ผลของโปรแกรมความรอบรู้ด้านสุขภาพเกี่ยวกับการบริโภคอาหารต่อพฤติกรรมการบริโภคอาหารของนักเรียนชั้นมัธยมศึกษาปีที่ 1 – 3 อำเภอวังทรายพูน จังหวัดพิจิตร

Effects of Food and Nutrition Literacy Program on Food Consumption Behaviors among Junior High School Students at Wang Sai Phun District, Phichit Province

นิพนธ์ต้นฉบับ

Original Article

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วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ2563;15(4):259-265.

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บทคัดย่อ

วัตถุประสงค์: ศึกษาผลของโปรแกรมความรอบรู้ด้านสุขภาพเกี่ยวกับการบริโภคอาหารของนักเรียนชั้นมัธยมศึกษาปีที่ 1 – 3 **วิธีการศึกษา:** การวิจัยกึ่งทดลอง ประชากรที่ใช้ในการวิจัยได้แก่นักเรียนชั้นมัธยมศึกษาปีที่ 1-3 อำเภอวังทรายพูน จังหวัดพิจิตร กลุ่มตัวอย่างแบ่งเป็น 2 กลุ่มๆ ละ 30 คน คือ กลุ่มทดลองและกลุ่มควบคุม สุ่มตัวอย่างโดยวิธีการสุ่มแบบสองขั้นตอน (two-stage sampling) เครื่องมือที่ใช้ในการวิจัยได้แก่ 1) โปรแกรมความรอบรู้ด้านสุขภาพเกี่ยวกับการบริโภคอาหารโดยประยุกต์ใช้ทฤษฎีการเรียนรู้เพื่อการเปลี่ยนแปลงของเมซิโรว์ oko 12 สัปดาห์ และ 2) แบบสอบถามพฤติกรรมการบริโภคอาหารซึ่งมีความเชื่อมั่นระดับยอมรับได้ (Conbrach's alpha coefficient เท่ากับ 0.75) การวิเคราะห์ข้อมูลใช้ สถิติเชิงพรรณนา ได้แก่ ความถี่ ร้อยละ ค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน และสถิติอ้างอิง ได้แก่ paired t-test และ independent t-test **ผลการศึกษา:** พบว่าพฤติกรรมการบริโภคอาหารของกลุ่มทดลองหลังได้รับโปรแกรมความรอบรู้ด้านสุขภาพเกี่ยวกับการบริโภคอาหารสูงกว่าก่อนทดลอง (*P*-value = 0.044) และสูงกว่ากลุ่มควบคุม (*P*-value < 0.001) **สรุป:** โปรแกรมความรอบรู้ด้านสุขภาพเกี่ยวกับการบริโภคอาหารทำให้พฤติกรรมการบริโภคอาหารดีขึ้น จึงสามารถนำโปรแกรมไปประยุกต์ใช้ในนักเรียนกลุ่มอื่น ๆ ต่อไป

คำสำคัญ: โปรแกรมความรอบรู้ด้านสุขภาพเกี่ยวกับการบริโภคอาหาร, พฤติกรรมการบริโภคอาหาร, ทฤษฎีการเรียนรู้เพื่อการเปลี่ยนแปลง, นักเรียนชั้นมัธยมศึกษาตอนต้น

Abstract

Objective: To examine effects of the food and nutrition literacy program on food consumption behaviors in junior high school students. **Methods:** In this quasi-experimental study, junior high school students (grade 1 – 3) of Wang Sai Phun District, Phichit Province were recruited with 30 students each in the experimental and control groups. Students were selected by two-stage sampling. Instruments included 1) 12-week food and nutrition literacy program based on the transformative learning theory of Mezirow and 2) questionnaire on food and nutrition consumption behavior. The questionnaire had an acceptable reliability (Cronbach's alpha coefficient of 0.75). Data analysis used descriptive statistics (mean with standard deviation and frequency with percentage) and inferential statistics (paired t-test and independent t-test). **Results:** Score of food consumption behavior of the experimental group at post-program was significantly higher than that at pre-program (*P*-value = 0.044) and that of the control group at post-progrsm (*P*-value < 0. 001) . **Conclusion:** The food and nutrition literacy program improved food consumption behaviors in junior high school students. The program should be applied in other groups of students.

