Journal of Food Health and Bioenvironmental Science
Journal homepage : http://jfhb.dusit.ac.th/

The Effect of Health Literacy on Self-Management Related to Food Consumption among Older Adults with Hypertension in the Community

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Article info

Article history:
Received : 28 February 2022
Revised : 18 April 2022
Accepted : 27 April 2022

Keywords:
Health literacy, Self – management, Older adults, Hypertension, Food consumption

Abstract

The study aimed to study the effect of the health literacy program on self - management related to food consumption among older adults with hypertension in the community. The study design was quasi-experimental study with pre and posttest groups. The participants consisted of 64 older adults with hypertension who were randomly assigned to an experimental and control group. Participants in experimental group received health education and six sessions of health literacy. Each session lasted 20-60 minutes within eight weeks. Control group received usual care and health education from health provider. self-administration questionnaire (nutrition literacy, food consumption pattern and self-management) was used to collect the data. Data were analyzed using independent t-test. Group reflection was analyzed using content analysis. Results showed that mean score of nutritional literacy, food consumption and self-management of the experiment group was significantly higher than the mean score of the control group (p-value <.001). Results from the reflection in the experimental group suggested some issues, including the understanding, access to information and applying knowledge. Participants suggested the methods to enhance health literacy for self-management on food consumption including providing knowledge, communication, sharing experiences and using photographic media. In sum, health literacy program can be used as a tool to enhance knowledge related to health.

Introduction

The older adult population in Thailand is at risk resulting in Thailand's ageing society. It has been predicted that Thailand will become an aged society in 2030 (National Committee on the Older adult, Department of Older adults, Ministry of Social Development and Human Security, 2020). This will inevitably affect the shift of social services towards the older adult population as an important target group for health promotion. At an older age, changes occur both physically and mentally. The changes in the body reduce the ability to care for themselves and subsequently, they have to rely more on family care in terms of economic, social and daily activities. However, the requirement for older adult care varies according to health conditions.

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Normal and at-risk older adult people can participate in outdoor or community activities due to less or no physical limitations. Moreover, the community can put their effort to participate in care for the older adult with complex illnesses. Care activities associated with health conditions, can be focused on health promotion and surveillance of risks to severity or complications of such diseases.

The significant health problems among the older adult include suffering from chronic diseases such as high blood pressure, diabetes, heart disease, etc. Chronic diseases are related to many modifiable risk factors such as unhealthy diets, physical inactivity, consumption of tobacco and alcohol and being overweight or obese (Aekplakorn, 2021). Behavior changes particularly in the retirement age group (from 60 onwards) prevent any further damage to their health. Moreover, any retirees without any health problem can also prevent serious illnesses later on in life. In 2020, the Thai National Health Examination Survey (NHES VI) reported that the prevalence of older adult with hypertension was 60.7% and prevalence of hypertension in Bangkok metropolitan was 27.2%. Division of Non-communicable Diseases 2022 in Thailand also reported the number of deaths from uncontrolled hypertension at 9.303 per 100,000 population.

High blood pressure, or hypertension, is a major health problem in older adults. The vascular system changes with age resulting in stiffer arteries. This causes increasing of blood pressure. Hypertension is known as "the silent killer," and often does not show any signs of illness. If hypertension cannot be controlled with lifestyle changes and medication, it can lead to serious health problems, including cardiovascular disease such as heart disease and stroke, vascular dementia, eye problems and kidney disease (WHO, 2021). These complications have an impact on older adult such as morbidity and mortality. The effects lead to dependency on family and community (Kanjanapibulwong et al., 2020; Aekplakorn, 2021. In addition, consumer behavior can also affect health conditions in those who are considered well. It can cause changes in biomarkers to indicate a person is at risk of developing the disease. Therefore, blood pressure control requires self-management. WHO (2013) recommended the involvement of patients through their own self-management surveillance such as smoking cessation, weight management, low-sodium and low-fat diet to better control high blood pressure. Self-management also applies to health promotion and the distal outcomes are health status and quality of life. In addition, a systematic review found that the majority of hypertensive individuals with higher health literacy tend to have better blood pressure control (Mohd Isa et al., 2021)

