Effectiveness of Nutritional Education in Promoting Healthy Eating among Elders in Northeastern Thailand

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Abstract: The purpose of this study was to examine the effects of a nurse-led nutritional education program in promoting healthy eating among elders, 60 years of age and older, who lived in non-municipal areas of northeastern Thailand. A multistage sampling method was used to obtain 166 subjects who were randomly assigned to either the experimental group (43 elders and 43 family members) or control group (40 elders and 40 family members). The experimental group participated in the researcher-developed nutritional education program, whereas the control group received usual care, including routine health education activities provided by health care personnel in the community. The nutritional education program was based on Pender's Health Promotion Model and multiple educational methods, including group teaching and individual counseling, to increase the subjects' nutritional knowledge/skills, perceived self-efficacy and benefits for healthy eating, while decreasing perceived barriers to healthy eating. Family members were urged to provide social support to encourage their respective elder's healthy eating. Data were collected, on subjects in both the experimental and control groups, via the researcher-developed Demographic and Health Related Issues Collection Form and the Elderly Healthy Eating Scale, prior to the experimental group entering the educational program, as well as at one week and 12 weeks after the experimental group completed the program. Descriptive statistics were used to assess the demographics and health-related issues, while one-way and two-way repeated measures ANOVA were used to test the effectiveness of the educational program.

Results showed the experimental group had significantly higher scores on overall healthy eating and healthy eating sub-dimensions (i.e. food selection, preparation and consumption) than did the control group. The experimental group also had higher healthy eating scores, than the control group, one week and 12 weeks after completing the education program. The findings suggest the nutritional education program can be used to promote healthy eating among elders in northeastern Thailand.

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Background and Significance

In Thailand, the number of elders, aged 60 years or older, is significantly increasing.[1] Although, the aging process is known to increase elders' vulnerability to illness, many illnesses that are major contributors to morbidity and

mortality among the elderly are related to elders' unhealthy behaviors (i.e. coronary heart disease, some types of cancer, stroke, hypertension, obesity, osteoporosis and non-insulin-dependent diabetes mellitus).[2] It has been shown that morbidity rates for these diseases can be reduced by modification or elimination of unhealthy or risky behaviors (i.e. smoking, alcohol and substance usage, stress, sedentary activity and unhealthy eating).[3] In addition, a significant relationship has been shown to exist between one's lifestyle (i.e. eating behavior) and health status.[4] Therefore, promotion of healthy behaviors seems vital to the promotion of health among the elderly.

Eating is recognized as vital to the existence of mankind; "you are what you eat."[5] Eating behaviors have been defined as one's activities related to food choice, preparation and consumption.[6] Almeida and colleagues have recommended the elderly should maintain adequate nutrition, so as to prevent nutritional deficiencies, and limit consumption of foods high in salt, fat, sugar and cholesterol.[7] Healthy eating involves consuming a sufficient amount of the necessary nutrients found to help elders maintain and improve their health.[5] Therefore, promotion of healthy eating or appropriate eating behavior is considered to be an important strategy for elders in improving their health, decreasing their risks of chronic diseases, extending their longevity and enhancing their quality of life.[8]

In Thailand, the terms, "healthy food consumption behavior," "nutrition behavior" and "healthy eating," all seem to mean making the right food choices and consuming the right food in the right portions.[9-11] Prior studies of elderly Thais have revealed nutritional knowledge, perceived self-efficacy, perceived benefits, perceived barriers and social support from family members are factors associated with elders' healthy food consumption behaviors, nutritional behavior and healthy eating.[9-12] These related factors support the usefulness of Pender's Health Promotion Model[13] and may be essential in promoting and maintaining healthy eating among Thai elders

Health education interventions have been shown to be an effective way to promote nutritional knowledge, attitudes and eating behaviors among elders.[14-16] Specifically, multiple educational methods, motivation and group participation have been found to be effective ways to improve elders' eating behaviors.[17-19] Theory-based educational programs also have been effectively used to promote healthy food consumption and nutritional behaviors of individuals, as well as groups.[9,12,20] However, most of these educational programs: used a quasi-experimental design; were implemented for a short period of time; did limited follow-up evaluations at 4 -12 weeks; or, were developed for elders residing in municipalities of central Thailand.

