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Effects of Self-management Program on Healthy Lifestyle Behaviors among Elderly with Hypertension

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This research aimed to evaluate whether a self- management program promoted healthy lifestyle behaviors (HLBs) and improved health outcomes among Thai elderly with hypertension. Participants were randomly allocated to either an intervention group (n= 20), that received an 8- week self-management program that included home visits, or a control group (n=20). The data were analyzed by a chi- square analysis, a mixed- model repeated measure MANOVA, and MANCOVAs. There were significant differences in the mean scores of healthy lifestyle behaviors at posttest and follow- up between the two groups (p <0.01). Moreover, the experimental participants showed statistically significant decrease in BMI as compared to the control group participants in posttest and follow- up (p <0. 001). There was a statistically significant reduction in blood pressure in the experimental participants, compared with the control participants at follow-up (p <0.001). Furthermore, healthy lifestyle behaviors increased significantly in the experimental participants compared with the control participants and baseline (p < 0. 001). In addition, BMI and blood pressure decreased in the experimental participants compared with the control participants and baseline (p < 0. 001). The self- management program resulted in improved healthy lifestyle behaviors, and health outcomes among the elderly with hypertension, and has implications for health promotion.

***Keywords*:** elderly, healthy lifestyle behavior, health outcome, hypertension, self-management program

The incidence and severity of hypertension has been steadily growing worldwide. It is anticipated that in the year 2025, the number of patients with high blood pressure will reach 1.56 billion (Bell, Twiggs, & Olin, 2015). Hypertension in Thailand between 2008 and 2012, especially in the north compared with other regions, had increased continuously (Aekplakorn et al, 2008). The rate of hypertension self-awareness, the rate of access to treatment services, and the hypertension control rate are relatively low because early stages of the disease do not show any obvious signs and symptoms (World Health Organization, 2016). As a result, patients neglect to take good care of them together with having an unhealthy lifestyle. Instances of these unhealthy behaviors include the lack of body movements and regular exercise, being overweight, smoking, bad diets such as those high-in-fat food, incomplete intake of medication for hypertension, and chronic stress conditions. These kinds of behaviors induce higher blood pressure, resulting in serious complications such as heart failure, stroke, and kidney failure that often lead to disability and death (James et al., 2014). Previous studies suggest that healthy

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lifestyle modifications such as weight reduction, stress management, healthy eating and increasing physical activity are a significant predictor of health status (Brill, 2011; Lyu, Lee, & Kim, 2016; Yamaoka, & Tango, 2012) and this reduces the national burden on costs for patient care (Merrill, Hyatt, Aldana, & Kinnersley, 2011).

However, little is known about the effectiveness of a self-management program, which integrates positive psychology with self-regulation techniques, for healthy lifestyle behaviours (HLBs) and health outcomes among the elderly with hypertension. The development of health programs by their nature is complex as a range of cognitive and behavioral issues have to be addressed. This requires integration of concepts from different theoretical perspectives. In previous researches, these concepts have been effective on their own or in other contexts; here the aim is to combine them to evaluate their effectiveness as part of an integrated healthy lifestyle program. Each concept has been shown to allow the elderly to live their lives more actively with better health outcomes and to maintain their well-being according to their potential (Ku, Fox, & Chen, 2016). Therefore, for these reasons, a self-management strategy consists of (1) self-goal setting; (2) making an action plan, (3) implementation with self-monitoring, (4) learning through feedback about their progress toward each goal, and (5) encouragement leading to the healthy practices being maintained. This is called the SMILE. It is integrated with social cognitive theory, particularly the principles of self-regulation (Bandura, 1991), positive psychology (Seligman & Csikszentmihalyi, 2000) and the eighth joint national committee (JNC 8) on prevention, detection, evaluation, and treatment of high blood pressure (HBP) (James et al., 2014). It focuses on the hypertensive patients' central role in managing their blood pressure. The research team developed materials suitable for hypertensive older patients with the necessary knowledge and self-management strategy. The patients with hypertension were empowered in their self-management, hopefulness, and encouragement on problem solving and a better perseverance of a healthy lifestyle, which lead to good health outcomes and the ability to live within a society with dignity, values, and quality. The purpose of the present study was to investigate the effectiveness of a self-management program on HLBs and healthy outcomes among an elderly with hypertension. We hypothesized that a self-management program would improve HLBs and health outcomes.

