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ORIGINAL ARTICLE

The effects of self-efficacy and family support program in 6 positions of Rusie Dutton exercise on blood pressure level among elderly with hypertension

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ABSTRACT

Hypertension is a serious "silent killer" that significantly increases the risks of brain and cardiovascular disorders as well as other diseases. Exercise with family support has been shown to reduce blood pressure. This study explored the effects of a self-efficacy and family support program in 6 positions of the Rusie Dutton exercises on blood pressure among elderly with hypertension. A quasi-experimental research with two-group pretest-posttest design integrated self-efficacy and social support as a conceptual framework. Thirty elderly Bangkok residents aged 60 -75 years were selected for each group. The instruments consisted of the demographic data questionnaire, form for the measurement of perceived self-efficacy in exercise among the elderly with hypertension , blood pressure measuring instruments and the self-efficacy and family support program in 6 positions of the Rusie Dutton exercises. The experimental group of elderly hypertensive patients received self-efficacy promotion by exchanging experiences and learning 6 positions of the Rusie Dutton exercises. In addition, the researcher handed out handbooks for the participants to exercise at home 3 times per week, 60 minutes per session , for 8 weeks. Moreover, family members provided encouragement, feedback information and exercise video clips with suitable clothing. The control group exercised by themselves. Comparisons of the pretest and posttest systolic blood pressure (M=16.54, t=9.800, $p < 0.05$) and diastolic blood pressure (M=20.16, t=9.566, $p < 0.05$) between the experimental and control groups showed significant differences. The experimental group blood pressure was reduced post-program by an average of approximately 15 mmHg for systolic blood pressure and 20 mmHg for diastolic blood pressure. This study provides a model exercise program for elderly people with hypertension, and also for healthcare providers to apply the Rusie Dutton exercises as a complementary approach to enhancing the efficiency of blood pressure control among elderly people with hypertension.

Key words: self-efficacy, family support program, Rusie Dutton exercises, blood pressure, elderly, hypertension

INTRODUCTION

Elderly with hypertension have systolic blood pressure greater than or equal to 140 mmHg and diastolic blood pressure greater than or equal to 90 mmHg.[1] The treatment goal for systolic blood pressure control in elderly hypertensive patients should be 130-139 mmHg and 70-79 mmHg for diastolic blood pressure. A survey conducted in 2015 revealed 750,248 registered hypertensive patients in which elderly patients made up 3,446.83 per hundred thousand people.[2] The impact of hypertension in elderly patients is significant complications including heart failure, coronary artery disease, eye impairment, kidney disease and stroke[3] and even death if left untreated. Moreover, multiple complications result in higher healthcare expenditures. Therefore, elderly hypertension management by strengthening elderly self-efficacy and providing family support to prevent and control high blood pressure is essential.

Perceived self-efficacy is a factor influencing motivation to perform health behaviors. Persons with high perceived self-efficacy have low perceived barriers to health behaviors because the aforementioned persons do not recognize barriers as problems[4], but challenges. Bandura explained that a person's behaviors occur as a result of two factors, namely beliefs and outcome expectations. A person with efficacy beliefs will perform behaviors until success is achieved. Perceived self-efficacy is based on information from four sources, namely models or experiences of others, building physical and emotional readiness, enactive mastery experience and verbal persuasion. Families are an important source of social support. House explained social support as interactions between recipients and providers with love, attachment, care and support in various areas consisting of emotional support, valuation support, information support and family support in the area of resources.[5]

Family support is a major factor in promoting self-efficacy among elderly people with hypertension, because families can provide beneficial information, help elderly people seek personal weaknesses in exercise, provide recommendations and offer feedback. Thus, elderly people with hypertension have confidence and believe in self-efficacy until they can exercise consistently. This finding corresponds with previous studies finding that elderly people who exercise with family members by swinging their arms for 40 minutes per day, 3 days per week, for 9 days have better exercise behaviors than the control group with statistical significance.[6]