Similar to other regions of Thailand, as the number of elders in northeastern Thailand has increased (10.7% of the population) so has the prevalence of diabetes mellitus, hypertension, osteoporosis and cancer.[2,21,22] Many of these health problems are recognized as being related to elders' lifestyles, particularly their eating habits.[23]

Since elders in northeastern Thailand predominantly live with their families, their respective family members play an important role in providing care for and supporting them.[24] However, throughout Thailand, family members often lack sufficient knowledge, skills and/or resources to provide care for their parents.[24] Elderly Thais, especially those living in rural areas, are known to experience difficulties due to having limited nutritional knowledge, inaccessible health care services, limited financial resources and poor practices regarding healthy eating behaviors.[25] Furthermore, elders in northeastern Thailand have been found to consume an unhealthy diet that is high in salt, sugar and fat, and low in minerals and fiber.[26]

Even though a number of programs have been developed to encourage health promotion behaviors, no program could be located, in English language or Thai journals, that sought to enhance and/or maintain healthy eating behaviors of elders living in northeastern Thailand. In order to promote elders' healthy eating behaviors, one needs to ensure the elderly have adequate knowledge and skills regarding a healthy diet. Thus, this study, using Pender's[13] model as a framework and multiple educational methods, involved the construction and examination of the effectiveness of a 3-month nutritional education program in promoting healthy eating among northeastern Thai elders.

Method

Design: A pretest-posttest, experimental and control group design was used. Data were collected from December 2008 to August 2009.

Ethical considerations: The study was approved by the Research Ethical Committee at the Faculty of Nursing, Chiang Mai University, the leaders of the two communities, used as study sites, and the heads of the two communities' primary care units (PCUs). All potential subjects (elders and family members) were informed regarding: the nature of the study; what study involvement entailed; confidentiality and anonymity issues; and, withdrawal being possible at any time without repercussions. All individuals consenting to take part in the study signed a consent form.

Setting and sample: The two villages, used as study sites, were located in a sub-district in northeastern Thailand. They had similar characteristics in terms of socioeconomics, sources of food, location, transportation, health services and cultural environment.

The sample was randomly selected using a multistage sampling method. Names of potential subjects were obtained from the leaders of the two communities' PCUs. An estimated sample size of 25 elders and 25 family members, for each group, was determined via use of power analysis, with an effect size of 0.80 and a level of significance (α) of 0.05.[20,27] Due to possible drop-outs and the expressed interest of many potential subjects about participating, the estimated sample size was increased by 45%. Thus, a minimum of 144 subjects, including 36 elders and 36 family members for each group, was determined to be needed for the study.

Since elders and their family members were involved in the study, two different criteria for inclusion were employed. The inclusion criteria for the elders were that they were: at least 60 years of age; able to verbally communicate with the primary researcher (PI); residing with at least one family member responsible for selecting and preparing their meals; not previously involved in a nutrition or health promotion program during the past 6 months; and, willing to participate in the study. The inclusion criteria for family members were that they were: at least 20 years of age; residing with and responsible for selecting and preparing meals for their respective elder; able to read, write and speak Thai; not previously involved in a nutrition or health promotion program during the past 6 months; and, willing to participate in this study. Individuals not able to continue the protocol or demonstrating an illness that would interfere with their participation were thanked for their time and not included.

A total of 180 subjects (90 elders and 90 family members) were approached, met the inclusion criteria and consented to participate in the study. Random assignment was then carried out to create the experimental group (45 elders and 45 family members) and control group (45 elders and 45 family members). During the study, two subjects in the experimental group and five in the control group dropped out because of illness or relocation to another village. Therefore, 43 elders and 43 family

members in the experimental group, and 40 elders and 40 family members in the control group, completed the study.

The majority of elders, in the experimental and control groups, respectively, were: female (n = 28; 65.1% vs. n = 24; 60.0%); farmers (n = 40; 93.0% vs. n = 37; 92.5%); and, married (n = 28; 65.1% vs. n = 27; 67.5%). All of the elders in both groups were Buddhists. Forty-three elders (100%) in the experimental group and 37 (93.5%) elders in the control group completed primary school. The mean age of the elders in the experimental group was 67.42 years (SD = 6.62; range = 60-85), while the mean age of those in the control group was 66.6years (SD = 5.5; range = 60-82). The majority of elders, in the experimental and control groups, respectively: lived with their spouses and children/grandchildren (n = 23; 53.49% vs. n = 23; 57.5%); had 3 to 4 family members in the household (n = 27; 62.8% vs. n = 24; 60.0 %); and, had family incomes of 1,000 to 5,000 baht (30 baht = 1USD) per month (n = 36; 83.72% vs. n = 38; 95.0%). The elders' source of income, predominantly, was from a salary, children/ grandchildren and a 500 baht monthly government allowance (n = 26; 60.47% vs. n = 31; 77.5%). Elders in both groups tended to perceive their incomes as inadequate (n = 21; 48.8% vs. n = 20; 50.0 %). No significant differences were found between the demographic characteristics of the two groups ($\alpha = 0.05$).