Literature Overview

In recent years, there has been an emerging focus on self-management strategies, the key practice in behavior modification, especially in the management of chronic conditions (Brady et al., 2013; Goyal et al., 2016). The self-management was derived from social cognitive theory (Bandura, 1991). The principles of self-management as they have been applied to individual patient's need to manage their health are especially pertinent (Clark et al., 1991). Although, different models of self-management have been developed over the past 20 years, they are rooted in three sub-functions such as goal adoption, self-monitoring, and self-reactive influences to sustain achieved healthful practices (Bandura, 2005). For example, in a randomised control trial, Park, Chang, Kim, and Kwak (2012) used the self-management program including goal setting, self-monitoring as part of the intervention to promote blood pressure control in older hypertensive patients. It showed that hypertensive self-management intervention was effective in symptom management when compared to no intervention or standard care.

Also, in the last decade research on a positive psychology perspective has addressed well-being and introduced additional interventions. Seligman (2005) defines positive psychology as the scientific study of a human's positive side through the development of his/her personal strengths and virtues, to promote well-being). It is founded on the belief that to maximize happiness and well-being individuals need to live a meaningful life and be able to fulfill their own potential in terms of their development (Seligman et al., 2005). It is through ones' observations, the processes of making decisions about the behavior to choose, and reflection on these processes that behavior changes occur that are a better fit to ones' life circumstances. The positive psychology interventions play a critical role in improving the frequency and intensity of positive cognitive and emotional states and health outcomes through their direct effects on positive attributes such as optimism, positive affect and well-being (Aspinwall, & Tedeschi, 2010). Higher levels of positive attributes have been associated with improvements in coping, self-regulation, and self-efficacy (Fishbach, & Labroo, 2007; Pressman, & Cohen, 2005). As shown in a study by Huffman et al. (2015) a positive psychology implementation in patients with ischemic heart disease created more efficient personal health care and contributed to the improvements in healthy behaviors and better health. Based on these, positive psychology interventions plus a self-management program is recommended to improve health. The research framework is shown in figure 1.