Self-management is the intrinsically controlled ability of an active, responsible, informed and autonomous individual to live with the medical condition, role and emotional consequences of their chronic conditions in partnership with their social network and the healthcare providers (Van de Velde et al., 2019). Therefore, the adjustment of consumer behavior is a good guideline for the self-management of the older adult. Meanwhile, advances in telecommunication technology have given the older adult access to information through various channels and a mass of health information. If older adults do not have sufficient health literacy, they could potentially struggle to comprehend an overflow of information and to make decisions on healthy choices. The latter could lead to an inappropriate decision on healthy behaviors. On the other hand, the older adult with chronic illnesses manages their consumption appropriately with health literacy through various information and communication channels that will offer them a good quality of life according to their health condition. The development of health literacy and self-management mutually complemented one another (Norris et al., 2002; Kim et al., 2004; Chodosh et al., 2005; Chao et al., 2013; Wang et al., 2017).

Health information education is a model of action to change consumer behavior and the outcome is the number of people who consumes that information. However, Nutbeam (2010) argues that the results of health information education should be the skill of individuals to make decisions or improve their behavior. This is known as "health literacy". Health literacy is considered as one of the most important skills to control people health. Health literacy is the set of patients' cognitive and social skills that allows them to access, understand and use information in ways that promote and maintain their health. However, one specific form of health literacy is nutrition literacy. Nutrition literacy reflects the ability to access, interpret and use nutrition information and exactly focuses on health literacy skills related to food consumption (Velardo, 2015). Food consumption is a periodic behavior. It is triggered at various moments of the day by a number of converging factors (time of day, need state, sensory stimulation, social context, etc.). As eating progresses, inhibitory influences of many origins (sensory, gastric, hormonal,

neural, as well as cognitive) develop and finally bring the meal to an end (Bellisle, 2019). Previous research evaluated the relationship between health literacy and food consumption among adult population. The results showed that high food literacy was associated with increased consumption of fruits and vegetables (Namdar et al., 2021)

The educational program is blended with sharing and learning and self-talk. It helps the older adult manage themselves to change dietary habits under their health condition. Developing health literacy in ways that builds confidence in decision-making contributes to better health literacy than education alone. The reasons mentioned above lead to the main objective of this research to develop health literacy of the older adult with the expectation that literacy will lead to appropriate decision-making and self-management. Health literacy is associated with self-management abilities, therefore, early recognition of low health literacy among older person together with interventions to improve health literacy might be very beneficial for older adults (Geboers et al., 2016).

Therefore, the objective of this research was to study the effectiveness of a health literacy program for self-management on food consumption among hypertensive older adult. The research framework employs the concept of health literacy (Nutbeam, 2000), namely access to information and knowledge, data analysis skills, utilizing information and knowledge, guiding of knowledge contributes to the health of others and concept of self-management by assessing health needs, selecting use sources and behavioral changes under health needs (Creer, 2000). There have been research supporting the study of the relationship between health literacy and self-management, health literacy and food consumption behavior (Geboers et al., 2016; Namdar et al., 2021). In this research, we explored these elements with the aim of viewing the effectiveness of the health literacy program.

Materials and methods

1. Study design

This quasi-experimental study was conducted using two groups and a pre-posttest design. The study period was from September 2019 to October 2020. Intervention conducted at eight weeks and measured nutrition literacy, self-management on food intake and food consumption pattern.

2. Population and sample

The reference population was the older adult, both male and female, aged between 60 and 65 years, who lived in the Bang Phlat District, Bangkok, Thailand. We selected this particular age group for our implementation because this is an early retirement age group and chronic diseases starts to affect their health. Hence, changing behavior prior to serious health consequences is therefore an imperative measure for disease prevention.

Samples were drawn from the reference population, who met the inclusion criteria as follows: 1) between the ages of 60 - 65 years, male or female 2) have a blood pressure ≤140/90 mmHg 3) fluency in reading and writing Thai language 4) participate in the project voluntarily and 5) have lived in the community for more than three months.

The sample size calculation used power analysis. A one-tailed test model was selected and a method for comparing the mean scores used two independent group tests. The influence effect size was 0.80 (Meethien et al., 2011; Sawekwan et al., 2019), the confidence level was 0.05 and the test power was 0.95 (Cohen, 1992). The results of the calculation were a sample group of 70 people, 35 in the experimental group and 35 in the control group.

