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ORIGINAL RESEARCH

Using food experience, multimedia and role models for promoting fruit and vegetable consumption in Bangkok kindergarten children

Chutima SIRIKULCHAYANONTA,[1] Kingkarn IEDSEE,[1] Poonsook SHUAYTONG[2] and Suwat SRISORRACHATR[1]

[1]Department of Nutrition, Faculty of Public Health, Mahidol University, and [2]Department of Family Health, Faculty of Public Health, Mahidol University, Bangkok, Thailand

Abstract

Aim: To evaluate the use of food experience, multimedia and role models for promoting fruit and vegetable consumption in kindergarten children.

Methods: A quasi-experimental study was conducted. A Bangkok public primary school was randomly selected and one of the kindergarten levels was purposively chosen. Program implementation consisted of 11 activities over an eight-week period from July to September, 2003. Data on demographic variables, and types and amounts of fruit and vegetables consumed and frequency of fruit and vegetables served were collected before and after the intervention. Program evaluation consisted of an analysis of the pre- and post-test data.

Results: After the intervention, fruit and vegetable eating behaviour scores (median ± interquartile range) revealed significant changes from 3 ± 8 to 7 ± 8 for vegetables and 6 ± 8 to 9 ± 8 for fruit (P-value < 0.001); the different types of consumed vegetables were increased from two to four (P-value ≤ 0.001); and the fruit and vegetable intake was significantly increased from 53 g to 77 g and from 11 g to 23 g respectively (P-value < 0.005).

Conclusions: Results of this pilot study were effective in increasing fruit and vegetable consumption in the kindergarten, however, longer-term evaluation and assessment of the impact on the home environment are required. The inclusion of nutrition education and instruction on healthy eating habits in the course curriculum combined with social support from teachers and families may improve and sustain fruit and vegetable eating behaviours.

Key words: food experience, fruit and vegetable consumption, health promotion, multimedia, pre-schooler, role model.

INTRODUCTION

Fruits and vegetables (F&V) are important components of a healthy diet. They contain essential nutrients such as vitamins, minerals, dietary fibre and phytochemicals, and are also low in fat, sodium and energy density.[1] Epidemiological evidence has shown significant relationships between high F&V consumption and the prevention of major chronic diseases such as hyperlipidaemia,[2] cardiovascular diseases and certain cancers, particularly epithelial cancer of the digestive and respiratory tracts.[3] An WHO/FAO[3] expert consultation report on diet, nutrition and prevention of chronic diseases sets population nutrient goals and recommends intake of a minimum of 400 g of F&V per day for the prevention of chronic diseases such as heart diseases, cancer, diabetes and obesity.[3] In Thailand, the Food Based Dietary Guidelines for Thai People recommended that four to six servings of vegetables and three to four servings of fruits should be consumed per day.[4] However, a report from the National Dietary Survey in 1995 revealed that Thai people consumed only 113.4 g of vegetables and 73.6 g of fruit per day (less than 50% of the WHO recommendation).[3] Moreover, pre-schoolers and school children consumed less than one serving of vegetables and one serving of fruit per day (70% below recommendation).[5,6] In other words, low F&V consumption among Thai people starts in early childhood and extends through to adulthood. According to other studies,[7,8] food habits and eating patterns acquired in early

C. Sirikulchayanonta, MD, Associate Professor
K. Iedsee, MSc, Research Assistant
P. Shuaytong, MSc, Associate Professor
S. Srisorrachatr, PhD, Assistant Professor
Correspondence: C. Sirikulchayanonta, Department of Nutrition, Faculty of Public Health, Mahidol University, 420/1 Rajvithi Road, Rajthevi district, Bangkok 10400, Thailand. Email: phcsr@mahidol.ac.th

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Table 1 Topics and teaching methods in program implementation

Week	*Topics*	*Teaching methods*
1	Creating awareness of health benefits and acceptance of F&V	1.1 Viewing cartoon and discussion benefits of eating F&V (A[(a)]1) 1.2 Listening to stories, and discussion (A2)
2	Giving knowledge on the kinds of vegetables and planting	2.1 Singing a song, playing a game (names of veg), and discussion (A3) 2.2 Explanation and demonstration of gardening activity(A4)
3	Giving knowledge on the kinds of fruits and planting	3.1 Viewing pictures of fruits, playing game (names of fruit) and discussion (A5) 3.2 Explanation, demonstration of gardening activity and practice (A6)
4	Purchasing and selecting of F&V	4 Hand puppet shows, demonstration with fresh F&V; discussion and practice (A7)
5	Cleaning and preparing fruits before eating	5 Demonstration and practicing in washing and preparing fresh fruit; discussion and practice (A8)
6	Cooking	6 Demonstration of correctly washing fresh vegetable and cooking; eating vegetable soup (A9)
7	Drawing and painting	7 Drawing F&V and painting (A10)
8	F&V party	8 Playing games and singing a song; tasting cooked vegetable and fresh fruit; eating lunch together (A11)