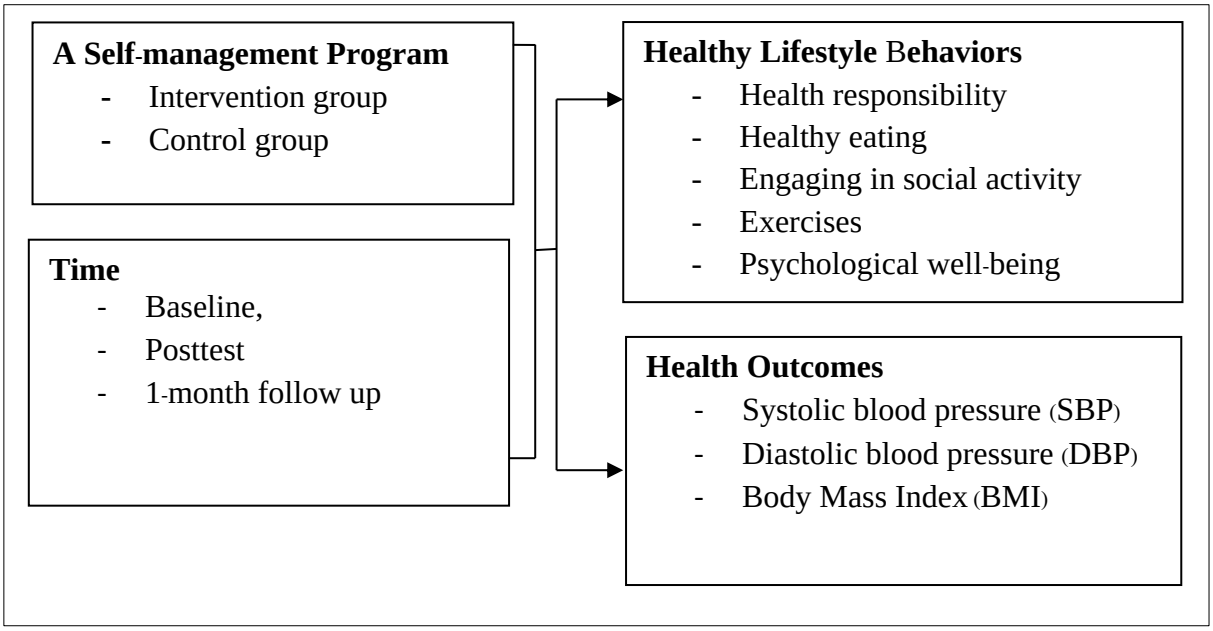


Figure 1. The Research Framework

Method

Participants

The study was conducted in two villages in Chiang Mai province in Thailand. The village was the unit of randomization. To avoid cross-contamination between the two groups, two villages were randomly assigned to an intervention or control condition where all elderly with hypertension in the same village receive the intervention or not. This randomization was advocated to minimize treatment "contamination" between intervention and control participants

(Torgerson, 2001). They were assigned to an intervention group and participants in the other villages to a control group. The inclusion criteria for selecting participants were: (a) older adults, aged between 60-75 years, (b) diagnosis of primary hypertension, defined as having a systolic blood pressure (SBP) between 140 and 159 mmHg and/or diastolic blood pressure (DBP) between 90 and 99 mmHg which are the definite diagnosis by the physician at least one year prior to start of study, and (c) participants who volunteered. The exclusion criteria were: (a) any severe medical complications such as kidney failure, stroke, and blindness that may make it dangerous for participants to engage in activities in this program, (b) time or work conflicts during the times when the program ran, (c) extreme obesity is defined as a BMI>40 kg/m^2 (World Health Organization, 2000) and (d) self-report of psychiatric illness such as depression or schizophrenia. In order to allow for an attrition rate of 20%, the total sample size was set at 40 participants which was an exploratory work. A sample size of 40 participants or 20 participants per group were need based on a tabulation scheme by Cohen (1988) with a medium effect size of 0.5, power as 0.80, and alpha at .05. All participants completed written informed consents prior to the program. This study was approved by the Research Ethics Committee of Srinakharinwirot University (SWUEC-172/58E) on January 14, 2016.

Study Design and Procedure

A Randomized Pretest, Posttest, and Follow-up (RPPF) design were used to evaluate the effectiveness of a self-management program on HLBs and health outcomes among the hypertensive elderly. The intervention that constituted the self-management program was applied to older adults with hypertension in the intervention group. There was a two-hour session per week for eight weeks followed by home visits once a week with individual counseling. While individuals in the control group were assigned to usual care that they were receiving prior to entry into the study. All measures were collected at three time points: baseline, 8 weeks (end of the program) and 12 weeks post baseline.

Table 1

Contents of a self-management program

Topic	Structure and duration (min)	
	Group sessions (120 minutes per session)	Individual sessions (30 minutes with each participant)
Week 1: Introduction to hypertension situation , and benefits of a self-management program Week 2: Hypertensive management Week 3: Health responsibility Week 4: Healthy eating Week 5: Engaging in social activity Week 6: Exercises Week 7: Psychological well-being Week 8: Conclusion	- Reviewing previous topic, share and discuss their self-management strategies - Setting a goal with regard to HLBs for health improvements - Making an individual action plan	- Monitoring and reflecting on their behaviors, as well as reinforcement by encouragement - Implementing their action plans - Learning through feedback from previous action plan - Encouraging to improve and maintain these changes over the long-term

Intervention

A self-management program was derived from the theoretical and empirical literature related to HLBs for older hypertensive patients using the SMILE steps. The program delivered via group and individual sessions and covered the following topics related to HLBs: health responsibility, healthy eating, engaging in social activity, exercises, and psychological well-being. Each participant in the intervention group first formulated their goals and action plans, implemented their action plans and then the health educators and researcher gave feedback to the participants while encouraging them to improve and maintain the HLBs in the following four weeks (Table 1). The effectiveness test of self-management program was conducted relying on the Brahmawong E_1/E_2 formula (Brahmawong, 1977) needed to try out the efficiency of process (E_1) and product (E_2) through three stages, i.e. individual testing (1:1), small group testing (1: 10), and field testing (1: 100), respectively. The self-management program efficiencies E_1/E_2 were 75.56/75.69, 75.08/75.58, and 75.88/75.63, respectively, which were above the 75/75 set criterion (Brahmawong, 2013). The self-management program was validated by 5 experts in the behavioral sciences and health educations which included a physician. The Content Validity Index was between 0.8 and 1.0.

