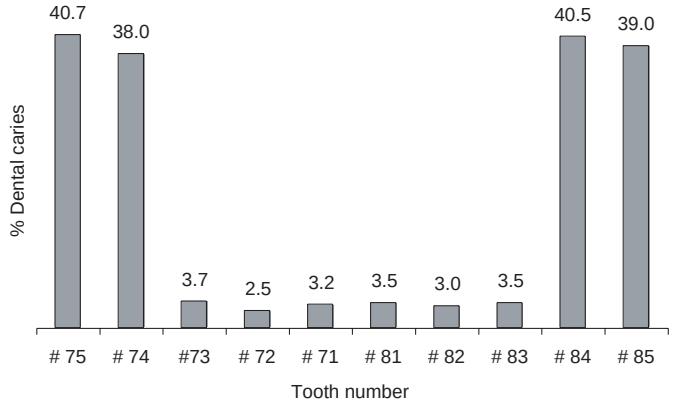
DISCUSSION

Vientiane, the capital of the Lao PDR, has been surveyed regarding dental caries very little (WHO, 1991). This is the first study to consider dental caries in the primary dentition of Vientiane preschool children aged 36 - 47 months, thereby providing new information about these age groups not included in the first national oral health survey.

The results from this study show a high prevalence of dental caries (82%) consistent with findings in other Southeast Asian countries of 61.6 to 95.5% (Koloway and Kailis, 1992; Carino *et al*, 2003; Department of Health, 2007). These findings are high compared to an American Academy of Pediatric Dentistry (2006) finding of a dmft of 5.5. The location of dental caries in our study was similar to a previous re-



(1a)



(1b)

Fig 1–Distribution of dental caries in upper (1a) and lower (1b) primary teeth.

port where the most severely affected teeth were maxillary central and lateral incisors, followed by maxillary and mandible first primary molars, maxillary and mandible second primary molars and canines (Fass, 1962).

The main reason for the high caries prevalence may be related to inadequate oral health promotion programs in Vientiane which does not cover kindergartens. In addition, no programs for pregnant woman or babies exists. Another reason may be parental attitudes toward the significance of primary teeth; their caretakers believe the primary teeth will be replaced by permanent teeth in the future.

Although, this study was conducted in Vientiane, where people have easier access to health care services, the findings revealed minimal treatment of primary teeth (0.02%). There is also a lack of pediatric

Table 3
Prevalence of dental caries in Vientiane, Lao PDR.

School	Prevalence *n* (%)	Mean±SD (teeth/person)				
		dt	mt	ft	dmft	dmfs
Municipality						
Public school	59 (84.3)	5.9±4.3	00±00	00±00	5.9±4.3	11.4±12.8
Private school	189 (82.1)	5.4±4.3	00±00	0.02±0.20	5.4±4.3	11.8±13.7
Non-municipality	80 (80.0)	5.9±4.5	00±00	0.03±0.30	5.3±4.5	10.7±11.1
Total	328 (82.0)	5.5±4.3	00±00	0.02±0.21	5.5±4.3	11.4±12.9
p-value	0.77	0.485		0.720	0.499	0.895

Table 4
Debris score and oral hygiene practice.

Factors	*n* (%)	dmft : mean (SD)	*p*-value
Debris score #51			
0	22 (5.5)	4.55 (5.21)	
1	98 (24.5)	4.22 (3.86)	0.257
2	97 (24.3)	4.99 (3.69)	
3	133 (33.2)	4.98 (3.78)	
Non-applicable	50 (12.5)		
Debris score #71			
0	129 (32.8)	4.02 (3.84)	
1	189 (48.1)	5.50 (3.84)	0.000
2	56 (14.2)	6.23 (4.72)	
3	19 (4.8)	11.32 (4.84)	
Non-applicable	7 (1.8)		
Frequency of tooth brushing			
Never brush	48 (12.0)	7.52 (4.32)	
1 time/day	140 (35.0)	6.74 (4.51)	0.000
≥2 times/day	212 (53.0)	4.26 (3.91)	
Tooth brushing			
by caretaker	167 (47.3)	4.69 (4.22)	
by him/herself with supervision	108 (30.6)	4.44 (3.99)	0.000
by him/herself without supervision	78 (22.1)	7.58 (4.22)	
Age to start brushing teeth			
6 mo to 1 yr	39 (9.8)	2.85 (2.925)	
1 to 2 yrs	142 (35.5)	4.31 (4.148)	
>2 to 3 yrs	121 (30.3)	6.27 (4.332)	0.000
>3 yrs to present	50 (12.5)	7.30 (4.253)	
Never	48 (12.0)	7.52 (4.322)	

dentists and limited child cooperation. Thus, a treatment aim was to relieve pain by giving medication. The small number of primary tooth restorations may be due to a lack of community awareness. The prevention of dental caries at this age group should begin in early childhood.

