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ORIGINAL ARTICLE

The effectiveness of the dental health education program on children from 2 to 5 years and their caretakers in Ratchaburi Province, Thailand

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ABSTRACT

It is the most common oral disease in several Asian and Latin American countries. In Thailand, the burden of dental caries is still high despite significant efforts and contributions to public health prevention programs for dental health. The objective of this quasi experimental research was to investigate the effectiveness of dental health education programs on the dental caries status in 2 to 5 years children living in Ratchaburi Province, Thailand. Quasi-experimental study design was used with routine group (n = 84) and treatment group (n = 205). Total sample size was 289. The routine group received routine dental health education and for the treatment group, comprehensive dental health education program for 6 months duration with initial and post measurements. Questionnaires were distributed to caretakers, and dental health examinations of children were completed by three well-trained expert dentists using the WHO dmft index for dental cares condition. Standard check list form prepared by WHO dentist international experts was used to diagnose the caries status outcomes, standard structure questionnaire was used to identify caries knowledge, oral hygiene and feeding practices in preschool children.

The data were analysed using descriptive statistics, chi-square tests and independent t-tests. Dental caries prevalence was 73.2% in the treatment group and 52.4% in the routine group. The mean of the dental caries occurrence in the routine group (3.49 ± 4.818) was statistically less ($p < 0.05$) than that of the treatment group (4.96 ± 4.968). Even though there was no significant difference, the treatment group had higher dental caries knowledge and feeding practices and the routine group had healthier oral hygiene practices. In sum, the findings suggest that a comprehensive dental health education program needs to continue particularly for children and whole family members with a longer duration of intervention.

Keywords: caretakers, children, dental health education, outcomes, Thailand

INTRODUCTION

According to World Health Organization (WHO) fact sheet, worldwide dental caries occurs in 60–90% of school children and the majority of adults. It is the most common oral disease in several Asian and Latin American countries [1]. In Thailand, the burden of dental caries is still high despite significant efforts and contributions to public health prevention programs for dental health [2].

There are negative impacts from dental caries in children such as pain, cavitation and discolouration of teeth. Moreover, absences from school for children and from work for parents can occur [3]. Additionally, unsightly dentition in children due to dental caries is associated with negative emotions concerning their parents. Remarkably, negative impacts have an enhancing effect that becomes stronger as the child grows older. In Brazil, 5 years old children with untreated caries prevalence was high up to 80% [3,4].

In a quasi-experimental study conducted in Brazil, the study group received oral health information from pamphlets and verbal elaboration by trained nurses whereas the control group only received dental education. As a result, the prevalence of dental caries was lower in the study group than in the control group. Thus, the use of pamphlets and oral instructions on dental health were a useful instrument in preventing dental caries [5]. In a randomized controlled trial (RCT) conducted in Ahvaz, Iran, the experimental group received the standard well-baby care program plus dental health education intervention which was not included in the control group. This dental health intervention had statistically significant positive promotions on the perceived threat, oral health literacy, oral health behaviour and also reduced the incidence of early childhood caries (ECC). The ECC in children was 35% in control group and 13% in experimental group [6]. In an RCT study conducted in southern Thailand, the control group received after-lunch tooth brushing with fluoride tooth paste and the intervention group received additional supervision of tooth brushing by teachers. After 2 year program, the DMFT index was 1.19 in control and 1.04 in intervention group respectively [2,7,8].

The dental intervention programs Thailand focused on dental health promotion of various ages and dental caries prevention programs. Most of the studies target on primary school children rather than pre-school children [2,7-12]. Moreover, this comprehensive dental program using quasi study design combined with phases for preschool children was very rare in Thailand. This study aimed to describe the outcomes of comprehensive and routine groups pertaining to caries status in preschool children in Ratchaburi Province as the prevalence of dental caries in all children living in that area was high according to 1st phase (64.8%). The expected benefits are to improve parents, teacher, children and community involvement in dental caries reduction.