In terms of health-related issues, the majority of elders, in the experimental and control groups, respectively, chose provincial public hospitals for treatment of their illnesses (n = 17; 39.53% vs. n = 22; 55.0%). Although the majority of elders had chronic illnesses (i.e. diabetes, hypertension and heart disease), only slightly under one-half showed signs and symptoms of their illnesses during the past 6 months (n = 18; 41.9% vs. n = 19; 47.5%) or took medications (n = 21; 48.8% vs. n = 19; 47.5%). The body mass index (BMI) of elders in the experimental group ranged from 15.23 to 31.11 kgs/m^2 (mean = 23.01 kgs/m^2; SD = 3.60), while the BMI of those in the control group ranged from 14.98 to 31.22 kgs/m^2 (mean = 21.63 kgs/m^2; SD = 3.20). The majority of elders in the experimental group were overweight (n = 23; 53.5%), while those in the control group were more likely to be of normal weight (n = 22; 55.0%). Most of the elders, in both groups, indicated they did not have any eating problems (n =28; 65.1% vs. n = 26; 65.0%). Children, grandchildren or relatives of elders, in the two groups, tended to be responsible for their respective elder's food selection (n = 19; 44.2% vs. n = 18; 45.0%) and preparation (n = 15; 34.9% vs. n = 18; 45.0%). No significant differences ($\alpha = 0.05$) were found between the experimental and control group regarding the health-related variables.

Like the elders, the majority of family members in the experimental and control groups, respectively, were: female (n = 33; 76.7% vs. n = 32; 80.0%); farmers (n = 41; 95.3% vs. n = 39; 97.5%); and, married (n = 39; 90.7% vs. n = 39; 97.5%). All of the family members were Buddhist, and most had a primary school education (n = 23; 53.5% vs. n = 16; 40.0%) and children (n = 25; 58.1% vs. n = 28; 70.0%). The mean age of family members in the experimental group was 49 years (SD = 13.55; range = 24-71yrs.), while the mean age of those in the control group was 44 years (SD = 13.12; range = 23-67 yrs.). No significant differences, in demographic characteristics, were found between the family members in the experimental and control group ($\alpha = 0.05$).

Instruments: Data were collected via two PI-developed instruments, including the: *Demographic and Health Related Issues Data Form (DHRICF), and Elder's Healthy Eating Scale (EHES).* The

Demographic and Health Related Issues Collection Form (DHRICF) consisted of questions regarding each elder's: age; gender; occupation; marital status; religion; educational level; source and adequacy of family income; living arrangements; body weight; height; chronic illnesses and related signs/symptoms; medications; source of health care services; number of family members in the household; present eating problems; and, individual(s) responsible for selecting and preparing family meals. Demographic information also was obtained regarding each family member's: gender; marital status; age; religion; occupation; educational level; and, relationship to the respective elder.

The *Elder's Healthy Eating Scale (EHES)* was used to measure each elder's healthy eating behavior. The *EHES* consisted of 114 items, in three subscales, related to food selection (36 items); food preparation (26 items); and, food consumption (52 items). Examples of items from each of the three subscales were: a) "I select quality fruits (fresh, good-color and mature with no bruises)"; b) "I cook using animal oils (pork or poultry)"; and, c) "I eat salty and sweetened foods." Possible responses to the 114 items ranged from 1 = "never perform" to 5 = "routinely perform." Subscale scores were obtained by summing across all relevant items. The possible range of scores, for each of the subscales, was: 36 to 180 (food selection); 26 to 130 (food preparation); and, 52 to 260 (food consumption). A total score for the entire scale, which could range from 114 to 570, was obtained by summing the three subscale scores. The *EHES* was examined, prior to use, for clarity, language appropriateness and content validity, by five experts in nutritional care of elders.[28] The item content validity index (I-CVI) ranged from 0.60-1.00, while the scale content validity index (S-CVI) was 0.97. The proportion of inter-rater agreement[29] among the five experts was 0.94. The scale's internal consistency was tested, with 14 elders similar to those in the study, and found to be 0.96.

