Original

Nutrition Education Using Nutrition Handbook and Tele-Counselling Improved Nutritional Knowledge and Behaviour of Elderly in Northern Thailand

Jukkrit Wungrath[1*] Pussadee Mongkol[2] and Yupa Chanwikrai[3]

[1] *Faculty of Public Health, Chiang Mai University, Chiang Mai, Thailand*
[2] *Cheongdoi Sub-district Health Center, Doi saket District, Chiang Mai, Thailand*
[3] *School of Medical Sciences, University of Phayao, Phayao, Thailand*

ABSTRACT The objectives of this research were to study the effect of nutrition education for caregivers for the elderly using nutrition handbook and tele-counseling on nutritional knowledge and behavior among caregivers for the elderly. The sample was caregivers for the elderly in Choeng Doi Subdistrict, Doi Saket District, Chiang Mai Province. There were two groups, namely the intervention group (n=22) and the control group (n=22). The sample was selected based on a purposive sampling. The results showed that the intervention group had a higher mean score of elderly nutrition knowledge and behavior after using the handbook than before. The intervention group had a higher mean score of elderly nutrition knowledge and behavior after using the handbook than the control group, with a statistical significance (p <0.01).

Keywords: Elderly, nutrition promotion, handbook, caregivers

INTRODUCTION

According to a survey by the National Statistical Office, the size of the elderly (aged 60 years and over) population in Thailand has significantly increased in recent years. The figures from 2015 to 2019 indicate annual increases of 15.9%, 16.5%, 16.7%, 18.0%, and 19.7%, respectively (1). Moreover, Thailand has been ranked as the second most aged society (over 20% of the population aged 60 or older, according to the criteria of the United Nations) in Southeast Asia, after Singapore (2). This rapid expansion suggests that Thailand needs to make contingency plans to meet the demands of an aging society that is growing quickly. Since older persons are considered to be at high risk of diseases due to the fact of deteriorating health, they require special care from their younger family members. Preparing the caregivers for the elderly in the family is also very important because the caregivers will manage and administer the process of caring for the elderly, treating and responding to the elderly in all aspects as appropriate. Caregivers must have knowledge and understanding about the elderly. The elderly and be able to play a comprehensive role in the care of the elderly. As a result, this will make the care of the elderly both at the family level and at the community level effective and the elderly will enjoy good health and quality of life. This is a valuable human resource and very valuable social capita (3).

The nutrition status of the elderly is dependent on many factors, including social conditions, and is influenced by the long-term effects of chronic disease and overall health status. The physiological changes of aging, including perceptual, endocrine, gastrointestinal, renal, and muscular changes, may also affect nutrition needs. Dietary allowances are recommended to meet the nutrition requirements of the healthy population and do not consider disease states or other problems frequently seen in the elderly. A previous study suggests that the elderly is at an increased risk of nutrition deficiencies because they cannot meet these nutrient needs (4). Therefor caregivers play an important role in providing caregiving assistance especially with regard to food and nutrition to elderly persons and their families.

Choeng Doi Subdistrict, Doi Saket District, Chiang Mai Province is located in the far north of Thailand. It was found that the community there has entered the aging society according to the criteria of the United Nations. More than 10% of the population is aged, with 1,945 elderly people representing 26.29% of the total population of 7,396. Most of these people's caregivers are family members such as a spouse, a sibling, or grandchildren. According to the preliminary data from local health centers it was found that these elderly people suffered from nutritional problems, including both malnutrition and overnutrition. In the group of malnutritional status elderly, this is due to the fact that the elderly have certain diseases that affect the consumption of foods, such as dental and oral health, diabetes, hypertension, etc., while the group with overnutrition are among those with incorrect consumption habits, consuming more food than necessary and thus causing overweight and obesity. Along with the previously reported problems, (3) it was found that the elderly have several limitations, due to physical condition or perception. The carrying out of activities directed to the elderly to promote and modify behaviors was difficult and possibly unsuccessful. Therefore, this action turned attention to caregivers who play a role in taking care of the health of the elderly in all matters including food and nutrition. The data obtained from a preliminary survey from community leaders found that caregivers

*To whom correspondence should be addressed: jukkrit.w@gmail.com

lacked sufficient knowledge of health, including nutrition knowledge.