Outcome measures

For the Blood Pressure (BP), resting BP was chosen as the outcome measure. Seated BP measurements were made on the right arm using a digital sphygmomanometer after the participant had been sitting quietly, with legs uncrossed, for 5 minutes. BP was measured three times and averaged to provide the decision value for Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP).

BMI was calculated as weight (Kg) / height squared (m^2). Weight was measured using a Floor type weight scale TANITA, which was calibrated and checked for accuracy by the company representing the manufacturer the day before it was used. Height was obtained using a stadiometer at baseline only. Participants were asked to remove their shoes prior to both measurements.

Statistical analysis

Statistical analyses were conducted using SPSS version 16. Descriptive statistics were used to describe the subjects' characteristics using Chi-square tests of categorical data for comparison between the intervention and the control group and no significant differences were found. These dependent variables were divided into 2 dimensions namely HLBs (health responsibility, healthy eating, engaging in social activity, exercises, and psychological well-being) and health outcome (Blood Pressure and BMI). For hypotheses testing, the data were analyzed by a mixed-model repeated measure MANOVA and MANCOVAs. This decreases the chance of Type 1 error that may have occurred if multiple ANOVA would have been utilized, and helps finding dissimilarity that could stay undiscovered (D' Amico, Neilands, & Zambarano, 2001). Statistical significance was set at $p \leq 0.05$.

Results

The baseline demographic characteristics of both the intervention group and the control group were not significantly different on the following categorical variables; gender, age, education and living arrangements (p>0.05). The mean age in the experimental group was 65.40 years compared with 66. 35 years in the control group. Additionally, the majority of the participants were female, married, primary school educated and living with others. HLBs and health outcomes increased from baseline to posttest and in the follow up period in the two groups as presented in Table 2.

Table 2

Means and Standard deviations of The Healthy Lifestyle Behaviors and Health Outcomes Measures Baseline, Post-test and Follow-up for the Two Groups

Dependent variables	Intervention group (n=20) Mean ± SD			Control group (n=20) Mean ± SD		
	T1	T2	T3	T1	T2	T3
Healthy Lifestyle Behaviors						
- Health responsibility	16.55 ± 2.14	18.50 ± 1.93	19.10 ± 1.17	16.40 ± 2.01	16.29 ± 2.39	16.85 ± 1.60
- Healthy eating	17.35 ± 2.28	19.85 ± 2.03	20.00 ± 1.17	17.50 ± 2.31	17.75 ± 2.40	18.65 ± 1.14
- Engaging in social activity	14.75 ± 2.36	17.25 ± 2.17	17.75 ± 1.45	14.65 ± 1.95	15.30 ± 2.27	14.95 ± 1.23
- Exercise	16.75 ± 2.07	20.30 ± 2.18	20.20 ± 1.40	16.45 ± 2.19	16.35 ± 2.91	16.90 ± 1.45
- Psychological well-being	14.35 ± 2.01	19.60 ± 2.06	19.45 ± 1.47	14.40 ± 2.39	14.40 ± 2.35	13.95 ± 1.15
Health Outcomes						
- BMI (Kg/m^2)	24.88 ± 2.09	22.25 ± 2.10	23.08 ± 1.47	25.24 ± 2.11	24.78 ± 2.50	25.34 ± 2.19
- SBP (mmHg)	141.70 ± 1.87	141.65 ± 2.16	139.90 ± 1.55	141.75 ± 2.15	142.25 ± 2.63	142.45 ± 1.70
- DBP (mmHg)	90.50 ± 2.82	90.65 ± 2.64	89.45 ± 1.73	91.00 ± 2.29	91.30 ± 2.20	91.25 ± 2.90