Intervention for the experimental group: The 3-month nutritional education program, developed by the PI and offered to subjects in the experimental group, aimed to increase the subjects' knowledge and skills pertaining to healthy eating and to motivate them to adopt and maintain healthy eating. Multiple educational approaches were used, including: nutritional education; individual counseling; motivational interventions; and, behavioral monitoring/maintenance. The content validity of each component of the program was verified by the same five experts used to assess the *EHES*. The PI set the date and times for the group sessions, held at each community's PCU, and established six groups of 12-14 elders and family members each. The PI also set the appointment dates and times for the individual counseling sessions at each elder's home. Then the following activities were provided for both the elders and their respective family members.

Nutritional education to increase nutritional knowledge and skills: The nutritional education component was scheduled during the 1st, 2nd, 3rd and 5th weeks of the program. Each session included 45-60 minutes of small group teaching and discussion, via use of a flip chart, about healthy eating, regarding: the Thai Food Pyramid Guide, Dietary Guidelines, and Nutrition Facts Labels for Thai elders;[30] essential nutrients; food choices and purchases; food preparation (safety and storage); benefits of and barriers to healthy eating; and, healthy food menus for elders in northeastern Thailand. Also, during week one of the program, each elder and respective family member was given the "Elder Healthy Eating Booklet" that provided information on healthy eating for elders. The content in both the booklet and the flip chart was developed, by the PI, based upon a thorough review of existing information related to healthy eating.[5,30,31]

Individual counseling: Two individual, 45-60 minute, counseling sessions with the PI, were scheduled during the 6th, 7th, 9th and 10th weeks of the program

in each elder's home. The counseling sessions assisted the elders, via problem solve activities, regarding issues they might encounter as they practiced healthy eating (i.e., barriers to adopting healthy eating; adjusting their dietary plan; and, setting realistic goals related to healthy eating). The elders also were given the PI's phone number and encouraged to contact her if they needed additional assistance concerning healthy eating.

Motivation to adopt healthy eating: The motivational plan was constructed using Pender's behavior-specific cognitions and affect concepts.[13] The plan consisted of: activities, once a week during the 2nd and 5th weeks, to increase perceived self-efficacy using demonstration of healthy food preparation and food choices, training and guidance on personal meal plan and personal goals setting, verbal reinforcement/advice to reduce emotional problems relating to eating behavior changes, and group discussions to adopt healthy eating; activities, once a week during the 3rd and 5th weeks, to increase perceived benefits of, and decrease perceived barriers to, healthy eating using group teaching regarding the benefits of healthy eating, group discussions about positive effects and problems/barriers regarding healthy eating, and individual counseling to help with selection of the best action for success and elimination of obstacles influencing healthy eating; and, activities, once a week during the 1st and 5th weeks, to increase perceived social support from family members using group teaching and discussions on significance of family support on eating behaviors, roles and responsibilities of family members in supporting healthy eating, types of support needed and strategies for providing support, and individual advice for encouraging family members to regularly facilitate elders to perform and maintain healthy eating.

Maintenance of healthy eating: The PI mailed four healthy eating handouts to each elder's home during the 8th and 11th weeks of the program. The handouts included: 1) "Easy Steps for Healthy Eating"; 2) "Sample Menu for Your Meals (Part 1)"; 3) "Sample Menu for Your Meals (Part 2)"; and, 4) "To Keep Healthy Eating in Your Daily Life." The first two handouts were sent the 8th week, while the last two handouts were sent the 11th week. The four handouts were developed by the PI based on review of existing information related to healthy eating.[5,30,31]

Monitoring healthy eating: The PI developed a 23-item "Self-Dietary Assessment Form" (SDAF) to appraise the elders' eating habits once each week during the entire program. The SDAF was given to the elders and their respective family members, by the PI, during week one of the program. Examples of questions in the SDAF included: "I have eaten a variety of fruits and vegetables during a meal" and "I have eaten salty and sweetened foods during a meal." Possible responses to the 23 items were: "yes" or "no." It took approximately 5 minutes to complete the SDAF. The PI provided additional information and advice whenever she noted, during a home visit, telephone call or group session, an elder was not appropriately performing healthy eating behaviors.

Prior to implementation of the 3-month nutritional education program provided to the experimental group, the content of the program, as well as the content of the materials (healthy eating booklet, flip chart, four handouts and self-dietary assessment form) used during the program, were assessed by the same five experts that examined the instruments used in the study. All of the experts found the program content and materials to be appropriate and valid.

In addition to the nutritional education program, the elders in the experimental group received usual health care and routine health education activities from their respective community health care providers. Their usual health care and routine health education activities included: curative care; home health care;

and, health promotion/disease prevention information. Since family members normally play an important role in caring for and supporting their respective elders, they also received the same routine health education activities administered to the elders by the community health care providers.

