

Effects of a Healthy Eating and Physical Activity Promoting Program among Preschool-age Children

นิพนธ์ต้นฉบับ

Original Article

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บทคัดย่อ

วัตถุประสงค์: เพื่อทดสอบประสิทธิผลของโปรแกรมส่งเสริมการบริโภคอาหารเพื่อสุขภาพและการปฏิบัติกิจกรรมทางกายต่อพฤติกรรมการบริโภคอาหารและการปฏิบัติกิจกรรมทางกายในเด็กวัยก่อนเรียน **วิธีการศึกษา:** การศึกษาแบบกึ่งทดลอง มีกลุ่มตัวอย่างเป็นเด็กวัยก่อนเรียนที่กำลังศึกษาชั้นอนุบาลปีที่ 2 - 3 ในจังหวัดนครนายก จำนวน 136 คน เลือกโดยการสุ่ม แบ่งเป็นกลุ่มทดลองและกลุ่มควบคุมกลุ่มละ 68 คน เครื่องมือที่ใช้ประกอบด้วยโปรแกรมที่สร้างจากทฤษฎีการเรียนรู้และการสนับสนุนทางสังคมที่ใช้เวลา 15 สัปดาห์ และแบบสอบถามพฤติกรรมการบริโภคอาหาร แบบสอบถามการปฏิบัติกิจกรรมทางกาย วัดผลเป็นคะแนนของพฤติกรรมทั้งสองก่อนและหลังสิ้นสุดโปรแกรม ทดสอบความแตกต่างของคะแนนพฤติกรรมโดยใช้ independent t-test และ paired t-test **ผลการศึกษา:** พบว่าเด็กก่อนวัยเรียนในกลุ่มทดลองมีคะแนนพฤติกรรมการบริโภคอาหารและการปฏิบัติกิจกรรมทางกายเมื่อสิ้นสุดโปรแกรมมากกว่าก่อนได้รับโปรแกรมอย่างมีนัยสำคัญทางสถิติ (P -value < 0.001 ทั้งสองพฤติกรรม) และเมื่อสิ้นสุดโปรแกรมคะแนนพฤติกรรมการบริโภคอาหารและการปฏิบัติกิจกรรมทางกายในกลุ่มทดลองมีค่าสูงกว่ากลุ่มควบคุมอย่างมีนัยสำคัญ (P -value < 0.05 ทั้งสองพฤติกรรม) **สรุป:** โปรแกรมส่งเสริมการบริโภคอาหารเพื่อสุขภาพและการปฏิบัติกิจกรรมทางกาย สามารถช่วยให้เด็กวัยก่อนเรียนมีพฤติกรรมการบริโภคอาหารและการปฏิบัติกิจกรรมทางกายที่เหมาะสมมากขึ้น

คำสำคัญ: โปรแกรมส่งเสริมการบริโภคอาหารเพื่อสุขภาพและการปฏิบัติกิจกรรมทางกาย, พฤติกรรมการบริโภคอาหาร, การปฏิบัติกิจกรรมทางกาย, ทฤษฎีการเรียนรู้, การสนับสนุนทางสังคม, เด็กวัยก่อนเรียน

Abstract

Objective: To examine effects of healthy eating and physical activity promoting program among preschool-age children on their healthy eating behavior and physical activity. **Methods:** In this quasi-experimental study, preschool-age children (N = 136) in Nakhonnayok province were randomized into test and control groups (n = 68 each). The 15-week program was based on learning theory and social support concept. Questionnaires on eating behavior and physical activity were used before and after the program. Comparisons of scores of the two behaviors were done using independent t-test and paired t-test, as appropriate. **Results:** In test group, scores of healthy eating behavior and physical activity after the program were significantly higher than those before the program (P -value < 0.001 for both behaviors). After the program, scores of healthy eating behavior and physical activity of test group were significantly higher than those in control group (P -value < 0.05 for both behaviors). **Conclusion:** Healthy eating and physical activity promoting program could improve preschool-age children's healthy eating behavior and physical activity.

Keywords: healthy eating behavior and physical activity promoting program, eating behavior, physical activity, learning theory, social support, preschool-age children

Introduction

Improper eating behavior and a lack of physical activity have been increasing and leading to more nutritional problems. Preschool-age children are of no exception. It is known worldwide that the most important indicator of child growth is their nutritional status. Unfortunately, nutritional problems among these preschoolers have been prevalent both internationally and Thailand.^{1,2} Based on the country's national survey, obesity has been increasing by 13.3% in the last five years³ which was worse beyond the target of less than 10% set by the 12th National Economic and Social Development Plan (2017 – 2021). Obesity among preschoolers is caused by poor eating behavior that leads to accumulation of excess calories and subsequent fat deposition. When left unchanged, fat cells are increased in

size and number. Diet control could only decrease size, but not number of the fat cells. As a result, obesity persists and weight loss becomes harder. About 50% of preschoolers with obesity have become obese adults. Obesity could also cause certain negative psychological effects.⁴

Significant factors affecting obesity include personal, family and environmental ones. Specific factors are, for example, diet, exercise and low physical mobility as seen in a long-hour television viewing.⁵ The growing poor eating behavior influenced by choice of foods, taste preference, fast food consumption⁶, and media and advertisements has led to worse dietary habit. These factors also contribute to obesity among preschoolers.