There are limited data on the effects of elderly nutrition promotion using a handbook together with tele-counseling to improve nutritional knowledge and behavior of caregivers for the elderly in northern Thailand. The objectives of this research were to study the effect of nutrition education using a nutrition handbook and tele- counseling on nutritional knowledge and behavior regarding elder care among caregivers in Choeng Doi Subdistrict, Doi Saket District, Chiang Mai Province, Thailand.

METHODS

This study was a quasi- experimental research with a two-group pretest-posttest design, conducted from March 2018 to February 2019.

1. Population and sample

The population in this study were 1,945 caregivers for the elderly in Choeng Doi sub-district, Doi Saket District, Chiang Mai province. The sample size was determined by using the Power of test at the power of the test was set at 0.80, with a 0.05 level of significance and a 0.50 effect size. The sample size was 44 people. The sample was selected randomly from lists of caregivers in Choeng Doi sub-district and divided into an intervention group and a control group, with 22 persons in each group. The inclusion criteria were those who care to older persons in their families without pay, had provided such caregiving to older persons for more than one year, lived in the same house with the older persons, could communicate in Thai, and finally were willing to participate in the study.

2. The research instruments consisted of:

2.1 The elderly nutrition promotion handbook. The researcher invited the sample in the experimental group to hear how to use the handbook. They took the books to use at home by themselves for a period of 8 weeks. The contents of the handbook (5) included: definition and importance of nutritional status in the elderly, energy and nutrients requirement in the elderly, principles of selection of food ingredients for the elderly, principles of cooking for the elderly, guidelines for promoting nutritional status in the elderly and sample menus for the elderly. In the control group, the researcher introduced the research, the objectives and process of implementing all activities but the implementation of the handbook was not included.

2.2 The instrument used to collect data that the researcher developed through literature review is divided into three parts as follows:

Part 1: Demographic data relating to the participants.

Part 2: The nutritional knowledge test. A total of 20 questions with 4 choice options, which focus on assessing knowledge about proper diet and nutrition in the elderly such as energy and nutrient requirements, the selection of raw materials, proper cooking methods, disease and nutrition problems in the elderly. The test was examined by 3 experts for content consistency. All items were found to have an item of congruence index (IOC) of more than 0.70. The reliability was tested with 30 caregivers for the elderly who were not in the sample group and was determined by the Kuder-Richardson formula to be 0.74.

- Knowledge average score 00.00 - 00.09 means low level of knowledge
- Knowledge average score 10.00 - 15.00 means moderate level of knowledge
- Knowledge average score 16.00 - 20.00 means good level of knowledge

Part 3: Assessment of nutritional behavior. The questions were focused on the caregiver's usual food-handling behavior regarding the elderly. Total of 18 questions with 3 ratings (regularly practice, sometimes practice and not practice at all). A positive behavior was rated 3, 2, and 1, while a negative behavior was rated 1, 2, and 3, respectively. The questions passed three expert examinations for content validity. All items were found to have an item of congruence index (IOC) of more than 0.70. The reliability was tested with 30 caregivers for the elderly who were not in the sample group. The Cronbach's alpha coefficient was 0.87.

- Behavior average score 18.00 - 30.00 means low level of behaviour
- Behavior average score 31.00 - 42.00 means moderate level of behaviour
- Behavior average score 43.00 - 54.00 means good level of behaviour

3. Data collection

This research was conducted from December 1, 2018, to February 29, 2019. The experiment with the intervention and control groups took about 8 weeks, as depicted below:

4. Data analysis

Demographic data were analyzed using descriptive statistics. The means of the nutritional knowledge and nutritional behavior between the intervention group and the control group, before and after participated the program, were compared using paired *t-test* statistics. The means of the nutritional knowledge and nutritional behavior between the intervention group and the comparison group were compared using independent *t-test* statistics. A p-value < 0.05 was considered statistically significant