Keywords: food and nutrition literacy program, food consumption behaviors, transformative learning theory, junior high school students

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Introduction

Over-nutrition and obesity have been increasing in Thailand. Based on the national health survey with physical examination in the year 2014, more than one-third of Thais aged 15 years or older were overweight or obese. Three and four out of ten men and women, respectively, were obese (body mass index or BMI of 25 kg/m^2 or higher and +1.5 S.D. or higher on the reference growth chart), and 18.6% and 45.0%, respectively, had abdominal obesity.[1] When compared with the 2009 national survey, prevalence of obesity had been increasing, specifically, 40.7% in 2009 to 41.8% in 2014 in women and 28.4% to 32.9% in men. For abdominal obesity, prevalence of 45.0% in 2009 to 51.3% in 2014 in women and 18.65 to 26.0% in men were found.[1]

Over-nutrition in children has also been a growing problem. In the 2009 national survey, 9.7% of children aged 6 – 14 years had over-nutrition compared with only 6.4% in 2001. Among children aged 15 – 29 years, 20.6% of them had obesity.[1] Meanwhile, obesity was also found more prevalent with a worrying trend in early childhood (age of 1 – 5 years) and school children (age of 6 – 14 years). Specifically, one out of every 10 school children was obese or overweight. [1] Obesity prevalence has been increasing with different rates in various regions depending on economic growth and

socioeconomic status. The highest rate was in Bangkok Metropolis and the lowest one was in the north-east region.[1] In 2016, the problem of over-nutrition and obesity in children has been increasing continuously with the overweight of 12.2% among school children.[2]

Various health related knowledge and understanding have been known to associate with desirable health behavior and eventually good health status. Health literacy, one of such capabilities, is defined as knowledge and understanding on health related matters. Individuals with health literacy also have skills in choosing to practice good health behaviors suitable for their health status and environment/context through the access, understanding and analysis of the information. The ultimate goal is to be able to take care of their health at individual level to family members and society level.[3-5]

The promotion of health literacy could help people more determined in taking care of themselves by means of behavioral change for self-care skill in everyday life.[6] Based on the conceptual framework of health literacy in adolescents of Manganello, health literacy affects health behavior of the adolescents.[7] Obesity related health literacy and decision making skill are related to positive health behaviors in food consumption among students in grade 1 high school who are overweight.[8] Obesity in children and adolescents is highly associated with health literacy.[9] A study in Taiwan found that health literacy was related with obesity among children aged 11 – 12 years.[10] Food and nutrition related health literacy help adolescents develop food consumption for a better health.[11]

In the survey of 2014 to 2016 on weight and height of children aged 5 – 14 years in the health region 3 of Thailand, there were 14.05%, 14.78% and 15.85% of children with overweight and obesity, in 2014 to 2016, respectively. In the health region 3, Wang Sai Phun district of Phichit province had a high and rising rate of overweight and obesity from 13.97% in 2014 to 15.29% and 16.92% in 2015 and 2016, respectively.[2] With a concern on the worrying trend of overweight and obesity among school children especially those in junior school students (i.e., grade 1 – 3), the author aimed to examine the effects of food and nutrition literacy program on food consumption behaviors among these students. The program was expected to develop food and nutrition related health literacy by means of promoting access to and analysis on information on nutrition consumption. Ultimately, a sound decision to engage in health eating behaviors was made and such behaviors are carried out according to the conceptual model of health literacy of Thailand which was modified from the work of Sorensen et al and the Consortium Health Literacy Project European.[6] The program is also incorporated with promoting the meaning of life to augment the program's concept according to the transformative learning theory of Mezirow.[12]

True learning in all age groups could lead to the internal changes which could further build the determination for the actual practice.[13] This concept was proved in the work of Chiangkhong where diabetes patients engaged in health literacy promoting program. Once health literacy was developed, the patients were more likely to adopt better health behaviors for glycemic control.[14] In this present study, the program was expected to help students have more food and nutrition related health literacy. More appropriate food and nutrition consumption behaviors were expected. In the long run, overweight and obesity could be prevented.