Intervention for the control group: Like those in the experimental group, subjects in the control group received the same usual health care and routine health education activities from their respective community health care providers. However, subjects in the control group did not receive the 3-month nutritional education program that was administered to those in the experimental group.

Data Collection: Once the elders and their respective family members, in both the experimental and controls groups, were identified, appointments were made with them, during the first week of the study protocol, to collect baseline data while they were visiting the PCU in their respective communities. Data were obtained from the elders via verbal administration for their portion of the *DHRICF* and the *EHES*. The PI gave the family members their portion of the *DHRICF* to complete. Following collection of the baseline data, the experimental group received the PI-developed nutritional education program, along with the usual health care and routine health education activities provided by their respective PCUs. The control group received only the usual health care and routine health education activities provided by their respective PCUs. During the 13th and 24th weeks of the research protocol (i.e. one week and 12 weeks after completion of the educational program by the experimental group) the *EHES* was administered verbally to each elder in each group at their respective PCU. During the 25th week of the research protocol (13 weeks after the experimental group completed the educational program and all data were collected), the PI provided the control group members the same nutritional education class, healthy eating booklet and nutritional handouts used by those in the experimental group. Details of the protocol timeline can be found in **Table 1.**

Table 1 Research Protocol Timeline

Week	B	1	2	3	5	6-7	8	9-10	11	13	24	25
Experimental group												
- measurement	P_1	-	-	-	-	-	-	-	-	P_2	P_3	-
- intervention	-	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	-	-	-
		←	Group		→	←	Individual		→			
Control group												
- measurement	P_1	-	-	-	-	-	-	-	-	P_2	P_3	N
- intervention	-	T_0	T_0	T_0	T_0	T_0	T_0	T_0	T_0	-	-	-

Note: B = Before beginning the experimental intervention
P_1 = Pre-test; measurement of the EHES before the experimental intervention
P_2 = Post-test 1; measurement of the EHES at the 13th week
P_3 = Post-test 2; measurement of the EHES at the 24th week
T_0 = Usual care
$T_1 - T_4$ = Group sessions 1-4; group teaching and group discussion
$T_5 - T_8$ = Individual sessions 5-8 (two home visits, four mailed-nutritional handouts and self-evaluation)
N = Provision of the nutritional education class, the healthy eating booklet and four nutritional handouts.

Data Analysis: Descriptive statistics were employed to describe the subjects' demographic and health-related characteristics. Chi-square, Fisher's exact test and the independent t-test were used to examine differences between groups at baseline. Repeated measures ANOVA were employed to test the change, over time, in each group and the difference between groups of overall healthy eating and healthy eating sub-dimensions, based on the assumptions of each statistics.

Results

As shown in **Table 2,** elders in the experimental group demonstrated significantly higher scores on overall healthy eating and healthy eating sub-dimensions at the 13th and 24th weeks of the research protocol (one week and 12 weeks after program completion) than did elders in the control group. The scores also showed an interaction between group and time. Therefore, changes in overall healthy eating and healthy eating sub-dimensions scores were tested using the Bonferroni correction in both groups. As shown in **Table 3,** while the scores of both groups significantly increased over time, elders in the experimental group had significantly higher scores on overall healthy eating and healthy eating sub-dimensions from the 13th to the 24th weeks of the research protocol (one week to 12 weeks after program completion) than the elders in the control group (see **Table 4**).

Table 2 Differences in the Overall Healthy Eating and Healthy Eating Sub-dimension Scores between and within the Experimental Group and Control Group Subjects

Variables	SS	df	MS	F^r	*p-values*
Overall healthy eating					
- Between subject					
Group	645974.868	1	645974.868	867.092	.000***
Error	60344.209	81	744.990		
- Within subject					
Time	543556.511	2	271778.256	1541.522	.000***
Time x group	360330.808	2	180165.404	1021.895	.000***
Error	28561.441	162	176.305		
Food selection behavior					
- Between subject					
Group	71215.507	1	71215.507	916.029	.000***
Error	6297.240	81	77.744		
- Within subject					
Time	47281.351	1.863[a]	25376.553	695.763	.000***
Time x group	34850.636	1.863[a]	18704.817	512.840	.000***
Error	5504.448	150.448[a]	36.473		
Food preparation behavior					
- Between subject					
Group	20309.549	1	20309.549	159.194	.000***
Error	10333.792	81	127.578		
- Within subject					
Time	34577.237	1.391[a]	24859.712	492.430	.000***
Time x group	10435.951	1.391[a]	7503.050	148.623	.000***
Error	5687.623	112.662[a]	50.484		

Table 2 Differences in the Overall Healthy Eating and Healthy Eating Sub-dimension Scores between and within the Experimental Group and Control Group Subjects (cont.)