According to the literature review on exercise methods for reducing blood pressure among elderly people with hypertension, most studies addressed the following three issues: 1) promoting self-efficacy; 2) family support and 3) promotion of self-exercise among elderly people. However, no studies were conducted by integrating self-efficacy with family support for hypertensive elderly patients in performing Rusie Dutton exercises to develop a program for reducing blood pressure. Rusie Dutton exercises are exercises of various parts of the body to stretch, retract, turn and twist in order for flexibility. These exercises are movements to relieve pain, reduce nerve and muscle tension, increase muscle strength and chest mobilization, and help the arms, legs and joints move with greater flexibility.[7] According to previous findings, practicing Rusie Dutton exercises 30 minutes, three times a week for 4 weeks, helped increase mean heart rates, systolic and diastolic blood pressure and muscle strength.[8,9]

However, there is a dearth of research evidence on the specific benefits of Rusie Dutton exercises in each position.

Therefore, the researcher's interest is in studying the effects of the self-efficacy and family support program in 6 positions of the Rusie Dutton exercises on blood pressure levels among elderly with hypertension with self-efficacy and social support concepts as a formwork for the study. The researcher expects to obtain a model exercise program for elderly people with hypertension after the end of the study and guidelines for community nurses and healthcare providers to apply Rusie Dutton exercises in elderly people with other chronic diseases.

METHODS

This quasi-experimental research with a two-group pretest-posttest design was aimed at exploring the effects of the self-efficacy and family support program in 6 positions of the Rusie Dutton exercises on blood pressure among elderly people with hypertension. The experimental group was given the self-efficacy and family support program in 6 positions of the Rusie Dutton exercises for 8 weeks. The control group was taught the 6 positions of the Rusie Dutton exercises and given handbooks, but had no support from family members.

Population and Sample

The population was elderly people with hypertension living in Bangkok. Power analysis was used to determine the sample size. Power of the test was set at .80 with a .05 level of significance and a .71 effect size. Next, 15 % was added to compensate for the dropout rate.[10] The sample size was 60 people from two communities in Bangkok. The participants were randomly selected by lottery from lists of elderly hypertensive patients in different communities with 30 subjects in each group. Inclusion criteria included patients with no restrictions against exercise such as coronary heart disease, cerebrovascular accident, knee osteoarthritis, peripheral arterial disease of the legs; Grade 1 BP of 120-159/90-99 mmHg, and ability to speak, read and write in Thai. In the experimental group, the elderly people with hypertension had to choose one family member capable of taking care of the elderly in exercise and possession of a smart phone with the LINE application and Internet access. The exclusion criteria were musculoskeletal pain, chest pain, dizziness during the practice and mental disorders.

Research Instruments

1. The instrument used to collect data is divided into the following two parts:

Part 1: The demographic data questionnaire was created by the researcher based on the literature review and related studies with 11 questions for elderly people with hypertension to answer. The questions had choices for responses with blank spaces to add short statements related to gender, age, marital status, level of education, family financial status, background of chronic illnesses, current exercise methods, family characteristics, number of family members and blood pressure scores. The respondents took 10 minutes to complete the questionnaires.

Part 2: The perceived self-efficacy in exercise measurement form for elderly people with hypertension was created by the researcher based on the literature review.[11] The form contained 10 questions with responses on a 5-level rating scale (most confident, high confidence, medium confidence, low confidence, and no confidence) with total scores of 10–50 points. High perceived self-efficacy among the elderly people with hypertension meant they had higher perceived self-efficacy in

exercising. The sample took 10 minutes to complete the questionnaires.

2. The research instruments were as follows:

1) HEM-7320 Omron digital blood pressure measuring device. The device was calibrated by comparing with the mean of blood pressure with mercury sphygmomanometer at the same time. Participant's blood pressure was re-measured after subjects had rested for at least 5 minutes.