Ethical Considerations

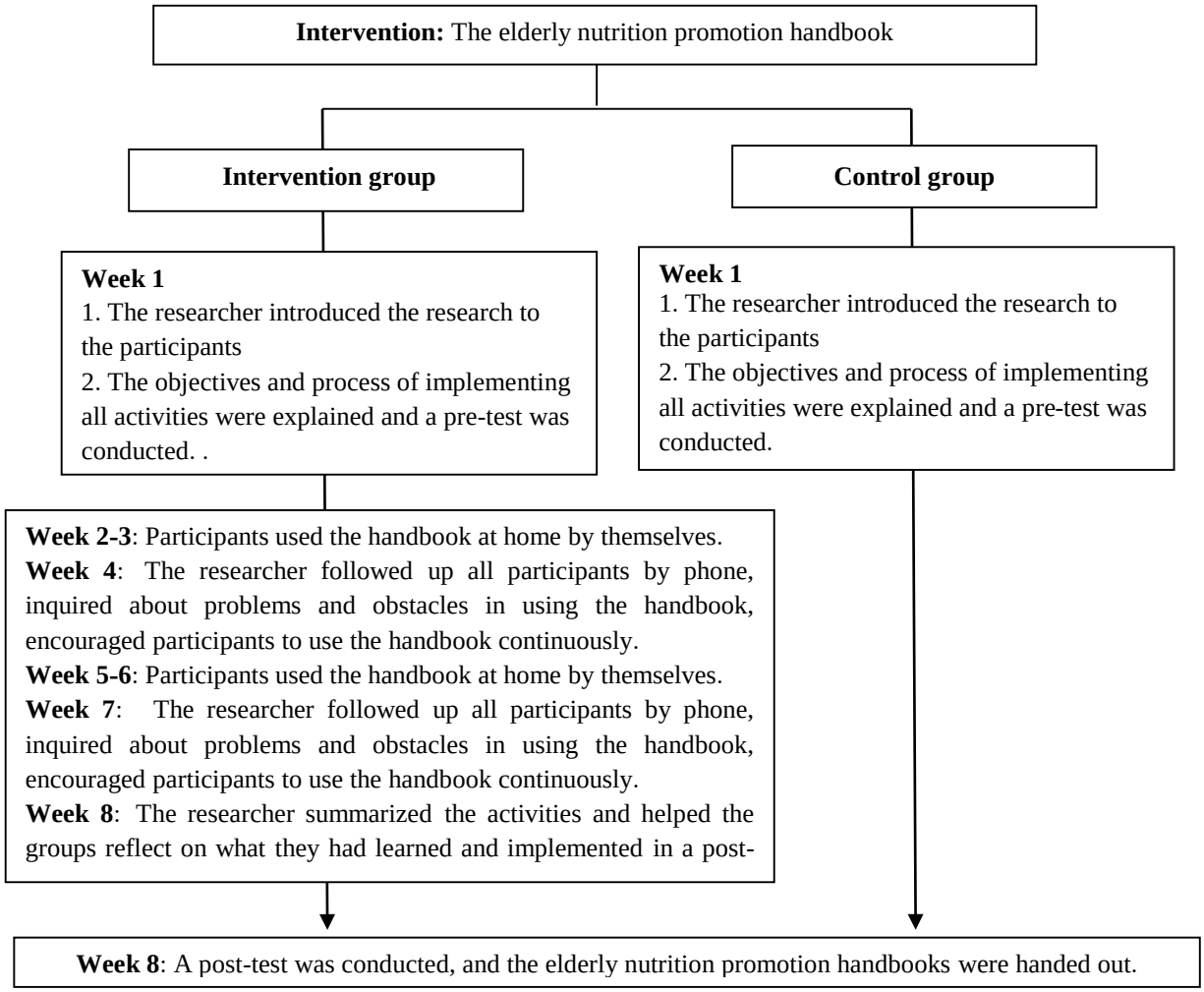
This study was conducted in accordance with the code of human research ethics and approved by The Ethical Review Committee for Human Research, Faculty of Public Health, Chiang Mai University (ET016/2561).

RESULTS

1. General information of the sample

Of the samples in the intervention and control groups, most were female (70.15 and 68.50%) and the average age was 50.60 and 51.15 years, respectively. The most common marital status was married (80.87 and 80.71%), they were educated at the secondary/ vocational level (56.23 and 54.41%), engaged in agriculture (63.05 and 65.21%), had family incomes of 10,001- 20,000 baht per month (40.43 and 42.20%) and the number of elderly needing care was between 1-2 people (90.70 and 84%).

Experimental procedures flow diagram



2. Effect of the elderly nutrition promotion handbook on the nutritional knowledge of caregivers

The pretest and post- test mean scores of the nutritional knowledge of the intervention group were 8.65 (SD = 2.47) and 18.23 (SD = 3.01), respectively. It was found that the post-test mean score of nutritional knowledge was higher than the pretest mean score, with a statistical significance ($p < 0.05$, $t = -16.67$), as shown in Table 1. The post- test mean scores of nutritional knowledge between the intervention group and the control group were 18.23(SD = 3.01) and 10.56(SD = 2.87), respectively. It was also found that the mean score of nutritional knowledge in the intervention group was higher than that of the control group, with a statistical significance ($p < 0.05$, $t = -4.28$), as shown in Table 2.