Variables	SS	df	MS	F[r]	*p-values*
Food consumption behavior					
- Between subject					
Group	155513.266	1	155513.266	544.657	.000***
Error	23127.529	81	285.525		
- Within subject					
Time	111799.337	1.751[a]	63832.198	1080.211	.000***
Time x group	97151.627	1.751[a]	55469.039	938.684	.000***
Error	8383.313	141.868[a]	59.092		

Note: [r] = 2-way repeated measures ANOVA.

[a] = Greenhouse - Geisser to adjust the degrees of freedom.

*** p < .001

Table 3 Comparisons of Overall Healthy Eating and Healthy Eating Sub-dimension Scores at Each Point of Measurement in the Experimental and Control Groups

Groups	Means			Statistics values	*p-values*
	baseline	13th week	24th week		
Overall healthy eating					
Experimental group	325.51	490.26	517.51	1604.509 [r]	.000***
Control group	330.30	347.28	349.90	82.739 [r]	.000***
Food selection behavior					
Experimental group	100.84	148.77	159.91	712.555 [r]	.000***
Control group	99.98	103.43	104.58	35.000 [r]	.000***
Food preparation behavior					
Experimental group	87.60	124.23	128.19	75.268 [f]	.000***
Control group	87.78	98.50	99.53	48.535 [r]	.000***
Food consumption behavior					
Experimental group	137.07	217.26	229.42	1148.495[r]	.000***
Control group	142.55	145.35	145.80	20.794[r]	.000***

Note: [r] = One-way repeated measures ANOVA

[f] = Freidman test

*** p < .001

13th week = week 13 of the research protocol or 1 week after program completion.

24th week = week 24 of the research protocol or 12 weeks after program completion.

Table 4 Multiple Pairwise Comparisons of Overall Healthy Eating and Healthy Eating Sub-dimension Scores at the Various Points of Measurement in the Experimental and Control Groups

Groups	Means			*p-values*		
	Baseline (1)	13th week (2)	24th week (3)	(1) vs. (2)	(1) vs. (3)	(2) vs. (3)
Overall healthy eating scores						
Experimental group	325.51	490.25	517.51	.000***[b]	.000***[b]	.000***[b]
Control group	330.30	347.28	349.90	.000***[b]	.000***[b]	.029***[b]
Food selection behavior						
Experimental group	100.84	148.77	159.91	.000***[b]	.000***[b]	.000***[b]
Control group	99.98	103.43	104.58	.000***[b]	.000***[b]	.083[b]
Food preparation						
Experimental group	87.60	124.23	128.19	.000***[f]	.000***[f]	.000***[f]
Control group	87.78	98.50	99.53	.000***[b]	.000***[b]	.469[b]
Food consumption behavior						
Experimental group	137.07	217.26	229.42	.000***[b]	.000***[b]	.000***[b]
Control group	142.55	145.35	145.80	.000***[b]	.000***[b]	1.000[b]

Note: [f] = Freidman test; [b] = Bonferroni test; *** = p < .001.
13th week = week 13 of the research protocol or 1 week after program completion
24th week = week 24 of the research protocol or 12 weeks after program completion

Discussion

The results reveal the elders who received the nutritional education program had significantly healthier overall eating habits, as well as healthier food selection, food preparation and food consumption behaviors, one week and 12 weeks after program completion (i.e. 13th and 24th weeks of the research protocol), than the elders who received only usual health care and routine health education activities. The findings also confirmed the beneficial effects of the program, which included health education strategies based on Pender's Health Promotion Model.[13] This finding is consistent with prior research wherein health education has been shown to be an effective strategy for promoting healthy eating in elders.[15,18,32] The positive effects of the program on healthy eating likely were due to the use of well-designed multiple strategies, methods and activities.