METHODS

This research evaluated the outcomes of comprehensive and routine dental health education in the 2nd phase of a community-based, quasi-experimental study design including dental caries occurrence,

caretaker dental caries knowledge, oral hygiene and feeding practices. The 1st phase was a cross-sectional study design to determine the factors associated with dental caries in children conducted in May of 2016 with a total sample size of 338 participants. The 1st phase results of ECC prevalence in all preschool children, urban, suburban and rural areas of Ratchaburi were 64.8%, 71.0%, 65.0% and 54.8% respectively. The 2nd phase included a routine group (n = 84) and a treatment group (n = 205) for a total of 289 participants as 2nd phase tried to followed the previous 1st phase participants. Theoretical model applied in 2nd phase was Trans Theoretical Model (TTM) to transform into healthy behaviour of dental care in children for long term. [13] (Figure 1)

Children from public daycare centres which were under local administration participated in this study. Sampling frame started with Ratchaburi province (10 districts) which was stratified into rural, suburban and urban. Then, they were simple randomized into five districts with 11 daycare centres (DC). The districts were then computerized random allocated into intervention areas (two districts with seven DC) and routine areas (two districts with three DC), which were in turn randomized into a treatment group (n = 205) and a routine group (n = 84).

The treatment group received a comprehensive program (routine dental health education plus health education on dental care, child growth, child brain development and mother and child nutrition), and the routine group received a routine dental health education program including dental health knowledge, prevention and treatment of dental caries.

In this study, caretakers included parents and relatives or cousins caring for the children. Baseline samples of two children groups were not different caries status and not different in socioeconomic and ethnicity. Inclusion criteria included 2 to 5 year children with their parents' consent with 20 primary teeth fully erupted. Exclusion criteria were children with physical or mental illness and caretakers who were not able to write or hold an interview.

Routine dental health education was conducted by a well-trained dental health team as a regular process in daycare centres in Ratchaburi Province according to their schedule. Comprehensive health education was conducted by a dental team of three well-trained expert community dental surgeons with three well-trained expert dental nurses and also a research team from the ASEAN Institute for Health Development at Mahidol University.

A structured questionnaire includeing theory background was reviewed by an expert team of International Collaboration Dental Centre of Thailand, Ministry of Public Health. For reliability, test was conducted with 30 preschool children in Samut Sakhon Province. For dental knowledge measurement was acceptable with Kuder Richardson 0.96 and for practice measurement, Cronbach's Alpha coefficient was reliable (0.84). For oral health record form of dental examination, WHO codes and criteria for oral health in children 2013 was applied. The parameters were socio-demographic, dental caries knowledge and oral hygiene and feeding practices. For ethical consideration, it was approved by Mahidol University with COA (Certificate of Approval) number 2018/077/0304. Questionnaire interviews of caretakers and dental health examinations of children were carried out by three well-trained expert dentists using

the WHO dmft (decayed, missing, filled teeth) index [14]. The interviews were conducted in two primary healthcare centres in Ratchaburi Province, Thailand.

The data were quantitatively analysed by descriptive statistics, chi-square tests and independent t-tests. Descriptive statistics including frequency and percent were calculated for socio-demographics. Chi-square test for socio-demographic characteristics was used to confirm similarities between categorical variables. Independent t-test was used to compare the means of research outcomes between routine and comprehensive groups. Statistical software package SPSS version 21 was used for analysis.