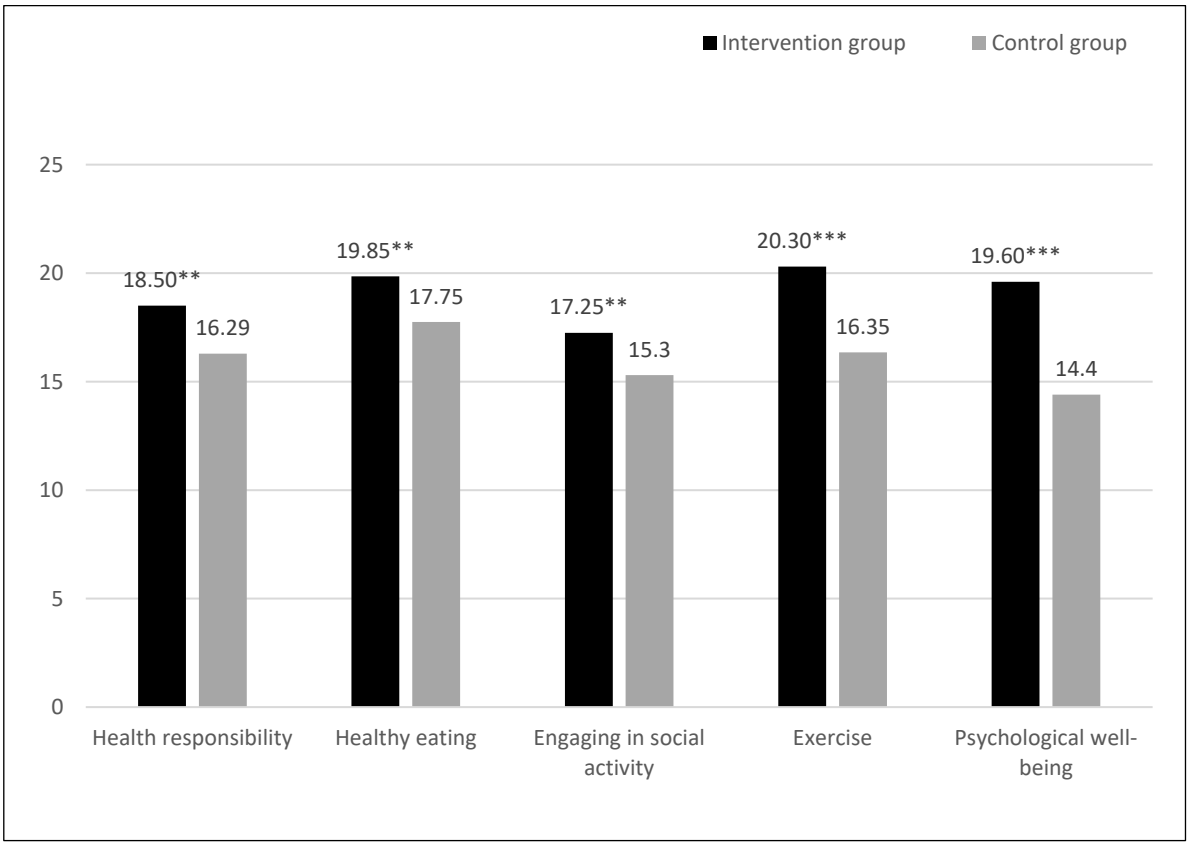
Note: BMI, Body Mass Index; SBP, Systolic Blood Pressure; DBP, Diastolic Blood Pressure; T1 Baseline; T2 Posttest; T3 Follow-up

The statistical analysis of HLBs and health outcomes in both the intervention and the control group were performed with a MANOVA with repeated measures. The results revealed that the HLBs were affected by time and depending on group analyzed, (Wilks'Lambda=0.107, $F_{12,27}$=18.71, p<0.001). For HLBs, there were significant differences at baseline, posttest and 1-month follow up in the intervention group (p<0.05).

Furthermore, there was a statistically significant Group x Time interaction for health outcomes, (Wilks' Lambda= 0. 67, $F_{6, 144}$= 5. 31, p<0. 001). For BMI, the self-management program significantly reduced all health outcomes of BMI at the posttest, and 1-month follow up compared to the baseline only in those in the intervention group (p<0. 01). By contrast, a post hoc test showed as significant only differences between baseline and 1-month follow up as well as posttest and 1-month follow up in the average BP (p<0.01).