2) The self-efficacy and family support program in 6 positions of the Rusie Dutton exercises was applied from Bandura[4] and House.[5]

This program involved eight themes for self-efficacy enhancement and family support of improvement over an 8-week period. Vicarious experience was performed by exchanging experiences with elderly hypertension models. Perceptions of physiological and affective responses were organized by 5-minute breathing meditation. Performance accomplishment was encouraged by teaching 6 Rusie Dutton exercise positions and feedback demonstrations. Verbal persuasion, emotional and appraisal support were provided by family members' encouragement. Information support was stimulated by watching video clips of Rusie Dutton and reading handbooks. Instrumental support was promoted by family members who prepared exercise clothing.

Validation of Research Instrument Quality

All of the research instruments were submitted to six experts to check content validity. The form for measuring perceived self-efficacy in exercising among elderly people with hypertension had a content validity index of 1, while the Index of Item Objective Congruence (IOC) of the self-efficacy and family support program and the Rusie Dutton exercise handbook for elderly people with hypertension was 0.78. In testing instrument reliability, the researcher tried the form for measuring self-efficacy in exercise among 30 elderly people with hypertension meeting the same criteria as the participants. Cronbach's alpha coefficient for the test of self-efficacy in exercise was .872.

Research Ethics

Study protocol conformed to the Declaration of Helsinki and was approved by the Institutional Review Board, Faculty of Nursing, Mahidol University, No. IRB–NS 2020/05.0601. The participants read and signed informed consent forms before participating in the study.

Data Collection

This study collected data from the experimental and control groups. This research was conducted over a period of approximately 8 weeks in 2020 as follows:

Experimental Group

Community Health Center, Morning of the First Day of the First Week (3 hours): The researcher visited elderly people with hypertension and family members. Elderly people with hypertension completed two questionnaires, namely the demographic data questionnaire and the form for measuring perceived self-efficacy in exercise, measured blood pressure, met with family members and handed out family support plans as guidelines for supporting the participants. Elderly people with hypertension exchanged experiences with model hypertensive elderly people who had been successful in the Rusie Dutton exercises in groups, taught about methods for assessing abnormal symptoms and corrections if abnormal symptoms occur before and during Rusie Dutton exercises, taught the participants to

meditate and walk back and forth to practice breathing, taught 6 Rusie Dutton exercise positions consisting of Damrong Kai Ayuyuen, Chuhad Wadlang, Kae Kiad, Ying Tanu, Non Ngai Pai Pod and Non Kwam Pab Bat, demonstrated until the participants were able to exercise correctly and handed out Rusie Dutton exercise handbooks.

At Home, Second Day of First Week – Sixth Day of Eight Weeks: Elderly people with hypertension performed 6 Rusie Dutton exercises for 60 minutes per time over a period of 8 weeks and, before exercising, the elderly with hypertension warmed by meditating and walking back and forth to practice breathing, which took 5 minutes. After exercising they meditated for 5 minutes. Family members encouraged, prepared suitable exercise outfits and provided feedback information on elderly people with hypertension on the accuracy of Rusie Dutton exercises.

First Days of Second and Fourth Weeks (5 minutes): The researcher followed up and visited family members by telephone to monitor the participants' exercise.

First days of Third and Fifth Weeks: The researcher sent a video clip on Rusie Dutton exercise to family members via the LINE application (length = 5 minutes/3 positions) to allow family members to play a video clip on Rusie Dutton exercise for the participants to review on a mobile phone.

Morning, Seventh Day of Eighth Week (20 minutes): Elderly people with hypertension completed the form for measuring perceived self-efficacy in exercise and measured blood pressure.