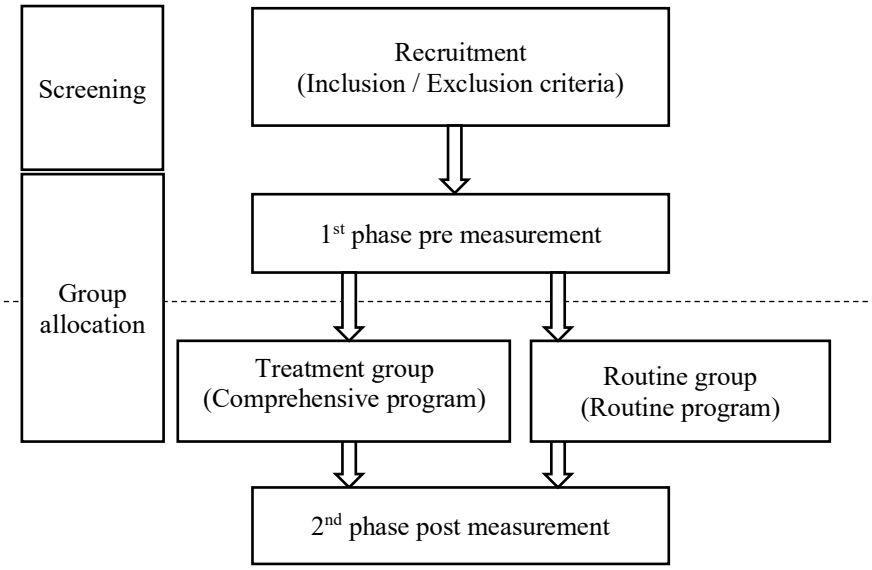

Figure 1: Intervention phases

RESULTS

Baseline socio-demographic characteristics of the 1st phase (Table 1) and 2nd phase (Table 2) are shown as to acknowledge foundation and continuation phase information. There were more children over the age of three than equal to or younger, and there were more boys than girls. There were more caretakers with an education of secondary school level or higher than those with primary school or lower. Most of the caretakers had employed jobs. In addition, most of them had family incomes of more than or equal to 10,000 baht (300.47 USD) per month. The total sample size was 289 in the 2nd phase and 338 in the 1st phase

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Table 1: Baseline socio-demographic characteristics (1st phase)

Socio-demographic variables	Baseline Participants n (%)
Age of child	
≤ 3 years	122 (36.1)
> 3 years	216 (63.9)
Median 3.70, Min 1, Max 6	
Gender of child	
Boy	184 (54.4)
Girl	154 (45.6)
Caretaker Education	
≤ Primary school	142 (42.0)
≥ Secondary school	196 (58.0)
Caretaker Occupation	
Unemployed	102 (30.2)
Employed	236 (69.8)
Family income per month	
< 10,000 Baht	132 (39.1)
≥ 10,000 Baht	206 (60.9)
Median 10,000, Min 1,500, Max 100,000	

In the 2nd phase of this study, the socio-demographic characteristics of most participants were the same as those in the 1st phase except that there were more boys than girls in the treatment group and the reverse in the routine group (Table 2) with no significant difference ($p > 0.05$) in each variable among the two groups. In the 2nd phase, 47.6% of routine group children were caries free and 52.4% were positive for caries with a mean of 1.53 ± 0.502. On the other hand, 26.8% of the treatment group was caries free and 73.2% were caries positive with a mean of 1.73 ± 0.443 (Table 2).

Table 2: Socio-demographics and dental caries status (2nd phase)

Socio demographic variables / Dental caries status of children	Routine group n (%)	Treatment group n (%)	p value (< 0.05)
Age of child			
≤ 3 years	30 (36.6)	62 (30.7)	0.234[a]
> 3 years	52 (63.4)	140 (69.3)	
Median 3.70			
Min 1, Max 6			
Gender of child			
Boy	40 (47.6)	112 (54.6)	0.278[b]
Girl	44 (52.4)	93 (45.4)	
Caretaker Education			
≤ Primary school	36 (43.4)	74 (36.1)	0.250[b]
≥ Secondary school	47 (56.6)	131 (63.9)	

Table 2: Socio-demographics and dental caries status (2nd phase) (cont.)

