ORIGINAL ARTICLE

The effectiveness of folk physical activity and food education programme on body mass, nutrition knowledge and consumption behaviour among overweight primary school children in Southern Thailand

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Abstract

Background and Study Aim: Overweight status among primary school children is recognized a major public health problem in Thailand. As the rates of overweight is higher than the key performance indicator targeted by the government, it is important for necessary measures and actions to be taken to solve the problem. This study aimed to determine the effectiveness of folk physical activity and food education program on body mass, nutrition knowledge score and consumption behaviour among overweight primary school children in Southern Thailand.

Material and Methods: Thirty-eight (N=38) primary school children of grade 4-6 were recruited and divided into experimental group (13 boys and 6 girls) and control group (12 boys and 7 girls). The intervention was conducted in six weeks. Data were analyzed using descriptive statistics and inferential statistics.

Results: Results showed the post-food consumption knowledge and behaviour between experimental and control groups were significantly difference ($p<0.001$; $p<0.05$), respectively. Post-body mass of experimental group decreased after participation ($p<0.01$) and it is in contrast to control group which significantly increased ($p<0.01$).

Conclusions: Results demonstrated that the combination of providing appropriate physical activity programme and food consumption education can result in reducing body mass among overweight primary school children. Besides, children can also learn about the food consumption and apply it as behaviour from younger age. Such programme should be promoted among all students continually and should be added and frequently conducted in the school health programme, so that student can do it as their daily routine towards realizing the national plan of having healthy generations in the future.

Keywords: physical activity, food consumption education, overweight student, body mass index, knowledge and behaviour.

Introduction

Overweight status among primary school children is recognized a major public health problem in Thailand. It is reported that there are high percentage of overweight among primary school children (12.57 per cent) that are above than key performance indicator targeted by the Ministry of Public Health, Thailand (10 per cent). Overweight problem among this group shows 1.7 fold increased in 12 years [1]. Student aged 6-14, in particular has increased from 11.14, 11.19 to 12.89 per cent between 2017 and 2019 (Health Data Center, 2015). Bangkok shows the highest percentage of overweight school student (23.94 per cent), Surat Thani is the second most (15.41 per cent) area whereas Nakonnayok reported the third range of the country (15.07 per cent). Nachon Sri Thamarat province, located in rural area, reach a position high, numbering 21st in Thailand [2]. It can be seen that the prevalence rate of overweight child is increasing even in the rural far areas.

There are various causes of getting overweight health among primary school children. Physical activity and food consumption are found to be common factors contributing to obesity [3]. The imbalance between intake and metabolic energy leads to fat gained. Physical inactivity and imbalance food consumption behaviour are well recognised as main causes of overweight [4, 5]. From the literature review about consumption behaviour among primary school children, they prefer high energetic food but there contains low nutrient for good health such as fast food, snake, hamburger and cake [6]. The world today supports the individuals to rely on technology and digital used to provide convenient daily living.

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Children spend most of their leisure time sitting in front of television and play games around 2-3 hours a day rather than performing physical activity. Learning environment does not support student to have enough physical movement. Daily study schedule is designed for student to sit on their desk and this reduces energy expenditure. In addition, most student spend less than 30 minutes a day and less than 3 times a week for this activity. Although they can do physical activity and exercise during physical education class, it runs for only 50 minutes a week. So it is not sufficient for spending energy and keep them in balance weight in their age [7].

These overweight children also have higher risk of health problem including chronic illness and easy susceptible to other health problems when they turn to older age; hypertension, diabetes, cardiovascular disease, for instance. Apart from this, overweight health condition can affect academic performance and related activity that fulfill the proper growth and development of school aged children [1, 3]. Among children who are 5-18 years old would have higher risk to stroke than those who have normal weight. The trend of hypertension also increases 2-4.5 folds while high cholesterol approach to 3-7 folds [8]. Being overweight child is somehow a stigma issue because they could be bullied by friends and people around them. This could affect their mental health and bring negative outcome in the long term. Some might also lose confident to participate in class and activity. Some could become depress and even lead to suicide [3, 8]. Thus, it can be said that being overweight not only create burden to individual children, it increases health care cost, reduce quality of live and can have short life expectancy [8].