Prior studies have recommended the use of multiple strategies in nutritional education programs to promote healthy eating in elders.[17,18,33] Mensing

and Norris[34] have indicated the use of a variety of methods is well documented with respect to enhancing the amount of educational information older people can retain. For example, the use of health education, such as the one used in this program, has been shown to promote healthy eating by elders.[8] In addition, the use of discussion sessions in this study allowed the subjects to learn from each other and to appropriately adapt their eating behaviors. As pointed out by Pender and colleagues,[13] individuals are more likely to take on a recommended health promoting behavior if they perceive the benefits of that behavior and if those perceived benefits outweigh the perceived barriers.[13] Thus, congruent with prior research, this study found, by addressing perceived benefits and barriers to healthy eating, the promotion and maintenance of healthy eating among Thai elders could be influenced.[12,35,36]

Regarding motivation, self-efficacy serves as a strong determinant and predictor of the level of accomplishment one attains.[37] Self-efficacy was addressed, in this study, by way of step-by-step mastery experiences (i.e. demonstration of healthy food preparation and food choices; provision of skill training and guidance in performing personal meal planning; and, encouragement to set personal goals for achieving healthy eating), verbal persuasion and emotional arousal pertaining to healthy eating behaviors. Similar to prior research, this study's findings supported the fact that improving healthy eating self-efficacy can, in turn, increase elders' health eating behaviors.[9,20,38]

Increasing the elders' perceived social support from family members may have been another reason for the program's success. The literature has pointed out that social support from family members can effectively promote and maintain healthy eating among elders.[19,39,40] Family members, in this study, assisted elders in solving problems and overcoming barriers, adjusting menu plans, setting realistic goals, self-evaluation, and performing/maintaining healthy eating behaviors. Similar to prior studies,[9,22] this study's program emphasized the significance of family support, as well as the roles and responsibilities of family members, in assisting and maintaining the elders' healthy eating behaviors.

Counseling, another key strategy in this study's nutritional program, was carried out via home visits and telephone calls for the primary purpose of addressing food selection and problem-solving. Prior research has found counseling to be beneficial in improving elders' eating behaviors.[41] However, in this study, telephone counseling did not appear to be useful to this group of elders. The elders mentioned their hearing difficulties and unfamiliarity with talking on the telephone hindered them in regards to their ability to discuss their eating behaviors on the telephone. Thus, the elders indicated they preferred to receive counseling via face-to-face contact during the home visits instead of via telephone calls. In addition, the home visits provided them with a more conducive environment in which to express their experiences and problems, as well as to receive support and encouragement from the PI.[18,40,41]

Maintenance of healthy eating behavior among the elders was addressed by sending them and their respective family members four handouts that re-emphasized the content presented in the group sessions. The handouts also served as a source of reference in case they had difficulty recalling the content from the group sessions. Similar to prior studies,[42,43] the mailed handouts proved beneficial in that the subjects expressed their gratitude regarding receipt of the additional printed information.

Continual monitoring (i.e. self-assessment) was carried out throughout the program via the "Self-Dietary Assessment Form" (SDAF) that was completed by the elders and family members once a week during the entire 3-month program. The information obtained from the SDAF was beneficial

to the elders and their respective family members, as well as to the PI in assisting the elders to achieve their healthy eating behavior goals. Similar to prior research, the findings of this study found self-evaluation, related to eating habits, to be beneficial in monitoring one's behavior.[10,12,23]

Unlike prior research conducted on the eating habits of Thai elders,[10,20,38] this is the only known study that has been conducted in the northeastern region of Thailand, as well as the only known study that has included family members in the educational program (intervention). In addition, unlike prior studies that have evaluated the success of their program at 1 and 3 months into the program, the success of this study's program was evaluated 12 weeks after completion of the program (24th week of the research protocol).

In conclusion, the findings of this study, using multiple educational strategies, suggests a nurse led nutritional education program for promoting healthy eating can improve and maintain healthy eating among elders in northeastern Thailand. Nurses who worked in PCUs could incorporate this program into their regular services for promoting healthy eating of elders living in a northeastern Thai community. However, the nurses would need to be trained in the use of the multiple educational methods and activities that were used in the program.

Limitations and Recommendations

Like all studies, this study has limitations. The subjects were: from only two communities located in northeastern Thailand; primarily farmers; and, from a low socioeconomic level. In addition, all of the elders had family members who were supportive of them and assisted them with respect to food selection, preparation, purchasing and consumption. Therefore, the findings can be generalized only to individuals with characteristics similar to those of the subjects. Therefore, future studies, that utilize a program with a variety of educational strategies, need to be conducted on elders who: come from diverse geographic locations throughout Thailand; have diverse occupations; are from a wide variety of socioeconomic levels; live alone; and, do not have available supportive family members.