The sampling technique used a stratified multistage sampling method. Bang Phlat district consists of 4 sub-districts, namely Bang Phlat Sub-District, Bang Yi Khan Sub-District, Bang Ao Sub-District and Bang Bamru District. Then communities from all four districts were selected to be represented at the provincial level using a probability proportional to size. The communities that were in the area of the sample 4 communities were Daowadung Temple community (A), Bang Yi Khan Temple community (B), Chatkaew Jongkolnee Temple community (C), Khong Makham community (D). Community A and C were assigned experimental group using a non-random method. A total of 64 older adults met the inclusion criteria and were enrolled into our study. The number in the experimental was equal to the control group (32 in each group). Three people from each group withdrew during the course of the study. It is to be noted that sample of 32 from each group still provided 90% of study power.

3. Research instruments

Experimental research tool: Health literacy program. The activities design was developed by researcher and used the concepts of health literacy of Nutbeam (2000), which aimed to increases the subjects' health literacy and

self-management and food consumption behavior. The details of the activities were making relationships, education, practicing communication skills by self-talk techniques, sharing experiences and learning and evaluating the program by reflection from the group. The program was conducted in eight weeks and it took 20 - 60 minutes to organize each activity (Table 1). Kaewdamkerng (2019) stated that in general, habit is formed by completing a task continuing within 66 days (approximately 2 months) or 21 days at least. Moreover, previous research applied 6-8 weeks (Patipattarakul et al., 2018).

The program was conducted by researchers and held at each community. The program for the experimental group comprised as follow:

Building relationship and health education: Before starting the health education program, we built the relationship within the group to create trust, empowerment and encouragement within the group. These activities took 20 minutes. Also, during the week the health education was scheduled during the 1st week which lasted 60 minutes for small group teaching and discussion, via use of flip chart to demonstrate knowledge on hypertension, regarding: definition, causes, symptom, treatment, prevention and risk factors (WHO, 2021; Thai Hypertension Society, 2019).

Nutrition education: The nutrition education was scheduled during 2nd week and lasted 60 minutes for small group teaching. We delivered the nutrition information related to healthy eating, a nutritional recommendation based on dietary approaches to stop hypertension (DASH) (NIH, 2021), Thai Food Pyramid Guide, Dietary Guidelines and Nutrition Facts Labels for Thai elders; essential nutrients (Nutrition Division, 2020) via picture media. We provided information on how to access resources and use of information (20 minutes for this session).

Individual practice skill: We demonstrated process of decision making by using a tree diagram. Evaluation of decision-making was captured by asking questions about advantages or benefits and disadvantages or risks of decisions. In addition, we demonstrated how to use such information, select resource and verify the reliability of the information for example reading food label. After demonstration, they practiced their skill and showed their results to researchers. This was scheduled during the 3rd week of the program in small groups and took 60 minutes. The intervention materials included food labels, leaflets, drug labels etc.

Practice self-communication skills: Activities were scheduled during 4th week and took 60 minutes. The activities consisted of an overview of self-talk technique (Kross et al., 2014; Health Direct, 2022) and practice of self-talk by telling own messages to encourage and motivate subjects healthy eating and behavior modification. Example of dialogues included: “I can do it. I have accomplished something more difficult”, “Can I eat salty food?” and “I have to read food labels before buying”. The dialogues were developed by researchers based on review of existing information (Nutrition Division, 2020; Health Direct, 2022)

Monitoring health eating: Activities were scheduled during 5th and 6th weeks. Subjects reported food consumption and self-talk technique to the researcher. It took approximately 20 minutes. We advised older adults whenever they were not appropriately performing healthy eating behavior.

Sharing and Learning: We delivered the activities during the 7th week in small groups and took approximately 60 minutes. Subjects shared experience and learning about self-talk technique, how to access health information and how decisions were made and applied.

Program evaluation: An evaluation by reflection was held during the 8th week in small groups. This session took approximately 40 minutes.

4. The intervention for control group

Like those in the experimental group, subjects in the control group received the same and 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 8 weeks health literacy program that was administered to those in the experimental group. Their usual health care and routine health education activities included; curative care, home health care and health disease prevention information

The instrument for data collection comprised of four questionnaires and developed by literature review as follows:

1. The personal data questionnaire consisted of seven items, namely sex, age, BMI, congenital disease, cigarette smoking, alcohol drinking and physical activity.