The data from weight analysis among grade 4-6 children from 2017-2019 in local school of Nachon Sri Thamarat province; Watsamakeenukul school reported by school health division showed that percentage of overweight among this group increases progressively from 4.89 per cent in 2017 to 5.29 in 2018 and to 8.89 in 2019. They have insufficient knowledge and understanding of the benefit to have proper physical activity and consume healthy food. They do have big meals 3 times per day. After school, they become very hungry and this causes chance of gaining more calories but children have low energy expenditure [3].

From literature, the combination of physical activity and food education programme can balance body weight and promote the individual a good health [8, 9]. This particular intervention still not exists in the rural school. Thus, this study was aimed to determine the effectiveness of such program to body weight among overweight primary school children of grade 4-6. In this study, we design physical activity based on local wisdom as it would suit context and lifestyle of study participant better, hoping that they will enjoy and include as part of their daily life. The finding can enhance relevant sector to support children an appropriate physical activity and consume healthy food to maintain balance weight. They can grow up to be healthy adult and be a good human resource for the nations development in the future.

Material and Methods

Participants

This quasi-experimental study involved primary school children of grade 4-6 by using purposive sampling. Thirty eight (N=38) participants based on inclusion and exclusion criteria were recruited. The inclusion criteria include: i) being student of grade 4-6; ii) having body weight higher than +2SD; iii) having no personal health problem and iv) obtaining permission from parent to participate in the study. The exclusion criteria were those that do not comply with the inclusion criteria and did not able to participate in all the programs conducted due to personal reason or having illness or injury during the experimental period. The participants were randomly recruited into control (N=19) and experimental groups (N=19). This study was approved by the institute ethical review board of Thaksin University, Thailand (No. 202-105)

Instrumentation and validation

The research instruments used in this study consisted of 2 parts: i) the questionnaire of general information, food cognitive assessment and food consumption behavior [2, 10] and ii) the guideline of how to eat healthy food combined with folk activity programme. The researchers assessed instrument of the second part by using content validity and reliability. The index of item objective congruence (IOC = 0.88) was evaluated by 3 experts from health and sports sciences department to check the validity of the content, coverage, clarity of language and suitability. After that, the researchers took into consideration on how to improve the language, content of the guideline and programme according to recommendations. The reliability was ensured by Cronbach's alpha coefficient (a =0.69) which was tested on 30 children who have characteristics as same as the sample group from other school.

This study followed Thailand national guideline of growth specific for children aged 5-18 years old [11]. According to this guideline, weight by height was used to identify obesity or thinness child. For overweight children, in particular, it is determined by +2 S.D.

Folk physical activity and food consumption behavior programmes

The programmes for this study combined of folk physical activity based on local lifestyles and cultural contexts and food consumption behaviour. The details were shown in Table 1.

Statistical analysis

The general characteristics and independent variables were analyzed by descriptive statistics (frequency, percentage, mean, and standard deviation). Whereas, inferential statistics were analyzed to compare the body weight between experimental group and control group by using independent t-test and to compare the food cognitive and food consumption behavior scores by using χ^2 at the significant level of 0.05 respectively.

Results

Table 2 showed the characteristics of participants. Table 3 showed the body weight by height among experimental and control groups. It can be seen that the number of obese was drop from 14 to 13 and pre-obese from 5 to 4 among experimental group. In contrast, the number of obese increase from 12 to 15 among control group.

Table 4 showed the knowledge of food consumption and food consumption behaviour pre- and post-intervention. No significant difference was found in the pre-test. In the post-test, experimental group was shown to improve in terms of these variables and also were shown to be significantly greater compared to control group.

Table 5 showed that the body mass of experimental group after participation (65.53±13.59 kg) was significantly decrease when compared to before (66.68±13.75 kg) ($p<0.01$). In contrast, the body mass of control group after (65.00±13.04 kg) was significantly increase when compare to before participation (63.78±12.88 kg). As, the body mass before participation between experimental group and control group was not difference. Same with