Specifically, we aimed at comparing the scores of food consumption behavior before and after the program in the experimental group and in the control group (within-group comparisons). In addition, we aimed to compare scores of the food consumption behavior of the two groups before the program and after the program (between-group comparisons).

Methods

In this quasi–experimental research, a two-group pre-test & post-test design was used with no randomization. Study population was 417 junior high school students (grade 1 – 3) from schools in Wang Sai Phun district, Phichit province, Thailand. Study sample size was estimated based on a medium effect size of 0.70, an error of 0.05, a power of test of 0.80.[15] A total number of 25 participants per group were required. To compensate for a 20% prospective loss of follow-up, 30 participants per group were recruited. Participants the in experimental groups were students from Wang Sai Phun school, Wang Sai Phun sub-district; while participants in the control group were from Noenhualo Nongyang Pittayakom school, Wang Sai Phun sub-district.

Participants were chosen by the two-stage sampling method. First, two schools in Wang Sai Phun were chosen for the experimental and control groups, one for each, by the simple random sampling. Second, a systematic random sampling was used to choose students. To be eligible in the

study, students needed to be in grade 1- 3 junior high school of Wang Sai Phun district, Phichit province. They had to be able to communicate and willing to participate. For exclusion criteria, participants who wanted to withdraw from the study, were ill, or moved out of the education registered area were excluded from the study.

In this study, food and nutrition literacy program was modeled as programmed activities to promote 6 aspects of health knowledge, specifically 1) access to health information and food and nutrition service, 2) knowledge and understanding that could affect food consumption behavior, 3) skills in health information communication and food consumption behavior, 4) skills in decision making on food consumption, 5) self-management on food consumption, and 6) media literacy on food consumption. This 12-week program was guided by the transformative learning theory.[12]

Food consumption behavior was defined as the 8 nutritional rules including 1) complete consumption of 5 groups of nutrition, 2) consumption of rice as main carbohydrate component with other flour alternative, 3) adequate consumption of vegetables and fruits, 4) regular consumption of fish, low-fat meat, and dry nuts, 5) consumption of milk suitable for age, 6) limited consumption of fat, 7) avoidance of highly sweet and salty foods, and 8) consumption of clean and uncontaminated foods. In this study, the rule of avoidance of alcohol and smoking was not included.

Instruments

Research instruments included 1) food and nutrition literacy program and 2) questionnaire on food consumption behavior. The details are as follows.

Food and nutrition literacy program for the experimental group

This 12-week program guided by the transformative learning theory of Mezirow consisted of 4 cognitive components or steps (X1 – X4) as follows. X1 was to build the participant's self-realization on food consumption behavior. Scenarios with dilemma to choose were given to the participants with their experiences on food consumption to be self-examined. X2 was critical self-reflection. Once their experiences on food consumption were examined, participants critically self-reflected how such consumption affected their body. In X3, the reflexive discourse was used to understand their consumption experience by using the knowledge gained from the program. By such process, the new insight from their old consumption experience could guide their actual behavior in the future. In the last step (X4), the action occurred. New knowledge about food consumption was applied in their actual action. More regular actions could become the desirable health behavior. Maintenance of the effective behavior could be done by follow-up monitoring with communication. Participants were encouraged to share their success experience and obstacles and problems in self-control among themselves. Their insights should be reflected so that pride in being able to self-care could be developed. Ultimately, their desirable behaviors could be sustained.

In terms of specific activities, details of activities in 12 weeks are as follows. In week 1, activities aimed at building group relationship, clarifying objectives of the program, and collecting data before the experiment. For steps according to transformative learning theory of Mezirow, the participants were encouraged to examine their experiences and knowledge, and wrote their self-reflection on such examination, and provided with guidance.

In weeks 2 – 3, participants were guided to the access to information. They were provided with the present situation of food consumption among school children, and appropriate food consumption rules. Participants were advised to work in groups to share and encourage each other to engage in self-reflection on how their food consumption experiences affected their body.