This study found significant differences in dmft and debris scores for the lower left lateral incisors but not the upper right central incisors. A possible reason may be fewer dental caries of the lower anterior teeth than the upper anterior teeth, thus the detection of dental debris may be more accurate. Analysis of the frequency of tooth brushing revealed significant differences in caries status. This finding is similar to a previous study (Schou and Uitenbroek, 1995); higher tooth brushing frequency was associated with fewer dental caries. Children whose parents brush their teeth during the first year, had the fewest dental caries. Tooth brushing by a caretaker or with parental supervision was associated with fewer early childhood caries. Our findings support recommendations that tooth brushing should start when primary teeth erupt; young children should brush with

Table 5
Dietary practices.

Factors	*n* (%)	dmft : mean (SD)	*p*-value
Feeding pattern			
Breast	77 (19.2)	4.16 (3.89)	
Bottle	48 (12.0)	5.71 (4.86)	0.008
Both breast and bottle	275 (68.8)	5.87 (4.37)	
Age stop bottle feeding(yr)			
1-2	6 (1.9)	4.17 (4.22)	
≥2-3	49 (15.2)	6.10 (4.88)	0.597
≥3-now	268 (83.0)	5.84 (4.37)	
Types of milk			
Sweet	131 (40.6)	6.60 (4.454)	0.000
Unsweetened	81 (25.1)	4.20 (3.822)	
Non applicable	111 (34.3)		
Candy consumption			
Never	45 (11.3)	2.80 (3.84)	
<2 times/day	157 (39.3)	4.43 (3.88)	0.000
≥2times/day	198 (49.5)	7.00 (4.35)	
Sweet beverage			
Never	59	5.05 (5.45)	
<2 times/day	247	5.38 (4.27)	0.041
≥2 times/day	94	6.17 (3.90)	

Table 6
Oral hygiene education and child dental visit.

Factors	*n* (%)	dmft : mean(SD)	*p*-value
Oral hygiene care education			
Yes	44 (11.0)	5.77 (4.56)	0.70
No	356 (89.0)	5.49 (4.37)	
Dental visit			
Yes	48 (18)	7.54 (5.25)	0.004
No	352 (82)	5.24 (4.19)	
Reason for dental visit			
Check-up	18 (37.5)	5.06 (4.61)	0.01
Toothache	30 (62.5)	9.03 (5.11)	

parental assistance or supervision and the frequency of tooth brushing should be at least twice a day.

This study also found children who drank breast milk had fewer caries than those who drank breast and bottled milk or only bottled milk. Those who drank sweetened milk had more dental caries than those who drank unsweetened milk. These results are consistent with another

study that found children who drank sweetened milk or other sweet drinks from a bottle had a higher prevalence of dental caries (Lamis and Hamdan, 2002). Sugar intake in early life may accelerate the accumulation of *Streptococcus mutans* in an infant's mouth and appears to be a risk factor for dental caries (Johnsen and Nowjack-Raymer, 1989).

Most of the caretakers (89%) never received oral health education. These data show caretakers may not know oral hygiene practices for their children. Eighty-eight percent of caretakers never took their children to see a dentist. The main reason for bringing their child to see a dentist was pain. Therefore, oral health education should be promoted. Dental caries were found in children aged 36 months who were in the first year of kindergarten. This means children had dental caries prior to attending school. In order to prevent early childhood caries, effective preventive programs should start at a very early age, before kindergarten. Besides dental health education, caries prevention using different types of fluoride should be carried out. Further studies should focus on preventive programs consistent with people's lifestyle and effective in preventing early childhood caries.

In summary, the prevalence of early childhood caries in Vientiane, Lao PDR was 82% with a dmft of 5.5, indicating the severity of caries. There were no missing tooth due to extraction and filled teeth were found in only 0.02 which means limited treatment of this age group. The greatest affected teeth were the maxillary central incisors. Factors related to early childhood caries were oral hygiene practices, milk and snack consumption, and child dental visits for check-up. Proper oral hygiene practice should be focused and oral health education should be promoted.

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