Based on previous research, community-based programs to help encourage proper eating behavior and physical activity have been developed. However, these programs have not been fully successful in preventing obesity among preschoolers. Since behavior modification effects brought by the program are not sustainable, preschoolers have regressed to their former poor habits. To be more effective, dietary behavior modification should emphasize more on healthy diets, a decrease in fat and sugar consumption, accompanied with concerns and skills of the parents in choosing proper diets for these preschoolers. In addition, physical activities should be encouraged more. With cooperation of parents, behavior modification to promote proper diet and more physical activity could become possible.^{7,8} In this study, a program to promote a healthy eating behavior and more physical activity among pre-school age children was tested. This program was created based on the learning theory on the children and social support from the parents. Based on our study framework, learning theory could enable children to learn and memorize, which could further lead to practice of the new behavior. Meanwhile, social support on the children was enforced by parents. It has been well known that parents play a major role in child rearing and have a direct influence on their children development. With all of these enforcements, children gain more confidence in performing these new healthy behaviors. The benefits of the program could be used to justify more implementation of the program to achieve a better health and prevent obesity among preschoolers.

Specifically, the objectives of this study included comparing 1) scores of eating behavior before and after the program among preschoolers in the test group, 2) scores of eating behavior between test and control groups both at before and after the program, 3) scores of physical activity before and after the program among preschoolers in the test group, and 4) scores of physical activity between test and control groups, both at before and after the program.

Methods

In this quasi-experimental research, two-group pretest-posttest design was employed to examine the effects of the program to promote healthy eating and physical activity among preschool-age children between test and control groups. Study population was preschool-age children in schools in Nakhonnayok province in the academic year of

2015 – 2016. Based on a significance level (α) of 0.05, power of 0.90, and an effect size of the intervention of 0.56, a sample size of 53 children per group was required.⁹ When adjusted for a 30% attrition rate, a final sample size of 68 children per group, or 136 children, was needed.

To be eligible, the children had to be in preschool classes of schools in Nakhonnayok province in the academic year of 2015 – 2016. They needed to be 5 to 6 years of age (preschool class 2 – 3) and able to communicate in Thai, and willing to provide consent to participate by their parents. The sample of participants was drawn by the simple random sampling where the investigators randomly selected one school for test group and another school for control group. Preschoolers in the two schools were then screened for eligibility and 68 children in each school were randomly selected. All participants stayed through the entire study period with no drop-outs.

Study instruments

Two instruments included the program to promote healthy eating behavior and physical activity and the questionnaire to collect data. The program was fully described in the following data collection section. For data collection questionnaire, there were two parts. The first part collected demographic information of the children and their family. The second part asking about eating behavior was developed from previous literature. It contained 20 questions pertaining to the weekly eating habit with a 4-point rating scale ranging from 1-never, to 2-rarely, 3-usually, and 4-always, and a possible total score of 20 – 80 points. In this study, the questionnaire had an acceptable internal consistency reliability with a Cronbach's alpha coefficient of 0.88.

In the third part, questionnaire on physical activity had 20 items with a 4-point rating scale ranging from 1-never, to 2-rarely, 3-usually, and 4-always, and a possible total score of 20 – 80 points. In this study, the questionnaire had an acceptable internal consistency reliability with a Cronbach's alpha coefficient of 0.81. We also evaluated the nutritional status from the children's weight and height based on the criteria set by the Ministry of Public Health.

In terms of instrument quality assurance, all questionnaires were tested for content validity by three experts and revised accordingly. The questionnaires were also pre-tested in 30 children comparable to the target participants and improved according to the preliminary findings.

This study was approved by the Human Ethics Committee of Srinakharinwirot University (issue number SWUEC/ E-066/ 2557) . Once approved, prospective participants were approached to seek written informed consent. With the voluntary nature of the study explained to them and their parents, they understood that they could end participation at any time with no excuses needed. Their discontinuation had no consequences. Their information will be kept securely and destroyed after the end of the study. Only group, not individual children, data were presented.