Firstly, a MANCOVA, with baseline HLBs as covariates, was performed to determine differences in HLBs between the intervention group and the control group. The overall F revealed a significant difference in the mean posttest scores of HLBs between the groups (Wilks' Lambda $=0.25$, $F_{6,27}=13.70$, $p<0.001$). A follow-up test with post hoc tests showed that the intervention group reported significantly higher HLBs scores in health responsibility ($F_{1,32}=6.56$, $p<0.01$), healthy eating ($F_{1,32}=9.24$, $p<0.01$), engaging in social activity ($F_{1,32}=7.54$, $p<0.01$), exercising ($F_{1,32}=27.95$, $p<0.001$), as well as psychological well-being ($F_{1,32}=56.66$, $p<0.001$), as compared with the control group (Figure 2).

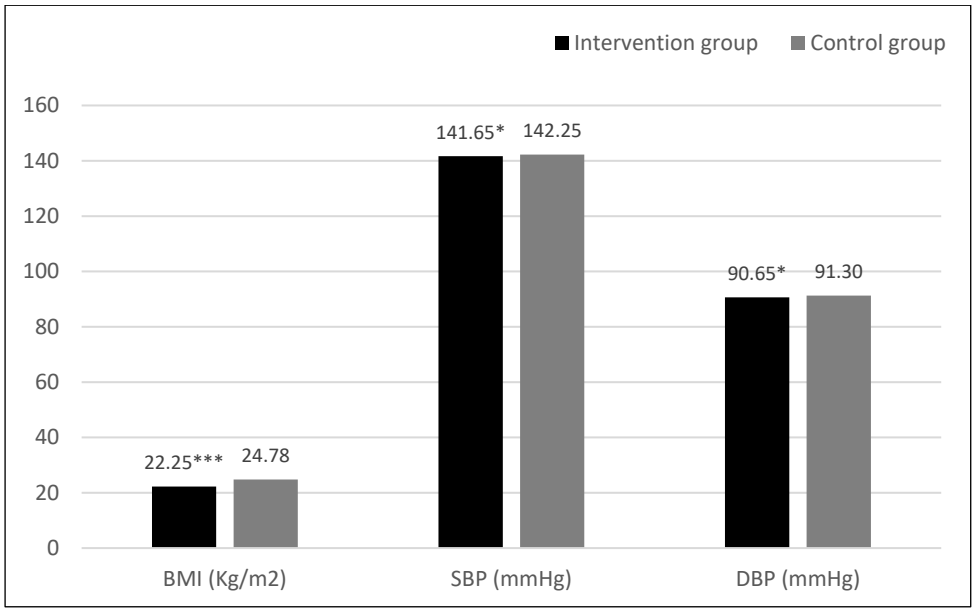
Difference between intervention group and control group on HLBs and health outcomes at the posttest



*Note: **p<0.01, ***p<0.001*

Figure 2. Healthy Lifestyle Behaviors means comparison between intervention group and control group at the posttest

Secondly, a MANCOVA, with baseline health outcome as covariates, showed that statistically significant multivariate differences between the posttest mean of BMI, SBP and DBP in the two groups (Wilks' Lambda=0.58, $F_{3,33}=9.66$, $p<0.001$). Post hoc tests showed a significant decrease in BMI in the intervention group compared with the control group at posttest, ($F_{1,35}=45.39$, $p<0.001$). However, there were no significant difference in the SBP means, ($F_{1,35}=3.235$, $p>0.05$), and DBP means, ($F_{1,35}=10.62$, $p>0.05$), of the two groups at the posttest (Figure 3).