2. The nutrition literacy questionnaire consisted of 15 closed-ended questions. The answers were five-point on the Likert scale, i.e., never practice, seldom practice, sometimes practice, often practice, and always practice (75 full marks).

Table 1 Health literacy program for self-management on food consumption

Session/Week	Activities	Relation between health literacy and self-management
Week 1 Session 1: 20 mins Session 2: 60 mins	1. Building relationship within the group to create trust and empowerment and encouragement within the group 1. Providing health education	Functional health literacy (empowerment)
Week 2 Session 3: 60 mins Session 4: 20 mins	1. Providing knowledge about nutrition for hypertension, DASH diet, diet control guidelines 2. Knowledge about how to access resources and use of information	Functional health literacy (access and understand)
Week 3 Session 5: 60 mins	1. Training about how to decision making 2. Practice skills in selecting resources, and verifying the reliability of the information	Functional health literacy (access and understand)
Week 4 Session 6: 60 mins	1. Overview and introduction self-talk 2. Practice self-communication skills by using the self-talk technique by telling own messages (internal dialogue) for behavior modification	Interactive health literacy (analytic and problems solving) Self-management
Week 5 – 6 Session 7: 20 mins by telephone	1. Individually reported on food consumption and self-talk technique to the researcher	Critical health literacy (decision making and application) Self-management
Week 7 Session 8: 60 mins	1. Experience sharing and learning (Sharing and Learning)	Functional health literacy (understand)
Week 8 Session 9: 40 mins	1. Program evaluation	

3. Food consumption patterns for the older adult questionnaire consisted of 13 closed-ended questions. The answers were five-point on the Likert scale, i.e., never practice, seldom practice, sometimes practice, often practice and always practice (65 full marks).

4. The questionnaire for self-management food intake pattern consisted of 16 closed-ended questions. The answers were five-point on the Likert scale, i.e., never practice, seldom practice, sometimes practice, often practice and always practice (80 full marks).

The determination of benchmarks to classify health literacy scores, dietary patterns and self-management behaviors on food consumption used a 4-level classification based on the criteria for measuring the health quotient of the Health Education Division, Department of Health Service Support, Ministry of Public Health (2018): Poor <60% of the full score, Fair ≥ 60% - <70% of the full score, Good ≥ 70% - <80% of the full score and Very Good ≥ 80% of the full score.

5. Measurement instrument

Health literacy program was validated by three experts in nutrition, adult and geriatric nursing and community health nursing. By checking how well the results corresponded to established theories and other measures of the same concept, security and the possibility of using the program. Health literacy program was revised according to the recommendations before applying to the sample group. The Index of Item-Objective Congruence (IOC) was used so as to find the content validity. In this process, the questionnaires were checked by three experts including, one expert in nutrition, two experts in adult and geriatric nursing and community health nursing field. The items that had scores lower than 0.5 were revised. On the other hand, the items that had scores higher than or equal to 0.5 were reserved. All of questionnaires had IOC between 0.8 to 1. The reliability of the questionnaires was determined to ensure that the responses collected through the instrument were reliable and consistent. The questionnaire was tested with 30 older persons that were not in the sample group. The reliability value was calculated by using Cronbach's alpha to ensure whether there was internal consistency within the items. According to the pre-test, the Cronbach's Alpha was 0.78, so the questionnaire was accepted for reliability (Tavakol & Dennick, 2011).

6. Ethical approval

This study was approved by the Ethical Review Committee for Human Research, Research and

Development Institute, Suan Dusit University, Thailand (SDU-RDI 2020-008). Each patient who participated in the study was informed of the nature and objectives of the study. A written consent form was obtained before data collection from each participant.

7. Data Collection

Once the older adults, in both the experimental and controls groups, were identified, they were informed the purpose of the research. Appointments were made during the first week to collect data in their communities. Data were obtained from the older adults via administration questionnaires. The health literacy development program was then conducted. The experimental group received the health literacy program, along with the usual health care and routine health education activities provided by their health care providers. The control group received only the usual health care and routine health education activities provided by their health care providers. During the 9th week, the questionnaires were administered to each older adults in each group. During the 10th week (9 weeks after the experimental group completed the health literacy program and all data were collected), the researchers provided the control group members the same health literacy program. Details of the protocol timeline is shown in Table 2.