Experiment and data collection

Once written informed consent from the parents was obtained, appointment for the participating children was made to collect information of weight and height. Children in test group were to receive the program intervention while those in control group were not. With a 24-week study period, all activities in the test group were as follows. In week 1, relationship between investigators and the family especially parents was initiated. In week 2, concerns about obesity was built among children. Children taught to learn about their health by measuring weight and height in week 3. In week 4, knowledge about healthy eating habit was provided to the children and parents. As expected, knowledge about proper physical activity was provided to the children and parents in week 5. In week 6, improper perception and behavior of the children were modified. In week 7, parents were provided with guideline for diary recording on diet and physical activity of the children. Finally, during week 8 to 24, the parents were expected to record daily diets and physical activities. Positive enforcement to children was provided with rewarding and encouragement from their parents.

For children in control group, appointments for weight and height measurements were made at weeks 1 and 25. At the two appointments, they were asked about their eating habits and physical activities. At the end of the study, children and parents in control group were provided with knowledge about healthy eating behavior and proper physical activities.

Data analysis

Descriptive statistics were used to present demographic and scores data, specifically frequency with percentage and mean with standard deviation, as applicable. Comparison of scores of eating behavior at before and after the program was done with paired t-test. Scores of eating behavior between the

two groups both at before and after the program with each group were compared using paired t-test. For scores of physical activity, the comparisons were done in the same fashion as those of eating behavior. All statistical significance was set at *P*-value < 0.05.

Results

Most of the preschool-age children in both groups were female and lived with their parents. Average ages in the two groups were comparable, 5.4 and 5.8 years old in test and control groups, respectively. Mothers were the person who prepared food for 44% and 49% of children in test and control groups, respectively. Almost all of the children in both groups had no chronic health problems and no food allergy. About two-thirds of the fathers and mothers in test group had a Bachelor's degree (68% and 60%, respectively) while 60% and 56% of the fathers and mothers, respectively, in control group did so. In terms of occupation, 58% of the fathers and 55% of the mothers in test group were government employees; while smaller proportions were found in control group (56% and 48% of the fathers and mothers, respectively).

In terms of healthy eating behaviors in the test group, the scores was significantly improved from 58.07 ± 5.46 to 65.98 ± 6.23 ($t = -1.847$, $n = 68$, P -value < 0.001) (Table 1). For the comparisons between groups before the program, score of eating behavior in test group (58.07 ± 5.46 points) was lower than that in control group (60.53 ± 7.69 points), but with no statistical significance ($t = -2.476$, P -value = 0.058). At week 25 however, score of eating behavior in test group (65.98 ± 6.23 points) was significantly higher than that in control group (57.46 ± 5.34 points) ($t = 11.768$, P -value = 0.039). It was noteworthy that while the score of eating behavior at the end in test group increased from baseline; the opposite direction was found in control group (Table 1).

Table 1 Scores of eating behavior of preschool-age children in the two groups before and after the program (N = 136).

Scores of eating behavior	Test group (n = 68)		Control group (n = 68)		Independent t-test	P-value
	Mean	S.D	Mean	S.D		
Before the program	58.07	5.46	60.53	7.69	-2.476	0.058
After the program (week 25)	65.98	6.23	57.46	5.34	11.768	0.039
Paired t-test (n = 68)	-1.847					
P-value	< 0.001					

In terms of physical activity in the test group, the scores was significantly improved from 54.64 ± 3.36 to 66.82 ± 4.37 ($t = -4.753$, $n = 68$, P -value < 0.001) (Table 2). For the comparisons between groups before the program, score of physical activity in test group (54.64 ± 3.36 points) was lower than that in control group (55.53 ± 3.25 points), but with no statistical significance ($t = -2.528$, P -value = 0.059). At week 25 however, score of physical activity in test group (66.82 ± 4.37 points) was significantly higher than that in control group (56.85 ± 4.37 points) ($t = 13.854$, P -value = 0.028). It was noteworthy that while the score of physical activity at the end in test group increased significantly from baseline; a slight increase was found in control group (from 55.53 to 56.85 points) (Table 2).

Table 2 Scores of physical activity of preschool-age children in the two groups before and after the program (N = 136).

Scores of eating behavior	Test group (n = 68)		Control group (n = 68)		Independent t-test	P-value
	Mean	S.D	Mean	S.D		
Before the program	54.64	3.36	55.53	3.25	-2.528	0.059
After the program (week 25)	66.82	4.37	56.85	4.37	13.854	0.028
Paired t-test (n = 68)	-4.753					
P-value	< 0.001					

Discussions and Conclusion

Our study found that preschool-age children undergoing the program to promote healthy eating behavior and physical activity (test group) had a significant improvement in healthy eating score and physical activity score (P -value < 0.001 for both). After the program, preschoolers undergoing the program (test group) had higher healthy eating behavior score than those in control group (P -value = 0.039). Similarly, score of physical activity at the end of the program in children undergoing the program (test group) was also significantly higher than that in control group (P -value = 0.028). This benefit of the program could be due to the fact that the program probably improved the behavior of the children. The success of the program could be in part contributed by the program's elements that were well dictated by learning theory and social support from the parents. The children engaged in learning and built up concerns strong enough to drive behavioral change. Social support could have been a positive enforcement for their confidence to perform further healthy behavior.