Table 1. Programmes for participants

Week	Study procedures		Duration per day
	Experiment group	**Control group**	
	Pretest- Body assessment		
1	Body weight assessment Evaluating knowledge of healthy food consumption	Body weight assessment Evaluating knowledge of healthy food consumption	50 mins
How to eat to prevent obesity			
2	Leaning about obesity and its cause through video Knowing how to prevent obesity Brainstorming and sharing their thought about the negative of obesity to their life and the research concluded issues Knowing about healthy meal and make own choice Knowing about folk physical activity and its typical		50 mins
2-7	**Folk physical activity practise**		
	Warming up (10 min) “Yhon ball” based on figure of eight model (4 min and 2 min break) “ Pra kong blloon” (4 min and 2 min break) “ Wing sam kha” (4 min and 2 min break) “ Tee luk lore” (4 min and 2 min break) “ Wing peaw” (4 min and 2 min break) Cool down (10min)		50 min
7	**Post test**		
	Body weight assessment Evaluating knowledge of healthy food consumption	Body weight assessment Evaluating knowledge of healthy food consumption	50 min

Table 2. Characteristics of participants

Characteristics		Experimental group (n=19)	Control group (n=19)
	Number (%)		Number (%)
Sex			
	Boy	13(68.4)	12(63.2)
	Girl	6(31.6)	7(36.8)
Age (Years)			
	10	3(15.8)	6(31.6)
	11	10(52.6)	6(31.6)
	12	6(31.6)	7(36.8)
Religion			
	Buddhist	19(100.0)	19(100.0)
GPA			
	3.60 - 4.00	5(26.4)	1(5.3)
	3.00 - 3.59	7(36.8)	8(42.1)
	2.60 - 2.99	7(36.8)	8(42.1)
	Less than 2.60	0(0.0)	2(10.5)
Weight (kg)			
	41.0-50.0	0(0.0)	2(10.5)
	51.0-60.0	8(42.1)	6(31.6)
	61.0-70.0	5(26.3)	8(42.1)
	71.0-80.0	4(21.1)	1(5.3)
	81.0-90.0	0(0.0)	1(5.3)
	91.0-100.0	1(5.3)	1(5.3)
	101.0-110.0	1(5.3)	0(0.0)
Height (cm)			
	131.0-140.0	1(5.3)	2(10.5)
	141.0-150.0	9(47.4)	6(31.6)
	151.0-160.0	6(31.6)	8(42.1)
	161.0-170.0	3(15.8)	3(15.8)

Table 3. Bodyweight by height among experimental and control groups

Weight by height	Experimental group	Control groups
	Number (%)	Number (%)
Before experiment		
Overweight	0 (0.0)	0 (0.0)
Pre-obese	5 (26.3)	7 (36.8)
Obese	14 (73.7)	12 (63.2)
After experiment		
Overweight	2 (10.5)	0 (0.0)
Pre-obese	4 (21.1)	4 (21.1)
Obese	13 (68.4)	15 (78.9)

Table 4. Knowledge of food consumption and food consumption behaviour in experimental and control groups.

Variable	Experimental group n=19		Control groups n=19		$\chi 2$	p
	Number	%	Number	%		
Before experiment						
Knowledge of food consumption						
Good	0	0	0	0		
Fair	11	57.9	11	57.9	0.00	1
Improved	8	42.1	8	42.1		
Food consumption behaviour						
Good	0	0	0	0		
Fair	12	63.2	16	84.2	1.03	0.60
Improved	7	36.8	3	15.8		
After experiment						
Knowledge of food consumption						
Good	12	63.2	0	0		
Fair	6	31.5	12	63.2	18.5	<0.001
Improved	1	5.3	7	36.8		
Food consumption behaviour						
Good	3	15.8	1	5.3		
Fair	16	84.2	15	78.9	10.57	0.005
Improved	0	0	3	15.8		

Table 5. The comparison of body mass between experimental group and control group before and after experiment

Body mass (kg)	Control group		Experimental group		t	p
	mean	SD	mean	SD		
Before	63.78	12.88	66.68	13.75	0.67	0.50
After	65.00	13.04	65.53	13.59	0.13	0.89
t	6.05		-6.60			
p	<0.01*		<0.01*			

body mass after participation between experimental group and control group was not difference.

Discussion

The purposes of this study were to compare body weight, knowledge of food consumption and food behaviour between experimental and control group, before and after participation following the programme on body weight among overweight primary school children of grade 4-6. In line with what was found in several previous studies [4, 7, 8, 9], findings of the current study showed the body weight of the experimental group after the experiment was reduced compared to before the experiment. In contrast to the body weight of the control group after the experiment was increased when compared to before the experiment.