Week 4 allowed for more understanding on information access and factors that could affect food consumption among school children. Participants were encouraged to assess and share their food consumption behavior in the last 3 weeks with each other. In week 5, participants were educated with daily food consumption and the malnutrition prevention. Such education session was done through group activities with learning materials and question-and-answer session for any questions or concerns. They were also encouraged to work together to come up with solutions for each of their group members. Mutual decision making was carried out on activities for food selection skills with clear self-care communications among the members.

In week 6, participants shared their experience in selecting food, were educated with food product selection and product labeling. They also engaged in planning and determining options for behavior changes by examining their past self-care

pattern and present living pattern. Information from such examination was used for determining new options to guide their food consumption behavior. Participants were advised to keep their newfound option to use in their daily living. They were led to review their acquired knowledge, write their learning with reflective thinking, and summarize knowledge from the activities.

In weeks 7 – 11, participants reviewed all topics they had learned and creatively communicated to each other. They were asked about changes after joining the sessions so far and encouraged to share with each other about the success and failure in the process of adopting new behavior via group learning. Participants also had health communication by means of presenting obstacles to building their desirable health behavior and solutions to overcome such obstacles throughout the activity process. They analyzed advantages and disadvantages of the tasks to overcome the obstacles and admiration for the success of behavior change was encouraged. Participants wrote about the changes of their behavior and determine the tasks suitable for behavior change in daily living. They reviewed knowledge acquired throughout the process and wrote their learning by reflective thinking. They mutually summarized knowledge from the activities, took turn to question and answer for each other, provided guidance and encouragement to each other. Next appointment for the second data collection was made.

In week 12, the researcher conducted the second data collection using the questionnaire. Participants and researcher summarized the activities. Participants reviewed their acquired knowledge, wrote with reflective thinking, helped each other in a question-and-answer session, and provided guidance and encouragement to each other. For participants in the control group, they were not required to attain any program but live as usual.

Questionnaire on food consumption behavior

This questionnaire had two parts. The first part asked about demographic information of the participants. The second part consisted of 30 questions asking the participant about their food consumption behavior. Response format was a 5-point Likert-type rating scale ranging from 1-never practice, 2-rarely practice, 3-practice sometimes, 4-frequently practice, and 5-always practice. For questions with negative health behavior, scores were reversed. Based on a possible total score of 150 points, food consumption behavior was categorized into high, moderate and low level of the desirable behavior (111 – 150, 71 – 110, and 30 – 70 points, respectively).

The questionnaire was tested for content validity by three experts consisting of two lecturers in public health and a lecturer in nursing. Questions had acceptable to high content validity with Item-Objective Congruence Index (IOC) of 0.67 to 1.0. Internal consistency reliability was tested with 30 participants comparable with the prospective participants. The questionnaire had an acceptable internal consistency reliability with a Cronbach's alpha coefficient of 0.75.

Human right protection

This study was approved by the lower northern regional committee of ethics in human study at Naresuan university (approval number: NU-RREC No: 020/62, approval date: September 26, 2019). All participants were provided with information that they could withdraw from the study at any time with no consequence. They were asked for voluntary participation. Once written inform consent was obtained, those who were in the experimental group were asked to join the 12-week activities. All information obtained from the participants was kept confidential and presented as summary statistics.

Data collection procedure

The first data collection was conducted before the experiment. Demographic and food consumption behavior of both groups were obtained. Demographic characteristics of the two groups were found comparable. Participants in the experimental group proceeded to the 12-week program; while those in the control group lived as usual. After the 12-week program, participants in both groups were asked to complete the questionnaire.

Statistical analysis

Demographic data and scores of food consumption behaviors were presented using descriptive statistics including mean with standard deviation and frequency with percentage. For within-group comparisons, scores of food consumption behavior before and after the program in the experimental group and in the control group were compared using paired t test. For between-group comparisons, scores of the food consumption behavior of the two groups before the program and after the program were compared using independent

sample t test. Statistical significance was set at a type I error of 5% (*P*-value < 0.05).

Results

Of a total of 30 participants in each group, all of them complete the study (Table 1). Almost two-thirds of the participants in the experimental group were female (60.00%): while slightly more male participants were found in the control group (53.30%). Since the majority of participants in the two groups were in their 13 years of age (60.00% and 46.70%, respectively), the majority were in their grade 1 of the junior high school level (56.70% and 50.00%, respectively).