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ประสิทธิผลของการสอนโภชนศึกษาเพื่อส่งเสริมพฤติกรรมการบริโภคอาหารเพื่อสุขภาพสำหรับผู้สูงอายุในภาคตะวันออกเฉียงเหนือของประเทศไทย

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บทคัดย่อ: การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาผลของโปรแกรมการสอนโภชนศึกษาเพื่อส่งเสริมพฤติกรรมการบริโภคอาหารเพื่อสุขภาพสำหรับผู้สูงอายุที่นำมาใช้โดยพยาบาล โดยศึกษาในกลุ่มผู้สูงอายุที่มีอายุตั้งแต่ 60 ปีขึ้นไป ที่อาศัยอยู่นอกเขตเทศบาลในภาคตะวันออกเฉียงเหนือของประเทศไทย กลุ่มตัวอย่างถูกเลือกโดยใช้วิธีการสุ่มแบบหลายขั้นตอนจำนวน 166 ราย ซึ่งถูกสุ่มเข้ากลุ่มทดลอง (ผู้สูงอายุจำนวน 43 รายและสมาชิกในครอบครัวจำนวน 43 ราย) และกลุ่มควบคุม (ผู้สูงอายุจำนวน 40 รายและสมาชิกในครอบครัวจำนวน 40 ราย) กลุ่มทดลองได้รับโปรแกรมการสอนโภชนศึกษาเพื่อส่งเสริมพฤติกรรมการบริโภคอาหารเพื่อสุขภาพซึ่งถูกสร้างขึ้นโดยผู้วิจัย ในขณะที่กลุ่มควบคุมได้รับการดูแลตามปกติ ได้แก่ กิจกรรมการสอนสุขศึกษาที่ถูกให้โดยบุคลากรทางสุขภาพในชุมชน โปรแกรมการสอนโภชนศึกษาถูกสร้างขึ้นบนกรอบแนวคิดการส่งเสริมสุขภาพของเพนเดอร์และวิธีการสอนแบบหลากหลาย อันประกอบไปด้วยการสอนแบบรายกลุ่มและการให้คำปรึกษารายบุคคล การเพิ่มความรู้ด้านโภชนาการและทักษะในการปฏิบัติ การเพิ่มการรับรู้ความสามารถของตนเอง การเพิ่มการรับรู้ประโยชน์ของการปฏิบัติ ในขณะที่ลดการรับรู้อุปสรรคของการปฏิบัติ นอกจากนั้นยังเพิ่มการได้รับการสนับสนุนของสมาชิกในครอบครัวของผู้สูงอายุ โดยทำการเก็บข้อมูลทั้งในกลุ่มทดลองและกลุ่มควบคุมโดยใช้แบบบันทึกข้อมูลส่วนบุคคลและข้อมูลที่เกี่ยวข้องกับสุขภาพ และใช้แบบวัดพฤติกรรมการบริโภคอาหารเพื่อสุขภาพสำหรับผู้สูงอายุ ซึ่งทำการเก็บข้อมูลก่อนการให้โปรแกรมและภายหลังโปรแกรมสิ้นสุดแล้วที่ 1 สัปดาห์และ 12 สัปดาห์ วิเคราะห์ข้อมูลส่วนบุคคลและข้อมูลที่เกี่ยวข้องกับสุขภาพด้วยสถิติเชิงพรรณนา ในขณะที่การทดสอบประสิทธิผลของโปรแกรมฯวิเคราะห์ด้วยสถิติความแปรปรวนทางเดียวและสองทางแบบวัดซ้ำ

ผลการวิจัยพบว่า ภายหลังการเข้าร่วมโปรแกรมฯ กลุ่มทดลองมีคะแนนพฤติกรรมการบริโภคอาหารเพื่อสุขภาพโดยรวม และคะแนนพฤติกรรมการบริโภคอาหารเพื่อสุขภาพรายด้าน ได้แก่ การเลือกซื้ออาหาร การเตรียมอาหาร และการรับประทานอาหารมากกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ และเช่นเดียวกันกลุ่มทดลองมีคะแนนพฤติกรรมการบริโภคอาหารเพื่อสุขภาพมากกว่ากลุ่มควบคุมภายหลังการสิ้นสุดโปรแกรมที่ 1 สัปดาห์และ 12 สัปดาห์ จากการศึกษาในครั้งนี้แสดงให้เห็นว่าโปรแกรมการสอนโภชนศึกษาสามารถนำไปใช้เพื่อส่งเสริมพฤติกรรมการบริโภคอาหารเพื่อสุขภาพสำหรับผู้สูงอายุในภาคตะวันออกเฉียงเหนือของประเทศไทยได้

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