Control Group

Community Health Center, Afternoon of First Day of First Week (1 hour and 40 minutes): Participants completed two questionnaires, namely the demographic data questionnaire and the form for measuring perceived self-efficacy in exercise. Then the researcher measured blood pressure, taught about methods for assessing abnormal symptoms and corrections if abnormal symptoms occurred before and during Rusie Dutton exercise, taught the participants to meditate and walk back and forth to practice breathing, taught 6 Rusie Dutton exercise positions (Damrong Kai Ayuyuen, Chuhad Wadlang, Kae Kiad, Ying Tanu, Non Ngai Pai Pod and Non Kwam Pab Bat), demonstrated until the participants could exercise correctly and gave out Rusie Dutton exercise handbooks.

At Home, Second Day of First Week – Sixth Day of Eight Weeks: The participants performed 6 Rusie Dutton exercises by themselves at 60 minutes per time for 8 weeks. Before exercise, the elderly people with hypertension warmed up by meditating and walking back and forth to practice breathing (5 minutes) and meditated for another 5 minutes after exercising.

Afternoon, Seventh day of Eighth Week (20 minutes): The participants completed the form for measuring perceived self-efficacy in exercise and measured blood pressure.

Data Analysis

Data analysis was performed by using the SPSS program as follows: The differences in the group demographic data of the experimental and control groups were compared by using the chi square testing and Fisher's Exact Test. The mean systolic blood pressure and diastolic blood pressure were compared between the intervention group and the comparison group were compared using independent t-test statistics and experimental groups were compared before and after the mean systolic blood pressure and diastolic blood

pressure by using paired t - test statistics. A p-value < 0.05 was considered statistically significant.

RESULTS

Most elderly people with hypertension in the experimental and control groups were females, married and had educational attainments at the secondary education/equivalent levels and up. Most of the experimental group had insufficient income, while the control group had sufficient income without savings. Most of the experimental group exercised by walking and swinging arms, while the control group did not like to exercise. Therefore, the researcher trained the participants to perform the Rusie Dutton exercises and gave exercise handbooks to both groups. Most family members living with elderly people with hypertension in the experimental and control groups were spouses, children and grandchildren who wanted husbands/wives and children to help with exercise.

The mean posttest systolic blood pressure of elderly people with hypertension in the experimental group after participating in the self-efficacy and family support program with Rusie Dutton exercise (*M*=126.13, *SD*=7.776, p < .05) was lower than the same pretest score (*M*=140.67, *SD*=6.525, p < .05) at 14.54 mmHg.

The mean posttest diastolic blood pressure of the elderly people with hypertension in the experimental group after participating in the self-efficacy and family support program with Rusie Dutton exercise (*M* =73.97, *SD*=11.346, p < .05) was lower than the same pretest score (*M*=98.83, *SD*=2.069, p < .05) at 24.86 mmHg, as show in Table 1.

Table 1 - Mean and standard deviation by systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the intervention group, before and after participating in the program.

Variables	Program	Intervention Group			
		M (SD)	t	df	p-value
SBP (mmHg)	Before	140.67 (6.525)	10.933	29	.000
	After	126.13 (7.776)			
DBP (mmHg)	Before	93.83 (2.069)	9.234	29	.000
	After	73.97 (11.346)			

The mean systolic blood pressure of the elderly people with hypertension in the experimental group after participating in the self-efficacy and family support program with Rusie Dutton exercise (*M*=126.13, *SD*=7.776, p < .05) was lower than the control group (*M*=142.67, *SD*=4.992, p < .05) at 16.54 mmHg.

The mean posttest diastolic blood pressure of the elderly people with hypertension in the experimental group after participating in the self-efficacy and family support program with Rusie Dutton exercise (*M*=73.97, *SD*=11.346, p < .05) was lower than the control group (*M*=94.13, *SD*=2.145, p < .05) at 20.16 mmHg, as show in Table 2.

Table 2 - Mean and standard deviation by systolic blood pressure (SBP) and diastolic blood pressure (DBP) between the intervention and control groups before and after participating in the program.