Such folk activities are activities that children like and are challenging while participating in the activities. It effects on the weight loss, decrease fat mass and increase muscle and bone mass in this age group. It also motivated and challenge to them for participating the programme [4, 6, 7, 8].

Children physical activity should be organized into multiple stations by alternating muscle groups from station to station in which one round of exercise consists of a minimum exercise of 5-8 stations, an intermediate exercise of 9-11 stations, or a maximum of 12-15 stations. They may repeat several rounds depending on the amount of exercise considering the number of stations, repetition per station and the intensity of each exercise period that resulting in the highest efficiency in training [12, 13, 14].

In terms of knowledge about food consumption,

it was found that the experimental group joined the activities that the researcher had organized with educate to participant by leaflets and dietary guidelines in school-aged children. The proportion of food that school-age children should consume and the amount of food that should be had and the type of food that should be eaten according to the color light food classification game according to traffic light color zones. To test knowledge and understanding of food choices, with power point as a media to educate for the sample group to understand the content better be able to act on food consumption properly and ability to recognize good response. Similarly, Chukaew [15] examined the effect of a nutrition self-management program on dietary behavior and weight among obese high school-aged children. The subject played a game of cards to practice grouping food. It was found that the students in the experimental group had more knowledge scores than before the experiment and different from the control group. As well as, Panmanee and Prabpai [16] studied the effect of a behavioral diet promotion program using planned behavior theory on weight loss behaviors of overweight school-aged children by organizing to educate about food consumption from the weight loss guide according to the proper food schedule, to brainstorm how fat affects life and how it affects the body, and to watch the obesity disaster video. It was found that after the experiment, the experimental group had an attitude score, referral group conformance, the efficacy intention in the weight loss behavior was higher than before the experiment and higher than the control group.

The results of this research support the concept of behavioral mapping theory that human behavior is guided by three beliefs: behavioral beliefs if individuals believe that behavior leads to positive retribution and a person would have a positive attitude towards that behaviour. But if it is believed to lead to a negative, there would be a bad attitude towards the behaviour. Normative beliefs are beliefs in another person that are important to one's self and tend to follow that person's behaviour. Control beliefs are perceptions of the ability to control behavior. It indicated that the educational activities that the researchers applied were consistent, giving the experimental group a greater understanding of food choices. As for consumption behavior, after the experiment, the experimental group had better food consumption behavior than the control group. It can adjust the food consumption behavior of the experimental group in a better way. Increased awareness of behavior modification, recognize the causes of the overweight, the effects of being overweight and the potential future risks or negative consequences of being overweight such as type 2 diabetes, high blood lipids, high blood pressure etc.

In our study, from our conversation with school teacher, the continuing increase of overweight child was possibly because children have low participation in physical activity and consume junk food. Not only that, from our observation after school hour, nearly all children bought junk food: soft drink, meat ball and french-fried selling in front of school before going home. This becomes their routine behaviour. Thus, as they had been involved in this study, with the knowledge that gat, we hope for adaptations to occur on their habit of eating behaviour. Besides, we also hope for the involvement of parents in educating and controlling children physical activity and dietary habit as previous study had demonstrated this step will play a role to attain the objective [3, 17] besides they also become the role model for the children [18]. The cooperation between teachers, parents and organizations are hope to be implemented in order to make the future generations more healthy and active [1, 6, 19, 20].

Conclusions

This study is the starting point for designing to reduce body weight of overweight school age children. To focus on their context, lifestyle and culture in order to facilitate the practical implementation for weight reduction are important to promote in school and their family. However, there are still suggestions for further study including:

1. The duration of the study should be increased to at least 12 weeks for a definite change in body weight and overall health outcomes. However, this study can carry out only 7 weeks because of the pandemic of COVID 19. The researchers have to stop the programmes as the school has to close and rely on online platform for all school activities.
2. It needs to develop a programme of children folk activities that are diverse and meet the needs of overweight school-aged children to have fun, more challenge but not to cause boredom to carry out activities regularly and have a sustainable impact on health.

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Conflict of interest

There is no conflict of interest

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