Table 1 Comparison mean average score of elderly care knowledge between intervention and control group before and after the experiment.

Sample group		$\bar{x}$	SD	level	p-value
Experimental group	before	8.65	2.47	low	0.000*
	after	18.23	3.01	good	
Control group	before	8.84	2.29	low	0.000*
	after	10.56	2.87	moderate	

*$p < 0.01$

Table 2 Comparison of mean average score of elderly care knowledge between intervention and control group after the experiment.

Variable	Intervention group		Control group		p-value
	$\bar{x}$	SD	$\bar{x}$	SD	
Mean average score of elderly care knowledge	23.18	01.3	10.56	87.2	0.000*

$p<0.01$

Table 3 Comparison mean average score of elderly care behavior between intervention and control group before and after the experiment.

Sample group		x̄	SD	level	p-value
Intervention group					
	before	28.64	7.35	moderate	*000.0
	after	42.50	56.4	high	
Control group					
	before	75.29	87.3	moderate	598.0
	after	52.29	96.3	moderate	

*$p < 0.01$

Table 4 Comparison mean average score of elderly care behavior between experimental and control group after the experiment.

Variable	Intervention group		Control group		p-value
	x̄	SD	x̄	SD	
Mean average score of elderly care behavior	42.50	56.4	52.29	96.3	*000.0

*$p < 0.01$

3. Effect of the elderly nutrition promotion handbook on the nutritional behavior of caregivers

The pretest and post-test mean scores of the nutritional behavior of the intervention group were 28.64 (SD = 3.75) and 42.50 (SD = 4.56), respectively. It was found that the post-test mean score of nutritional behavior was higher than the pretest mean score, with [a] statistical significance ($p < 0.05$, $t = -10.14$), as shown in Table3.

The post-test mean scores of nutritional behavior between the intervention group and the control group were 42.50 (SD = 4.56) and 29.52 (SD = 3.96), respectively. It was also found that the mean score of the nutritional behavior in the intervention group was higher than that of the control group, with a statistical significance ($p < 0.05$, $t = -7.80$), as shown in Table 4.

DISCUSSION AND CONCLUSION

The results of this study revealed that after participation the program, nutritional knowledge including the elder care behavior of the intervention group was higher than before, with statistical significance. The program was developed in accordance with the active learning conceptual framework which emphasized a learning-management process that allows learners to learn and practice by themselves through an effective handbook and with supervision by phone, which enabled them to maintain stable, longer learning outcomes than with a traditional learning process. Many studies have indicated that participants who take part in a program like this improve their knowledge and behavior. This study's findings illustrate that after receiving the program, the mean score of nutritional knowledge and caregiving behavior for the dependent older persons of the intervention group was higher than that of the control group. This finding supports a study by Robrujen (6) who developed the basic elderly care handbook and studied the effect of using the basic elder care handbook on knowledge and behavior regarding elder care among caregivers. The results showed that the experimental group had a higher mean score of elder care knowledge and behavior after using the handbook than before. The experimental group had a higher mean score of elder care knowledge and behavior after using the handbook than the control group. The health caring skills were at good level, while the overall satisfaction of the elderly who were cared by these caregivers was very high. As with the Suthimanus et al. (7) study that developed a handbook for caregivers for uncontrolled blood pressure, it was found that the caregivers had higher knowledge and / or perception of their competencies than before using the manual. In addition, a study by Sooksa-art et al. (8), which used an educational guide for caregivers of elderly patients with dementia, found that after using the manual caregivers had a statistically significant increase in knowledge scores on disease management and drug use.

Self-care barriers for the elderly are caused by many factors, including the environmental and cognitive factors that interfere with following the recommended treatment regimen. Because of the limitations elderly people encounter as a result of physical and mental deterioration, they need assistance from their family members in terms of health care and the performance of daily activities. However, caring for elderly persons is complicated and requires comprehensive healthcare knowledge and understanding of elderly behavior (3). Providing support from within the family, caregivers may be important in overcoming barriers to self-care. The characteristics of an elderly person's family environment in which diabetes management takes place have been associated with self-management behaviors (9-11). Fisher et al. found that family structure and organization were associated with acceptable eating behavior and exercise among the elderly (13). In another study of predominantly older African-American adults with diabetes, researchers noted that family support was comprehend to the pattern of diet self-care behaviors (12).