Variables	Program	Control Group	Intervention Group			
		M (SD)	*M (SD)*	t	df	p-value
SBP (mmHg)	Before	138.47 (5.740)	140.67 (6.525)	-1.387	58	.171
DBP (mmHg)	Before	93.17 (1.821)	93.83 (2.069)	-1.325	58	.190
SBP (mmHg)	After	142.67 (4.992)	126.13 (7.776)	9.800	58	.000
DBP (mmHg)	After	94.13 (2.145)	73.97 (11.346)	9.566	58	.000

DISCUSSION

Research Hypotheses 1 - Participants who received the self-efficacy and family support program with Rusie Dutton exercise had lower mean posttest blood pressure than those who did not receive the program. The findings can be discussed as follows: 1) The experimental group exchanged experiences with model elderly people with hypertension who successfully performed Rusie Dutton exercises in groups. Observations of the models' actions might have helped the experimental group use the exercise modeling as guidelines in practice, thereby resulting in exercise until blood pressure was lower than the control group.[12] Similarly, hypertensive patients viewed models and symbols of staff-dancing exercises, watched VCD media and acted as models. The experimental group had lower mean systolic blood pressure than the control group.[13] 2) The experimental group received encouragement, reminders and praise before and after they exercised. Verbal persuasion or recommendations from family members might have caused the experimental participants to feel that they received more love and concern, which persuaded them to exercise more.[12] This finding corresponded with the hypertensive elderly patients who received capacity-building through verbal persuasion and encouragement to exercise. The experimental group was able to control systolic blood pressure at acceptable levels (SBP < 139 mmHg) and better than the comparison group.[14] 3) Family members provided feedback information for the hypertensive elderly patients concerning the accuracy of Rusie Dutton exercise along with handbooks and video clips, which might have caused the elderly people with hypertension to continually self-improve and assess with increasingly convenient access to news and information.[15] The findings were consistent with the findings of elderly hypertensive providing feedback information, viewing hypertension knowledge videos, recommending hypertension knowledge and exchanging experiences. The experimental group was found to have lower mean systolic and diastolic blood pressure scores than the control group.[16,17]

Research Hypotheses 2 - Participants who received the self-efficacy and family support program in 6 positions of Rusie Dutton exercise had lower mean posttest blood pressure than at pretest. The findings can be discussed as follows: Rusie

Dutton exercise is an aerobic exercise with continuous movement of large muscles in each posture. By using oxygen as a large source of energy, the lungs, heart and blood vessels are affected due to the manner of exercise with stretching and controlled breathing. These findings correspond with Rusie Dutton exercise for 30 minutes, 3 times, 4 weeks, which can result in lower mean systolic and diastolic blood pressure, while muscle strength of inspiration breathing before exercise[8,9]. Moreover, 4 positions (Chuhad Wadlang, Gaegiad, Non Ngai Pai Pod, and Non Kwam Pab Bat) from 6 positions of Rusie Dutton exercise increased oxygen circulation in the lungs. Thus, hemoglobin can take more oxygen. And each time the heart compresses, the increasing oxygen supply in the blood decreases heart rate and blood pressure.[18] Exercise that induces lower muscle movement includes Damrong Kai Ayuyuen and Ying Tanu, both of which help reduce muscle tension and promote muscle relaxation. The impact on reducing body stimuli of the central nervous system, particularly concerning hypothalamus and reticular formation, regulates the autonomic nervous system functions, which reduces heart rate and blood pressure.[19-20]

Studying its strengths, the program has potential to reduce BP. Family members can motivate Thai wisdom through Rusie Dutton exercise in elderly with hypertension for sustainable exercise. Moreover, exercises have effective physical and psychological benefits for participants. However, limitations such as uncontrolled the anti-hypertensive medications of participants should be addressed.

RECOMMENDATIONS

The results obtained from this study should be monitored and assessed in the long term, then used with other models of exercise with effects on other areas of physical capabilities or to create consistency with other areas of physical capabilities requiring measurement of physical fitness. Further research designs may increase the measurement of exercise behavior of the elderly with hypertension.

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