[(a)] Activity.
F&V, foods and vegetables.

childhood 'track' into later childhood and adulthood. Thus, improving lifestyles and focusing on healthy food choices at an early age can have a major impact on the future health and life quality of adults.

Kindergarten children are dependent on others to provide their food. Early experience with food is crucial in the development of food acceptance patterns, both in terms of the acquisition of food preferences and the regulation of food intake.[9] Food preferences learned via repeated exposure to F&V in eating experiences can have long-term influences on food choices[10] and can be used as a tool for nutritional education. Furthermore, food acceptance and the development of food choice patterns are multifactorial, and include food availability, cultural, environmental and social factors.[11] The aim of this study was to evaluate the effectiveness of a food experience program that promoted F&V consumption in Bangkok kindergarten children.

METHODS

A quasi-experimental study with a one-group, pre- and post-test design was conducted from July to September 2003. A public primary school in Bangkok was randomly selected. Before intervention, one of the two classrooms at the kindergarten level (K1/1) was purposively selected because a greater percentage of its students exhibited low F&V consumption when compared with the other classroom in a preliminary survey based on questionnaire responses from 60 parents. The kindergarten children were aged four to five years, physically normal, living with parents and able to participate throughout the program. Children who were absent from the program more than 20% of the time were excluded. Permission for the study was given by the school director. The proposal was reviewed and approved by the Institutional Review Board of Mahidol University. An informed consent form was obtained from all parents and assent received from the children.

Program implementation

A comprehensive approach was used, including the use of multimedia and role models in a food experience program according to Social Learning Theory.[12] The program consisted of 11 activities (e.g. cartoon, games, gardening, cooking), of 30–40 minutes duration each for eight consecutive weeks that presented information on health benefits of F&V in a manner to improve familiarity with and acceptance of the concept. These consisted of the planned class activities shown in Table 1 (the first three sessions were longer than the others).

Regarding the gardening activity, planting steps were demonstrated to the children and they then planted vegetable seeds in groups. As part of the cooking activity, a demonstration of correctly washing vegetables was implemented before being sliced by researchers and cooked in vegetable soup that was served for the students' lunch. Finally, F&V tasting parties were held in the classroom. Various kinds of F&V were arranged for tasting; and their names and usefulness were reviewed, accompanied by games and songs. They ate F&V together at the parties.

Implementation tools

The multimedia used for implementation was shown in Table 1. Five kinds of fresh vegetables and five kinds of fruit were chosen. They were chosen because they were nutri-

tious, easily accessible and available seasonally, and approved by the teacher who was responsible for school lunches. One serving of each kind of F&V was served at lunch and the five selected menus for five days, which were served one week before and after the program were as followings: Chinese kale/rambutan; Chinese white cabbage/guava; Ivy gourd/ripe papaya; Chinese cabbage/pineapple; and pumpkin/banana.

Teachers, peers and parents were used as role models while eating together. A take-home letter for parents was sent out at the fourth week of the intervention to inform them of ongoing project activities, and it included guidelines to motivate and encourage the children to eat F&V of recommended variety and quantity.

Data collection

The questionnaires were evaluated for their content validity by experts and then validated by pre-testing with 32 parents of K1/2 group of students of the same school. These were used to collect pre-test data from parents of the study group. They included background characteristics, family F&V consumption behaviour (details included variety of F&V regularly consumed) and parental roles in encouraging their children to eat F&V (e.g. kinds, amount and frequency of F&V served; response when children refused to eat F&V). Researchers recorded children's F&V eating behaviour at lunch time with respect to both kinds and amounts consumed (i.e. according to the five selected menus mentioned above) for five days before and after the program. The kinds of F&V consumed were coded as zero for eating and one for not eating. The amounts of F&V were weighed in grams (g) and recorded before and after eating. The intake amount was assessed and recorded in the record form as: intake = amount served less amount left over.