Socio demographic variables / Dental caries status of children	Routine group n (%)	Treatment group n (%)	p value (< 0.05)
Caretaker Occupation			
Unemployed	25 (29.8)	68 (33.2)	0.573[b]
Employed	59 (70.2)	137 (66.8)	
Family income			
< 10,000 Baht/month	33 (39.8)	69 (34.0)	0.263[a]
≥ 10,000 Baht/month	50 (60.2)	134 (66.0)	
Median 10,000			
Min 1,500, Max 100,000			
Caries-free children	40 (47.6)	55 (26.8)	
Caries-positive children	44 (52.4)	150 (73.2)	

Remark: Min = Minimum, Max = Maximum
[a] = Independent t-test (p value < 0.05), [b] = Chi square (p value < 0.05)

The significant differences among the study groups with respective measurement outcomes is summarised in Table 3. There was a significant difference ($p< 0.05$) in the mean scores of children with dental caries between the treatment group (4.96 ± 4.968) and the routine group (3.49 ± 4.818). With regards to dental caries knowledge level, there was no significant difference ($p > 0.05$) in the mean scores of the treatment group (8.24 ± 0.713) and routine group (8.19 ± 0.843). There was no significant difference ($p > 0.05$) in the mean score of the level of oral hygiene practices of caretakers between the treatment group (4.54 ± 0.921) and that of the routine group (4.63 ± 1.039). Finally, there was no significant difference ($p > 0.05$) in the mean scores of the level of feeding practices of caretakers to their children between the treatment group (2.47 ± 0.796) and the routine group (2.40 ± 0.852). (Table 3)

Table 3: Measurement of research outcomes (2nd phase)

Groups		Dental caries in children	Dental caries knowledge	Oral hygiene practices	Feeding practices
Routine group	Mean scores (SD)	3.49 (4.818)	8.19 (0.843)	4.63 (1.039)	2.40 (0.852)
Treatment group	Mean scores (SD)	4.96 (4.968)	8.24 (0.713)	4.54 (0.921)	2.47 (0.796)

Table 3: Measurement of research outcomes (2nd phase) (cont.)

Groups	Dental caries in children	Dental caries knowledge	Oral hygiene practices	Feeding practices
Mean diff: (95% CI) between two groups	1.473 (0.228_ 2.717)	0.053 (-0.139_ 0.245)	0.094 (-0.338_ 0.150)	0.068 (-0.139_ 0.276)
p value between two groups	**0.021***	0.584	0.447	0.516

Remark: SD = Standard Deviation, *p value < 0.05

DISCUSSION

This study focused on the evaluation of outcomes of dental caries occurrence of children, dental caries knowledge and the practices of caretakers in Ratchaburi Province, Thailand. Most of the children were boys that were more than three years old. Most of the caretakers had secondary school level or higher education with employed jobs and family incomes of 10,000 baht (300.47 USD) per month (Table 1).

The socio-demographic characteristics of children and caretakers were similar between the treatment and routine groups with no significant difference in each variable (Table 2). There was no significant difference in the age of most of the children between both groups (older than 3 years) in the 2nd phase of the study (Table 2). Thus, this parameter was consistent with that of a previous related study conducted in southern Thailand [2]. In the 2nd phase, according to sampling frame, availability of children sample size vary sharply among two groups. There were more boys than girls in the treatment group but not in the routine group with no significant difference among the two groups. This might have resulted from the higher number of children availability in the treatment group than control. The sex ratio was comparable in a quasi-study carried out in Pelotas, Brazil [5].

Caretaker socio-demographics in the 2nd phase (Table 2) showed more participants with an education at the secondary school level or above than primary school or below in both the treatment and routine groups, with no significant difference among the two groups. In contrast, the majority of mothers had a primary education in the study and control groups in an RCT study design carried out in South Bangalore city, Iran [15]. In the 2nd phase, there were more employed than unemployed caretakers in both groups with no significant difference among the two groups. Likewise, most of the caretakers had a paid job or employed occupation in a previous related study [16]. In the 2nd phase, most of the caretakers earned more than 10,000 baht (300.47 USD) per month in both groups with no significant difference among the two groups. High-income families were also more common in all three groups in a study conducted in Hong Kong [17].

This study has provided essential information regarding the prevalence of dental caries among children in Ratchaburi Province, Thailand. Dental caries prevalence in the 2nd phase for the routine group was 52.4% with a mean of 1.53. Prevalence in the 2nd phase for the treatment

group was 73.2% with a mean of 1.73. The higher dental caries prevalence in the treatment than routine group (Table 2) suggests that prevention is still necessary as the child grows older and that controlled guidance is required by caretakers. The prevalence data obtained in our study was far more severe than that in previous related studies [18, 19].