Table 1 General characteristics of the participants (N = 60).

General information	Experimental group (N = 30)		Control group (N = 30)	
	n	%	n	%
Gender				
Male	12	40.00	16	53.30
Female	18	60.00	14	46.70
Age (yrs)				
13	18	60.00	14	46.70
14	7	23.30	10	33.30
15	5	16.70	6	20.00
Junior high school level				
Grade 1	17	56.70	15	50.00
Grade 2	8	26.70	9	30.00
Grade 3	5	16.70	6	20.00

Levels of food consumption behavior after the program in both groups

Of a total of 30 behaviors, participants in the experimental group had the highest score in the behavior of washing vegetables and fruits before eating (number 26) with a mean score of 3.93 ± 0.90 out of 5 points, followed by eating 3 meals everyday (number 1) (mean = 3.80 ± 0.99 points) and washing hands before every meal (number 25) (mean = 3.80 ± 1.12 points). Behavior with the lowest score was eating grilled or roasted food (number 19) with a mean score of 2.97 ± 0.89 points.

In the control group, the behavior of eating pickled vegetables and fruits (number 13) was found with the highest mean score of 3.67 ± 0.92 points, followed by eating a variety of vegetables with various colors in a given meal (number 16) (mean = 3.63 ± 0.92 points), having 3 meals everyday (number 1) (mean = 3.80 ± 0.99 points), and choosing food with enclosed package (number 29) (mean = 3.60 ± 1.10 points). The behavior with the lowest score was having breakfast (number 7) (mean = 2.90 ± 0.88 points) and adding fish sauce and/or sugar for every meal (number 22) (mean = 2.90 ± 1.02 points).

Table 2 Scores of food consumption behaviors (N = 60).

Food consumption behavior	Experimental group (N = 30)		Control group (N = 30)	
	mean	SD	Mean	SD
1. Eating 3 meals in a given day	3.80	0.99	3.60	1.10
2. Eating carbohydrate such as rice, flour, taro, potato in the meal	3.60	0.77	3.27	0.71
3. Eating protein such as meat, egg, milk, nuts in the meal	3.53	0.81	3.40	0.85
4. Eating vitamins such as vegetables, Chinese cabbage, morning glory, and kale in the meal	3.53	0.90	3.37	0.92
5. Eating fat such as oil and meat oil in the meal	3.00	0.78	3.30	0.87
6. Eating minerals or fruits such as guava, mango and banana	3.63	0.76	3.20	0.88
7. Eating breakfast	3.43	1.16	2.90	0.88
8. Eating noodle, flour-thread food, bread more than rice in each meal	3.07	0.90	3.27	0.90
9. Eating two ladleful of rice for each meal	3.47	0.97	3.33	0.71
10. Eating instant noodle	3.00	0.98	3.20	0.88
11. Eating vegetables in the meal	3.73	1.04	3.53	0.93
12. Eating fruits such as mango, orange, and apple after meal	3.77	0.89	3.27	0.90
13. Eating pickled vegetables or fruits	3.47	0.81	3.67	0.92
14. Eating fresh vegetables more than boiled vegetables	3.70	0.95	3.20	0.99
15. Eating sweet fruits such as watermelon, ripe mango, durian	3.60	1.03	3.43	1.00
16. Eating a variety of vegetables of various colors in the meal	3.50	0.82	3.63	0.92
17. Drinking skim milk 1-2 glasses daily	3.17	0.79	3.33	1.02
18. Drinking mainly cow milk	3.53	0.93	3.43	0.89
19. Eating grilled or roasted foods	2.97	0.89	3.33	0.95
20. Eating high-fat food such as pork leg, crispy pork, and pork belly	3.67	0.66	3.03	0.96
21. Eating foods that are processed, sweetened or salted, and slated fish	3.67	0.84	3.00	0.94
22. Adding fish sauce and/or sugar before eating	3.70	0.79	2.90	1.02
23. Eating all kinds of meat in a large amount daily	3.47	1.13	3.37	0.92
24. Eating various kinds of meat in a day such as pork, fish, and chicken	3.63	1.15	3.37	0.92
25. Washing hands before every meal	3.80	1.12	3.33	0.95
26. Washing vegetables and fruits before eating	3.93	0.90	3.43	1.06
27. Buying food from food stalls on the sidewalk	3.53	1.19	3.37	1.03
28. Inspecting expiratory date before buying food	3.73	1.08	3.03	1.06
29. Buying food with enclosed package	3.77	1.19	3.60	1.10
30. Eating clean, well cooked food	3.67	1.21	3.03	0.96