The F&V eating behaviour scores of 2, 1 and 0 were assigned according to eating without prompting, eating after persuasion and not eating after persuasion, respectively. The total scores ranged 0–10; and the final scores of 8–10, 5–7 and <5 were assigned as good, fair and poor F&V eating behaviour, respectively.

After the program, parents completed the questionnaire again with some additional questions regarding F&V promoting behaviour, changes in their children's eating behaviour, usefulness of the given guidelines in F&V consumption and their children's attitude towards the program.

Statistical analysis

Data analysis was carried out using SPSS for Windows, version 10 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to describe the general characteristics of the samples. Wilcoxon signed ranks tests, with statistical significance at an α level of ≤ 0.5, and median and interquartile range were used to compare between pre-test and post-test data for types and amounts of F&V consumed, child eating behaviour scores and frequency of F&V preparation by parents. McNemar's test was used to compare between parental reinforcements for eating F&V before and after intervention.

RESULTS

A total of 37 students were included in the study before intervention. Because seven students were orphans, one student left school and three students were absent during intervention for more than 20% of the classes, only 26 students (13 boys and 13 girls) participated throughout the program.

The study children (aged four to five years) were mostly the first or second child in their families. Most parents were in the 30–39 years age group (mean ages 33 for fathers and 30 years for mothers), had completed secondary school and were employees. Mean family income was 9000 baht per month.

In Table 2, it was shown that before intervention, children consumed more fruits than vegetables, the median kinds of F : V consumption were 3:2 and amounts were 53:11 g.

From direct school lunch observation, it was revealed that the median scores of child F&V eating behaviour were 6 and 3 out of 10. F&V serving by parents were seven and four days a week because their children did not like F&V due to the bitter taste, smell and texture. After intervention, the median kinds of vegetables eaten increased significantly from two to four (P-value < 0.001), whereas the kinds of fruits eaten did not change (P-value = 0.434). There was also a significant increase in the median amounts of vegetables (from 11 g to 23 g; P-value < 0.001) and fruits (from 53 g to 77 g; P-value = 0.001) eaten. In addition, the median scores of eating behaviour increased significantly from 3 to 7 for vegetables (P-value < 0.001) and 6 to 9 for fruits (P-value < 0.001). It was reported from post-test data that at home children often talked about vegetables and were proud that they had eaten vegetables in their school lunch. In addition, parents responded to the sent-home message by serving more F&V for their children and there was an increase in serving of vegetables by parents from four to six days a week (P value = 0.014) (Table 2). They also reported that their children ate more types and amounts of F&V than previously. During the program, children also notified the researchers that their parents prepared more types of F&V for them.

Table 3 indicated that more than half of children were always given reinforcement if they refused to eat F&V and parental reinforcement was significantly increased after intervention (P-value = 0.007).

Researchers observed that children enjoyed watching VCD cartoons of Popeye check that we may need TM after Popeye and learned that 'Popeye was very strong because of eating vegetables'. Similarly, girls were mostly interested in the story of 'Nid, a girl and the pumpkin' is this a book is so needs to be referenced.

After the second week of the implementation phase, the students were curious to know what kinds of F&V they would have for lunch. They observed and encouraged their friends to eat vegetables at lunch referring to Popeye and Nid as the models.

Table 2 Kinds and amounts of F&V consumed by the children, the child eating behaviour scores and frequency of F&V preparation by parents before and after the intervention

Variable	*Median ± Interquartile*		$Z^{(a)}$	P *value*
	Before	*After*		
Kinds				
Vegetables	2 ± 3	4 ± 4	−3.657	0.000
Fruits	3 ± 4	4 ± 4	−0.782	0.434
Amounts (g)				
Vegetables	11 ± 40	23 ± 49	−3.714	0.000
Fruits	53 ± 73	77 ± 103	−3.226	0.001
Child eating behaviour scores				
Vegetables	3 ± 8	7 ± 8	−4.209	0.000
Fruits	6 ± 8	9 ± 8	−3.397	0.001
F&V serving by parents				
Vegetables (day/week)	4 ± 5	6 ± 3	−2.449	0.014
Fruits (day/week)	7 ± 3	7 ± 3	−1.000	0.317

[(a)] Wilcoxon signed ranks tests.
F&V, foods and vegetables.

Table 3 Parental reinforcement for eating F&V before and after intervention (n = 26)

Parental reinforcement for eating F&V	*Before* (n)	*After* (n)	*McNemar* χ^2 *(df = 3)*	P *value*
Never	4	2	11.98	0.007
Seldom	8	6		
Always	14	18		

F&V, foods and vegetables.