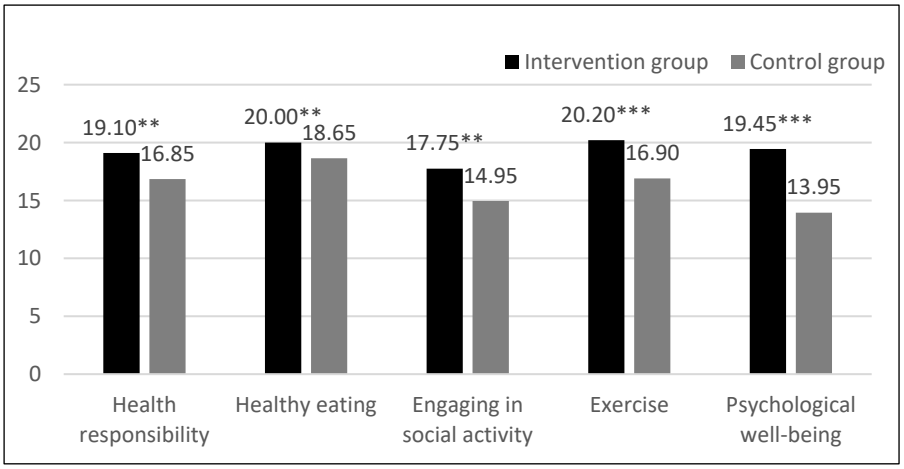


*Note: BMI, Body Mass Index; SBP, Systolic Blood Pressure; DBP, Diastolic Blood Pressure; *p<0.01, **p<0.01, ***p<0.001*

Figure 3. Health Outcomes means comparison between intervention group and control group at the posttest

Difference between intervention group and control group on HLBs and health outcomes at the 1-month follow up

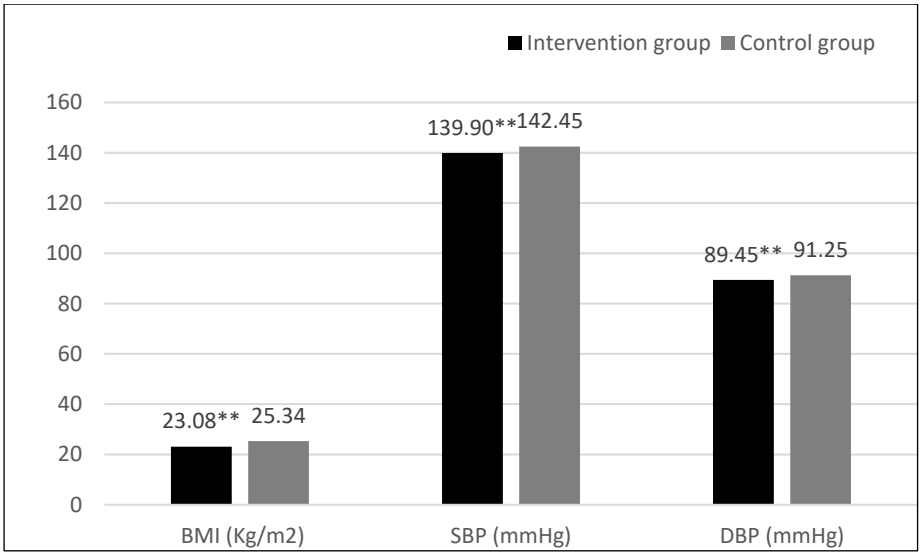
Thirdly, differences between groups at follow-up were evaluated through a series of MANCOVAs, with the same covariates as used in the posttest analyses. Results revealed significant differences in the mean follow-up scores of HLBs in the two groups (Wilks' Lambda= 0.09, $F_{6,27}$= 47.94, p<0.001). Post hoc tests showed that there were significantly greater health responsibility ($F_{1,32}$=47.47, p<0.01), healthy eating ($F_{1,32}$=19.03, p<0.01), engaging in social activity ($F_{1,32}$=76.67, p<0.01), exercising ($F_{1,32}$=102.14, p<0.001), as well as psychological well-being ($F_{1,32}$=302.88, p<0.001), compared with the control group (Figure 4).



*Note: **p<0.01, ***p<0.001*

Figure 4. Healthy Lifestyle Behaviors means comparison between intervention group and control group at the 1-month follow up

Finally, the multivariate tests revealed that the group variables, (Wilks'Lambda = 0.34, $F_{3,33}=21.79$, $p<0.001$), had statistically significant main effects. Post hoc tests showed a significant decrease in BMI in the intervention group compared with the control group, ($F_{1,35}=41.98$, $p<0.001$), SBP means, ($F_{1,35}=63.37$, $p<0.001$), and DBP means, ($F_{1,35}=45.65$, $p<0.001$), at follow up (Figure 5).