8. Data analysis

Descriptive statistics were used to summarize demographic data. Continuous variables were presented as mean ± standard deviation and categorical variables were shown as frequencies and percentages. Chi-square, Fisher's exact test was used to compare the demographic data between groups and the independent t-test was used to examine differences between intervention and control groups, based on the assumptions of each statistic. Paired t-test was used to analyze in the difference between pre and posttest for the same subject. P values less than 0.05 were considered as statistical significance. Content analysis was used to summarize the results from the reflection.

Results

A total of 64 participants completed the study, with 32 in the experimental and 32 in the control group. All characteristics of participants in both groups were similar in gender, age, cigarette smoking, alcohol drinking and physical activity except BMI (Table 3).

The general characteristics of the experimental group was that most were female (84.4%). Participants' ages ranged from 60 to 65 years old, with a mean age of 63.34 years old (SD =1.89). Half the participants had BMI at the level of obesity (50.0%). Twenty five percent of the participants had congenital diseases such as high blood pressure and diabetes. The majority (93.8%) were non-smokers and did not drink alcohol (84.4%). Only one person exercised daily (3.1%). The majority of the control group was also females (68.8%). Their age ranged from 60 to 65 years old, with a mean age of 62.78 years

Table 2 Research protocol timeline

Week	0	1	2	3	4	5	6	7	8	9	10
Experimental group											
measurement	T1	-	-	-	-	-	-	-	-	T_2	
intervention	-	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	-	-
		Group					Individual		Group			
Control group											
measurement	T1	-	-	-	-	-	-	-	-	T_2	HL
intervention	-	P_0	P_0	P_0	P_0	P_0	P_0	P_0	P_0	P_0	P_0	

Remark: 0 = Before beginning the experimental intervention
T_1 = Pre-test; measurement of the nutritional literacy, food consumption, self-management before the experimental intervention
T_2 = Post-test; measurement of the nutritional literacy, food consumption, self-management at 9th week
P_0 = Usual care
$P_1 – P_6$ = Group session 1-6
P_7 = Individual session
$P_8 – P_9$ = Group session 8-9
HL = Provision of the health literacy program

old (SD = 1.93). The BMI at the level of obese was 43.8%. With regards to the control group, there were 37% of congenital diseases such as high blood pressure and diabetes. The majority of the participants were non-smokers and did not drink alcohol (84.4% and 65.6%, respectively). Only 9.4% exercised every day (Table 3). No significant differences were found between the demographic of the two groups (p-value>0.05), except BMI and congenital diseases (p-value<0.05).

The overall pre-test nutritional literacy of the experimental group and the control group was at a fair level meaning sufficient nutrition literacy and ability to practice it correctly. After the experiment, results found that most of the experimental groups had very good nutrition literacy and had proper and consistent practice. For the majority of the control group, there was a fair level of nutrition literacy.

The overall food consumption behavior of the experimental group and the control group was at a fair level. In other words, participants had a minority of correct dietary consumption. After the experiment, results found that most of the experimental groups were at a good level of dietary behavior. The majority of the control group had food consumption behavior at a fair level.

The pre-test self-management behavior on food consumption in the experimental group showed a majority of subjects at a fair level. They were able to

Table 3 Demographic characteristics of participants

Characteristics	Experimental group (n = 32)		Control group (n = 32)		P-value
	n	%	n	%	
Gender					0.637
male	5	15.6	10	31.3	
female	27	84.4	22	68.8	
Age (years)					0.187
60 - 61	8	25.0	10	31.3	
62 - 63	5	15.7	7	21.9	
64 – 65	19	59.3	15	46.9	
	Mean =63.34 SD.=1.89		Mean =62.78 SD.=1.93		
BMI (Kg./m.^{2})					0.000
< 18.5	1	3.1	0		
18.5 – 22.9	8	25.0	6	18.8	
23.0 – 24.9	7	21.9	12	37.5	
≥ 25	16	50.0	14	43.8	
	Mean = 25.22 SD.=3.54		Mean = 24.87 SD.=2.62		
Congenital diseases					0.03
Yes	8	25.0	12	37.5	
No	24	75.0	20	62.5	
Cigarette smoking					1.00
Yes	1	3.1	1	3.1	
Recovering smoker	1	3.1	4	12.5	
No	30	93.8	27	84.4	
Alcohol drinking					0.762
Yes	1	3.1	1	3.1	
Recovering drinker	4	12.5	10	31.3	
No	27	84.4	21	65.6	
Physical activity					0.119
Everyday	1	3.1	3	9.4	
> 2 days - ≤ 5 days /week	15	46.9	12	37.5	
≤ 2 days /week	16	50.0	17	53.1	