DISCUSSION

A pilot study using food experience, multimedia and role models for promoting F&V consumption was implemented and its effect on F&V consumption and behaviour at lunch time were evaluated. Frequency of serving F&V at home and parental reinforcement for eating F&V were also assessed.

Based on Social Learning Theory,[12] the use of symbolic models such as cartoons and stories that are appropriate for young children helps them to learn from one another via observation and imitation and to model their behaviour, attitudes and emotional reactions to others. It has an important causal impact on both personal and environmental factors in ways that can help initiate behaviour change. The participants' behaviour was reinforced by a model that had a strong likelihood of being accepted and thus reinforced in their group.

After eight consecutive weeks of intervention, there was an increase in the types of vegetables eaten, but there was no significant change in the types of fruit eaten by the children. This was probably because they were already eating more types of fruits than vegetables, because fruits were more easily served and because fruits have a variety of colours, smells, textures and tastes. It was also reported by Domel *et al*.[11] that children's preferences for fruit were higher than for vegetables. The advantages of the food experience program were that the students had more opportunity to learn, see, touch and taste a variety of F&V. Cullen *et al*.[13] revealed that increasing accessibility and availability of F&V were important predictive factors in children's F&V eating habits. Therefore, exposure to F&V might play an important role in influencing food preferences and selection. From this study, before the intervention, the median scores of child vegetable eating behaviour were poorer than fruit eating behaviour; and vegetable serving by parents was only four days a week, and this was probably the cause of the low F&V intake among the study group at the start. After the intervention, the average amount of vegetable intake more than doubled (from 11 g to 23 g), although this was still much less than one serving (70 g) per meal. The take-home letter to parents encouraging them to motivate their children to eat a variety of F&V in recommended serving sizes was successful in that the post-test data revealed that parents served their children F&V more regularly and encouraged them to eat more. This approach is supported by another previous study.[14]

The F&V eating behaviour was significantly improved because of various program activities. In essence, a range of media were used in a number of activities that exposed children to different F&V and instilled positive attitudes towards F&V. Such an approach is supported by previous research;[15] and this pilot study suggests it was successful in the present setting. Role models and social support for eating F&V from family, teachers and peers are major factors in encouraging F&V consumption in elementary school chil-

dren,[16] because they have the opportunity during meals to observe other children and may try to eat vegetables served on their plate even though they do not like them. This process makes children familiar with the taste of vegetables. Much child behaviour is learned from others and can produce satisfying or reinforcing results. However, Rhee[17] reviewed various studies on parental reinforcement for eating F&V and found that it was a sensitive issue that should be considered carefully lest it result in adverse consequences. For example, promising unhealthy food such as dessert as a reward for eating vegetables may mislead children into unhealthy food habits or may lead them to devalue or dislike vegetables and reject them in the future when given a choice. Parents should be cautioned regarding the proper ways of promoting F&V consumption.

Researchers observed students' interest in the activities and this has also been reported by previous studies[18,19] showing that cooking is more than simply making something delicious to eat. A variety of food preparation activities such as measuring, pouring, cutting, stirring and grinding can be used to stimulate eye–hand coordination and to learn names and colours of foods. A 'tasting party' is an enjoyable way for children to compare tastes of F&V. As Feldman[19] indicated, a teacher's attitude towards food does influence children's attitudes. If teachers prefer fresh F&V, children imitate that behaviour. If a teacher joins with the children and enjoys the food served, the children will also enjoy the meal. Moreover, Beaty[18] has reported that children feel good when adults sit next to them and eat the same food.

Thus, parents and teachers should provide ample opportunities for children to consume F&V, and should encourage them to develop and maintain healthy eating habits by acting as role models and giving social support.[20] Therefore, food experience at school and supportive environmental factors at home should contribute to positive attitudes and healthy eating habits among pre-school children.

This pilot study of using multimedia to promote F&V consumption was a one-group, pre- and post-test design with small sample size because we aimed to see the impact of the implementation tools. Results indicated that they were effective and produced a clear and consistent set of activities. Future research with larger sample sizes in pre-school and school children including a control group and longer-term follow up are required to assess the sustainability of improved F&V eating behaviours. The inclusion of nutrition education and instruction on healthy eating habits in the course curriculum, and social support from teachers and families are recommended for sustainable behaviour change.

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