*Note: BMI, Body Mass Index; SBP, Systolic Blood Pressure; DBP, Diastolic Blood Pressure, **p<0.01, ***p<0.001*

Figure 5. Health Outcomes means comparison between intervention group and control group at the 1-month follow up

Discussion

This study on an intervention program was designed to induce behavior changes that will lead to a healthier lifestyle produced an interaction between time and group membership on HLBs. The control group showed no differences in HLBs scores between baseline and posttest, or at one-month follow-up. Furthermore, these results concur with the results of the study conducted by Heinrich, Schaper, and Vries (2010) in concluding that the best way to promote HLBs is by self-management. Possible reasons for the increase in HLBs might be that the program activities in this research focused on patient-tailored self-management (Jolly et al, 2016). It also focused on appreciating and addressing the individual needs of each participant, which was considered more appropriate than just lecturing the elderly to educate them. Instead, the experimental group were supported and encouraged to change their behaviors to be able to achieve self-management of their health for long-lasting HLBs.

Moreover, the experimental group achieved lower average BMI in the posttest and the follow-up than at baseline. This reduced BMI was maintained even at the one-month follow up. In contrast, at baseline and posttest, as well as at the one-month follow-up, the BMI of the control group showed no differences. This result concurs with the results of previous studies of self-management programs conducted by Melchart, Doerfler, Eustachi, Wellenhofer-Li, and Weidenhammer (2015) allowing the conclusion that a self-management program is effective in reducing body weight reduction. This could be due to participating in the self-management program and follow-up period encouraging the experimental group to control their diet and

body weight by restricting foods with high calories and high fat along with providing them with opportunities for more physical exercise.

However, when changes in average blood pressure readings were compared, the average blood pressure of the experimental group decreased more during the one-month follow-up period than at baseline and posttest. In contrast, at baseline, posttest, and the one-month follow-up, the BP average of the control group exhibited no differences. What was notable is that despite both the intervention and the control groups having full knowledge that they were suffering from hypertension before the program, they still kept on living unhealthy lifestyles and neglecting self-care by paying no attention to their blood pressure readings and relying only on doctors to treat their BP. There seemed to be either a lack of knowledge that their behavior could affect their BP or a lack of motivation to act. However, after the intervention group participated in the activities in the self-management program, their behaviors improved as their lifestyles became healthier. The average BP in the experimental gradually reduced as exercising consistently lowered the rate at which the blood was pumped from the heart. The decrease in peripheral arterial resistance helps to reduce arterial BP. A meta-analysis of 72 studies by Cornelissen and Fagard (2005) indicates that the least time for the BP level to change was 6 weeks after posttest. However, most studies suggest 14 weeks for the change to occur. The SBP and DBP before and after the program were unchanged in this study. This was perhaps caused by the shorter duration despite the regular performing of activities in the program that was designed to reduce BP. It seems that SBP and DBP are health outcomes that require time to change and a longer follow up period might have revealed changes (Thutsaringkarnsakul, Aungsuroch, & Jitpanya, 2011).

While this study produced some interesting results, it has several limitations that need to be considered. Firstly, there was some lack of statistical power due to the small sample size. Perhaps, this study requires to be replicated with larger groups with high blood pressure levels. There are few self-management programs in Thailand yet this study and the literature suggest that they appear to be effective. Based on this model, future studies could usefully adopt such self-management programs for the elderly with other chronic disease. A range of elderly groups also need to be studied as the elderly in each area are affected by different contextual and behavioral factors. Therefore, future studies should be designed using a Multigroup Multilevel Structural Equation Modeling Approach (MMSEM). Factors to be included would be self-management, health-management by social or medical service officers, environmental factors, demographic factors such as age, marital status, and the coexistence of family.

Secondly, the length of follow-up in this study was quite short (4 months post-baseline). Future intervention studies should cover a longer period both for the intervention and the follow-up to try to ascertain the optimum time required to ensure that the good habits being adopted are stable with regard to the intervention and that the follow-up period is long enough for all changes including BP to be evidenced. Future research could also assess the benefits to the individual in terms of improved quality of life and the economic benefits to the health service in terms of reduction in drug usage, burden of disease, rates of readmission to hospital and reduction in the complications occurring from the disease in the longer term. This study focused on the elders and their social-demographic characteristics and did not explore the role of families and other social supports. Future studies could usefully investigate the role of families and other social support in the development of HLBs and health outcomes improvements among the hypertensive elderly.

Acknowledgments

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