Tana et al. confirmed that a poor nutritional status of the older outpatient is independently more associated with the caregiver burden than with cognitive and physical disability. The combined evaluation of both patients and caregivers can improve knowledge and assistance to the elderly subjects (12). According to Correa et al. (13) the nutritional status of the elderly is a matter of concern and that it may be associated with a low quality of life influenced by the education level of the caregiver, but also by age, economic conditions and the limited autonomy of this population. The education level of the caregiver was determinant in the preparation of foods exclusively for the elderly. Apparently, those with higher education levels prepared special foods more often. The education level of the caregiver was a determining factor for nutritional status; nearly all individuals cared for by those in the tercile with the least years of

formal education were malnourished. Higher education levels reduced and even eliminated nutritional problems in the more privileged social groups (13, 14).

Consequently, if the nutritional knowledge and the care behavior of the of caregivers were developed to a higher level, it would contribute to better caregiving for older persons in general. Moreira et al.(15) showed

that improving the caregivers' knowledge about nutrition is one of the factors pointed out as important for prevention and control of avoidant food intake behavior. In addition, it was found that there were positive effects of nutritional education for elderly and their caregivers on body mass control, nutritional status, mood, and also on the reduction of cognitive decline in older adults with dementia (15). This is in accordance with the study of Hsiao et al.(16), who have investigated the effects of a family care-based dementia dietary educational program on family caregivers' nutritional knowledge, healthy eating behavior and nutritional status of people with dementia. The results found that the scores of the caregivers' nutritional knowledge significantly increased after receiving the dementia dietary educational program and enhanced the nutritional status of elderly with dementia. This is in line with Robrujen's study (5), which developed an elderly care program that emphasized the caregiver role. In this program, an elderly health care handbook was used. The content consisted of general health and nutrition promotion in the elderly; it was found that after having participated in the program and using the handbook caregivers had higher average knowledge than before. in other words, caregivers with adequate nutrition knowledge are able to apply their nutritional care practices skillfully and improve older persons' quality of life.

The findings of our study indicated that use of the elderly nutrition promotion handbook and tele-counselling had significant effects on the caregivers' nutritional knowledge and behavior. The literature review showed that using media, including a handbook, together with tele-counseling educational programs provides services for patients' health maintenance through telephone follow-up, with the advantage of promoting accessibility for patients who live far away from clinics. Tele-counseling is a comprehensive strategy to improve patients' knowledge and support lifestyle changes (17). It appears that a telehealth system that includes tele-counselling may significantly improve elderly persons' behavior, and also reduce the caregivers' burden (18). This result is expected because the lessons in the handbook contained useful information with regards to issues such as the nature and physiology of elderly, nutrient needs, raw materials and food selection, proper food menu design, nutrition problems in elderly and basic problem-solving. A previous study also found that using a health handbook could help caregivers to enhance their health knowledge and behavior (19). This may have been because after the intervention, the caregivers increased their nutritional knowledge, which may have had some impact on their behavior (16). This supports the social learning theory that personal knowledge and behavioral learning can be achieved through self-motivation, self-adjustment and interaction with a social environment (20).

The results of this study concluded that the use of elderly nutrition promotion handbook and tele-counselling improved the nutritional knowledge and behavior of the caregivers. The results were significantly higher than before using the handbook and were significantly higher than in the control group. This enables caregivers to take care of food and nutrition in the elderly effectively and as a result the elderly can enjoy a healthy and good quality of life. Pala-ard et al. (21) and Jantriyawong (22) reported in their studies that the knowledge and skills of caregivers are very important in assuring that the elderly can enjoy good health and well-being. The fact that caregivers for the elderly have accurate knowledge about nutrition aspects of the elderly will increase their health and well-being.

The results obtained from this study could be highly beneficial as basic information for promoting nutritional knowledge and behavior, especially for caregivers for the elderly, as they play an important role in looking after dependent older persons. However, this research has some limitations; the changes that occurred in the elderly were not studied after the caregivers had been encouraged to develop better knowledge and behavior concerning nutrition. Therefore, the researchers recommend that investigators conduct further studies on the issue.

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