Table 4 Level of nutrition literacy, food consumption and self-management behaviors

	Scores	Level	Pre-test n (%)		Post -test n (%)		p-value
			Experimental group (n=32)	Control group (n=32)	Experimental group (n=32)	Control group (n=32)	
Nutrition literacy							0.000
(75 full marks)	< 60% of full marks	Poor	10 (31.3)	12 (37.5)	0	11 (34.4)	
	≥ 60% - <70% of full marks	Fair	12 (37.5)	17 (53.1)	2 (6.3)	19 (59.4)	
	≥ 70% - <80% of full marks	Good	10 (31.3)	3 (9.4)	11 (34.4)	2 (6.3)	
	≥ 80% of full marks	Very good	0	0	19 (59.4)	0	
Food consumption behavior							0.346
(65 full marks)	< 60% of full marks	Poor	11 (31.4)	7 (21.9)	2 (6.3)	7 (21.9)	
	≥ 60% - <70% of full marks	Fair	14 (43.8)	20 (62.5)	8 (25.0)	20 (62.5)	
	≥ 70% - <80% of full marks	Good	7 (21.9)	5 (15.6)	13 (40.6)	5 (15.6)	
	≥ 80% of full marks	Very good	0	0	9(28.1)	0	
Self-management behaviors							0.451
(80 full marks)	< 60% of full marks	Poor	7 (21.9)	18 (56.3)	0	6 (18.8)	
	≥ 60% - <70% of full marks	Fair	17 (53.1)	13 (40.6)	1 (3.1)	19 (59.4)	
	≥ 70% - <80% of full marks	Good	8 (25.0)	1 (3.1)	6 (18.8)	7 (21.9)	
	≥ 80% of full marks	Very good	0	0	25 (78.1)	0	

manage themselves on food consumption well. The majority of the control group was poor. They could not manage their food consumption well. However, after the experiment, results suggested that most of the experimental group had a very good level of self-management behavior. In the majority of control group, the level of self-management behavior of food consumption was moderate (Table 4).

The experimental group had the mean score of all components (nutritional literacy, food consumption and self-management) significantly higher than the control group with statistical significance at level of <0.001 (Table 5).

Table 5 Mean score of nutritional literacy, food consumption behavior, and self-management behavior between experimental and controlled groups by using independent t-test

variables	Experimental group		Controlled group		p-value
	mean	SD	mean	SD	
Before					
nutritional literacy	47.72	6.0	45.31	5.29	0.940
food consumption behavior	40.06	4.85	40.40	3.32	0.742
self-management behavior	51.91	6.26	66.66	5.77	0.001
After					
nutritional literacy	60.25	5.63	45.38	5.19	<0.001
food consumption behavior	47.53	5.58	40.81	3.27	<0.001
self-management behavior	66.65	5.77	52.06	5.69	<0.001

The experimental group had the mean score of all components significantly higher than before the experiment with statistical significance level of <001 (Table 6).

Table 6 the mean score of nutritional literacy, food consumption behavior, and self-management behavior between before and after intervention of experimental group by suing dependent t-test

variables	Before experiment		After experiment		p-value
	mean	SD	mean	SD	
nutritional literacy	47.72	6.0	60.25	5.63	<0.001
food consumption behavior	40.06	4.85	47.53	5.58	<0.001
self-management behavior	51.91	6.26	66.65	5.77	<0.001