Our findings were consistent with the study of Chotibang and colleagues where promoting healthy eating behavior with the participation of parents and teachers participation was tested.¹⁰ They found that with social support from parents and teachers, children had more understanding and concerns about eating healthy foods and engaging in more physical activity. However, our findings were different from the study of Chen where social support was not incorporated into the program to promote healthy eating behavior.¹¹ As a result, healthy eating behavior was not sustainable in Chen's study. A sustainable result in our study could possibly due in part to a once a week phone call. With this relatively frequent phone call, we were able to remind and encourage the healthy behaviors. If any problems were found, appropriate and continuous recommendations for individual children were provided. The results based on this frequent phone call strategy in our study was consistent with the study of Choojan and co-workers.¹² In their study, the phone call was placed to ask the major parent about eating behavior of the children. Solutions specific to individual families could be directly and continuously provided.

The obvious benefit of the program to promote healthy eating behavior and physical activity could be due to the elements of the learning theory and social support. As guided by learning theory, concerns about obesity could be gradually built. Continuous learning about healthy eating and physical activity could be stimulated and maintained. Subsequent modifications on improper perception and poor behaviors in children and parents were a result. Social support from parents was also a crucial part of the success. Proper reward and enforcement from the parents when desirable behaviors were performed helped the children gain confidence. This behavior modification was thus effective in controlling the children's weight.

Our findings suggested that elements of our program could guide school nurses and teachers to help preschoolers to develop healthy behaviors to prevent obesity. However, to be more applicable, future studies should examine a long-term effect with a longer study duration. In addition, schools in areas with different cultures and socioeconomic status should also be tested.

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References

1. World Health Organization. Childhood overweight and obesity. 2011 (Accessed on Jan. 1, 2016, at [http:// www.Who.int/dietphysicalactivity/childhood /en/](http://www.Who.int/dietphysicalactivity/childhood/en/))
2. International Obesity Task Force. A simple guide to classifying body mass index in children. 2014. (Accessed on Oct. 8, 2016, at [http:// www.noo.org.uk/uploads/ doc/ vid_11601_A_simple_guide _to _classifying_BMI_in_children.pdf](http://www.noo.org.uk/uploads/doc/vid_11601_A_simple_guide_to_classifying_BMI_in_children.pdf))
3. National Statistical Office. Statistical year book 2017. Bangkok. 2017. (in Thai)
4. Mo-Suwan L, Aekplakorn W, Ruangdarakanon R, et al. Fourth Thai national health examination survey 2008–2009. 2010. (Accessed on Aug. 6, 2017, at <http://www.hiso.or.th/hiso5/report/report1.php>) (in Thai)
5. Chotibang J, Fongkaew W, Mo-suwan L, et al. Development of family and school collaborative (FASC) program to promote healthy eating and physical activity among school-age children. *Thai J Nurs Res* 2009; 13(2):133–146. (in Thai)
6. Kumvan W, Wachrasin C, Sethaput C. Healthy eating behavior in obese school-age children in Thailand and its related factors. *J Boromarajonani Coll Nurs Bangkok* 2017;33(2):25-42. (in Thai)
7. Kongton T, Banchonhattakit P. Effectiveness of promoting vegetable and fruit consumption behavior program among pre-school children by parents at child development center, muang district, Surin province. *Pub Health J Burapha Univ* 2013;8(1):26-36. (in Thai)
8. Faith MS, Van Horn L, Appel LJ, et al. Evaluating parents and adult caregivers as "agents of change" for treating obese children: evidence for parent behavior change strategies and research gaps: a scientific statement from the American Heart Association. *Circulation* 2012;125(9):1186–1207.
9. Polit DF, Beck CT. Nursing research: generating and assessing evidence for nursing practice (10th ed.). Philadelphia. Wolters Kluwer Health, 2017.
10. Chotibang J, Namprom N, Worakidpoonpol P. Effect of empowerment program on eating behavior and physical activity among overweight children. *Nurs J* 2012;39(1):23-34.
11. Chen JL, Weiss S, Heyman MB, et al. (2009). Efficacy of a child-centered and family-based program in promoting healthy weight and healthy behaviors in Chinese American Children: a randomized control study. *J Publ Health (Oxf)* 2010;32(2):219-229.
12. Choojan S, Thongbai W, Kummabut J. The effect of self-efficacy and family support promotion program on consumption behavior among late school aged. *J Boromarajonani Coll Nurs Bangkok* 2016;32(1):31-43. (in Thai)

Editorial note

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