The outcomes of this research on dental caries occurrence in children, caretaker dental caries knowledge, oral hygiene and feeding practices are summarized in Table 3. Dental caries occurrence in children was significantly lower in the routine group (mean = 3.49 ± 4.818) than in the treatment group (mean = 4.96 ± 4.968). Even though, the baseline of dental caries in both group were not different, it may be the effects of uncontrolled factors such as the 24 hours shop for sweet, sweet drink, or sweet snack can be easy to access surrounding house, as a result more caries was found in treatment group as they have more risk. The available treatment group children were from urban and sub urban areas (n=205) whereas routine group children were from rural area (n=84) according sampling methods. Thus, more caries was found in treatment group as they have more risk of caries from 24 hour shops with sweets and cold drinks. Additionally, even though the same caretakers were requested to take part in the 2nd phase, some parents from 1st phase were employed and not available. Therefore, they sent relatives or cousins. Thus, more intensive involvement of parents and children in dental health program for children is required for the next research. In a randomized controlled trial of four levels of evaluation, early childhood caries was statistically significantly higher ($p < 0.05$) in the control than study group [6]. In a Thailand study of school-based intervention, dental caries incidence was lower in the intervention than control group [2].

In the case of dental caries knowledge of caretakers, the treatment group (mean = 8.24 ± 0.713) had more dental caries knowledge than the routine group (mean = 8.19 ± 0.843) without a significant difference between the two groups. In an Iranian study, oral health knowledge literacy was statistically significantly different between the study and control groups ($p < 0.05$) especially in the six-month follow-up visit [6].

Regarding the oral hygiene practices of caretakers, there was no significant difference between the mean scores of practice levels in the routine group (mean = 4.63 ± 1.039) and treatment group (mean = 4.54 ± 0.921). In a study conducted in Ahvaz, Iran, the oral health behaviour differed statistically between the study and control groups ($p < 0.05$) especially in the six-month follow-up visit [6]. In one RCT study, oral health practices were not significant ($p > 0.05$) [17]. Most of the oral hygiene practices were statistically different in the RCT of a parental-designed study [11, 20].

Finally, the feeding practices of caretakers in the treatment group (mean = 2.47 ± 0.796 SD) had a higher level than that of the routine group (mean = 2.40 ± 0.852 SD), but this was not statistically significantly different. However, there was significant difference ($p < 0.05$) in feeding practices between the groups in a study conducted in south Bangalore, [15]. In a London RCT study, the dietary habits did not differ significantly between the groups [9, 21].

Community randomization was done starting from the provincial level down to the daycare centres. Therefore, this study was able to generalize for community settings in a Thai context. Participants in both study and routine groups were also blinded. It is difficult to compare the results of our study with those of other researchers given the lack of consistent study designs. Moreover, the study is based on strong theory background in methodology. The 2nd phase of the study followed the same children and the same caretakers that participated in the 1st phase. Dental caries examinations were conducted according to WHO oral health assessment guidelines. However, this research is not representative of all children as it focused only on those with 20 fully erupted primary teeth. Blinding was not possible with dentists and research assistants as they involved planning and implementation with dental health educators of intervention[9 11].

To achieve a better outcome, the dental health education program should be conducted with children and caretakers as well as whole family members and follow the same participants of previous phases. A cost evaluation of the dental health education program is suggested for further research. The involvement of private day care centres is also recommended. Primary healthcare volunteers, teachers, dentists, local administrator, stakeholders and whole community are crucial together with multi-sectorial involvement for caries reduction in children.

CONCLUSION

In summary, dental caries was still progressing and occurring in both groups and more severely in the treatment group. For outcomes, even though not significant, the treatment group had better dental caries knowledge and feeding practices even though they did not have significant differences, whereas the routine group had better oral hygiene practices and lower caries occurrence with significant differences ($p < 0.05$). The initial findings suggest that the dental health education program should continue particularly for children and whole family members with a longer duration of intervention.

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