Evaluation of the program by reflection from the experimental group

The results from the reflection of the experimental group are summarized as follows: the understanding of the information or health literacy for self-management on food consumption must be studied and understood well; read more; do not believe in delivered information without factual information from knowledgeable people; or from advertising with solicitation to buy. People and communities with access to information and health literacy need to seek further knowledge and build empowerment, community and social support and effective communication at the family level, as well as expand widely at the community level. People must interpret information before they can analyze and make food consumption decisions. Therefore, having academics come to suggest and help develop community leadership skills results in an analytical thinking process to be a leader in community development and improve people in the community to gain skills. The methods of developing health literacy for self-management on food consumption were health education from academics giving direct knowledge. People can transmit the knowledge correctly to the community. In addition, there are self-talk techniques, communication in small groups and communication at the community level. Self-talk is a method that helps people be mindful before doing anything. It serves as a reminder to them every time they do something, until the behavior becomes second nature for them. For example, they read a nutrition label before buying a product or searching for information. Moreover, sharing experience and learning support health literacy and self-management, such as exchanging knowledge on how to self-manage and make decisions on consumption. The visual teaching materials are important to enhance health literacy for self-management in groups with learning restrictions. Therefore, the use of illustrations and explanations is suitable for the older adult, such that pictures can provide more understanding.

Discussion

All characteristics of participants in both groups were similar in gender, age, cigarette smoking, alcohol drinking and physical activity. However, BMI showed significant difference at level of <0.001 and the mean score of BMI experimental group was greater than the control group. The finding suggested that the experimental group showed a great self-management. This indicated that BMI factor could have an effect on self-management. Vinkers et al. (2014) suggested that good self-management intervention in overweight individuals could improve outcomes in behavioral and anthropometric. This indicated that older adult's obesity might have greater interest in program to improve their health.

The level of nutrition literacy and self-management behavior in the experimental group

increased after the experiment. It has been suggested that the development of health literacy, guidelines and appropriate activities can develop and promote health literacy (WHO, 2009). Good health literacy will improve health behaviors (Ginggaew & Prasertsri, 2016). Likewise, Rattanawarang & Chanta (2018) reported a study that health literacy is related to self-care behavior in chronic disease and the testing program showed the mean scores on nutrition literacy increased significantly after testing of the experimental group (p-value < 0.001). Our study findings were supported by several previous studies (Thepin, 2019; Boontanon et al., 2019; Visscher et al., 2018). An appropriate activity for the group will improve health literacy (WHO, 2009). Methods and guidelines for development in organizing the learning process led to learner memorization learning (Sheridan et al., 2011; Visscher et al., 2018; Kaewdamkeeng, 2018). The results of the mean score before and after the experiment of food consumption behavior and self-management behavior on food intake of the experimental group showed a significantly higher score than before the test (p-value < 0.001). The results could be explained by knowledgeable individuals, having a variety of information which helps them in making decisions about behavior improvement (Pongkiatchai & Wongwiseskul, 2018). Moreover, Santo et al. (2005) stated that the development of health literacy, especially health education followed by group or individual practices, will help promote decision-making skills on health behaviors and good self-management. Prior studies have found that health literacy is associated with positive self-management and health behaviors (Ginggaew & Prasertsri, 2016; Wang et al., 2017; Ratanawarang & Chantha, 2018). The study by Jayasinghe et al., (2016) found that low health literacy had a significant effect on health behaviors among Australian patients (p-value < 0.001). Therefore, in this study the effects of the health literacy development program on the older adults for self-management in food consumption influenced the experimental group to gain more nutrition literacy, consumption behavior and self-management behavior. The experimental group's mean scores were significantly different from the control group's (p-value < 0.001). Our findings suggested that health literacy and health education, including activities to promote knowledge, can empower individuals to gain self-management in terms of health and the ability to make decisions about their health more appropriately.

Interestingly, the evaluation of reflections toward the activities among experimental group indicated that perspectives of older adults on nutritional health literacy appeared to be associated with understanding of the information, information accessibility, the ability to transform the information to daily life practice. Likewise, older adults reflected the emphasized strategies to augment health literacy helped them with self-management on nutritional habits to improve their health. These strategies included education, communication, sharing experiences and infographic or illustration. Moreover, the ability to read and write are important for older adults to gain and understand the information on basic health literacy, especially in health education and cognitive appraisal on health information such as the predominated risk, medical information and nutrition labels (Nutbeam, 2000; Sorensen, et al., 2012; Pongkiatchai & Wongwiseskul, 2018). Health information is typically available and older adults could seek the information resources. However, the complexities of the different data structures had an influence on the decision to evaluate and apply information (Harzheim et al., 2020). World Health Organization (WHO) implied that readability, transformation skills and an insightful understanding are the principal factors for enhancing health literacy and improving an effective communication among individuals (WHO, 2009). Besides, information accessibility is an interactive health literacy (Nutbeam, 2000; Sorensen et al., 2012; Pongkiatchai & Wongwiseskul, 2018). It is the ability to find a strategy to promote self-management by seeking and classifying information across the different sources. Ghaffari-Fam et al. (2020) studied health information and blood pressure control. They found that the accessibility to seek health information could predict blood pressure control among Iranian hypertensive clients (p-value < 0.05). In sum, the availability, accessibility of the information and communication are crucial to generate nutritional health literacy.