Scores of food consumption before and after the program

In terms of within-group comparisons, score of food consumption in the experimental group improved (i.e., increased) from 96.10 points before the program to 106.07 points after the program with a statistical significance (*P*-value < 0.001) (Table 3). A slight improvement (i.e., a slight increase) in the control group from 94.90 to 99.23 points from before to after the program, respectively, was found but with no statistical significance (*P*-value = 0.196).

At pre-program, score of food consumption of the experimental group (96.10 points) was comparable with that

of the control group (94.90 points) with no statistical significance (*P*-value = 0.651) (Table 3). At post-program, score of food consumption of the experimental group (106.07 points) was statistically significantly higher than that of the control group (99.23 points) (*P*-value = 0.019).

Table 3 General characteristics of the participants (N = 60).

	Mean ± SD		*P*-value†
	Experimental group (N = 30)	Control group (N = 30)	
Before program	96.10 ± 7.68	94.90 ± 12.22	0.651
After program	106.07 ± 6.59	99.23 ± 13.86	0.019
P-value*	< 0.001	0.196	

* Paired t test.

† Independent t test.

Discussions and Conclusion

The food and nutrition literacy program significantly improved the score of food consumption behavior in junior high school students. Certain behaviors with high scores after the program included washing vegetables and fruits before eating, followed by having 3 meals everyday, and washing hands before meal.

The researcher set a wide array of activities for junior high school children. The program consisted of health communication, presentation and sharing of obstacles in their own health behavior practice, examination of past experiences, sharing knowledge among group members, and the use of reflective thinking. These elements encouraged the participants to practice. The realization of being able to control food consumption behavior further reinforce the sustainable practice. Hence the score of food consumption behavior was increased.

The score of food consumption behavior of the participants of the health literacy promoting program was significantly higher than that of those in the control group at the end of the study. This could be due to the benefit of the food and nutrition literacy program on food consumption behaviors which was guided by the transformative learning theory of Mezirow.[12] According to Mezirow, four driving cognitive components of transformative learning are experience, critical reflection, reflective disclosure and action. Experience is the examination of past experience on food consumption. In critical reflection, once the person examining their past experience, how such behavior affects their body is considered. After reflective discourse, the persons realize how their consumption behavior affects their body when compared with what they know. Finally, action reflects the application of new experience offered by new knowledge to sustainable behavior on food consumption. Our participants could have internalized the knowledge and realized how their behavior affects negatively on their body and health. Such realization could make them more determined to practice more on proper food consumption.

Our finding was consistent with that of Chiangkhong's study where health literacy help diabetic patients improve their glycemic control behavior and blood level glucose when compared with those reciving usual care.[14] The study of Samruayruen and Sribenchamas also showed that hypertensive patients attending health literacy program emphasizing medication use had a significantly higher level of proper medication use than those receiving usual care.[16] The study of Suknual and colleagues also revealed that self-management behavior of hypertensive patients undergoing the self-management health literacy program were significantly improved after the program significantly higher than those receiving usual care after the end of the program.[17]

Our finding indicated that the food and nutrition literacy program could improve the food and nutrition consumption behavior among junior high school students. Relevant institutes and stakeholders should consider this kind of program to improve food consumption behavior for their students to improve their health. More studies in other groups of population, in other regions of Thailand, and on sustainability of the behavior, for example, within 6 months or one year, should also be conducted.

In conclusion, the food and nutrition literacy program was effective in improving score of food and nutrition consumption behavior among junior high school students with a statistical significance.

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