The ability to apply knowledge skills are critical to the health literacy level (Nutbeam, 2000; Sorensen et al., 2012; Pongkiatchai & Wongwiseskul, 2018). The older adult's ability to interpret data, analyzing and decision-making lead to decision-makings in self-management. The results of the activity assessment showed that knowledge and understanding of the older adult helped decision-making and ability to apply information. This study findings are in keeping with the results of Boontanon et al., (2019). That reported the

older adult with good health literacy led to nutrition decision making and behavioral change. Besides, a study by Ghaffari-Fam et al. (2020) found that people with healthy literacy were able to control high blood pressure.

When discussing the promotion of health literacy for self-management in food consumption, the older adult noted that educating, communicating, sharing experiences and using infographic illustration could improve health literacy. This suggestion is in line with the Kwanmuang's study (Kaewdamkereng, 2019) which reported that the strategies of promoting health literacy are varied based on the health literacy level such as the functional health literacy level, the strategies of promoting health literacy, the learning process development and the educational tool selection. Moreover, the interactive health literacy level, such as the questioning skills and creating a friendly atmosphere for learning and the critical health literacy level, such as the method of promoting health literacy, the training in decision-making skills, identifying problems, searching for information to help evaluate and decide, self-assessment and self-management are also included. According to the health education study results from Santo et al. (2005), that mentioned the development of health literacy, particularly health promotion as well as individual and group practice will enhance the decision-making skills toward health behaviors and self-management. Allen et al. (2017) stated that health lifestyle will be improved by the individual or group health promotion as well as launching group activities, sharing experiences and discussing topics related to communication channel where the information is dependable and of high-quality. The communication in this research is intrapersonal communication or self-talk, following mindfulness in the manner of Buddhist psychology which was used amongst the athletes. Tod et al. (2011) suggested that positive self-talk can motivate self-empowerment. It also helps the athletes to be more concentrated during competitions. The findings are supported by the psychologist as self-talk helps people to consolidate positive thoughts, feelings, emotions in stressful situations. (Kross et al., 2014). It is similar to the Buddhism (constant mindfulness) as it induces precepts, meditation and reduce stress. For the instructional tools, our results are consistent with the study of Kaewdamkereng (2019) in that the process of promoting health literacy, is essential to choose appropriate and standard instructional medias. To our knowledge, there are several instructional tools available, however these are used in many ways based on the type of study objectives and participants. In this current study, we employed image and explanation for the older adult, as this type of tool allows the older adult to ask questions as well as helps the researcher to clarify any points that the older adult may not fully understood. There was an agreement between researchers and participants on using images as a teaching media as well.

This study has some limitations including measured food consumption behavior and self-management behavior for only at a short period. Secondly, this study did not follow blood pressure control, which is an important clinical outcome. Therefore, it could not be assured whether this program was effective in blood pressure control. The potential effectiveness of health literacy program and health outcomes would be a relevant topic for future research with an extended period of study.

Conclusion

In conclusion, a health literacy development program for self-management on food consumption of the older adult can increase the level of nutrition literacy, dietary behavior, and self-management. Besides, the method to enhance health literacy for self-management of food consumption is educating, communicating, sharing experiences, and use of the Fotonovela technique. It could develop health literacy in the older adult as well. Therefore, we recommended that it would be suitable to implement at primary public health center to improve health literacy among older adults. They could also use self-talk technique and sharing learning to improve decision making and applying skills.

Acknowledgements

We extend our appreciation to all study participants. Suan Dusit University supported this research by a grant and we extend appreciation.

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