A Casual Model of Adherence to Therapeutic Regimens Among Thai Older Adults with Hypertension

Arunya Namwong, Sirirat Panuthai, Thanaruk Suwanprapisa, Totsaporn Khampolsiri

Abstract : A cross-sectional, predictive correlational design was used to test a causal relationship between predicting factors and adherence to therapeutic regimens among older adults with hypertension. Simple random sampling was used to obtain a sample of 341 attending five hypertension clinics in a community hospital in northern Thailand. Data collection used 9 questionnaires, including the personal information sheet, the Chula Mental Test, the Chula Activities of Daily Living Index, the Hypertension Knowledge-Level Scale, the Health Belief for Hypertensive Patient Scale, the Hypertensive Self-efficacy Scale, The Hypertensive Social Support Scale, the Provider-Patient Communication Scale, and the Hypertensive Adherence to Therapeutic Regimens Scale. Data were analyzed by Pearson's product moment and structural equation model.

Results showed that the modified model fitted with the data and explained 60% of the variance in adherence to therapeutic regimens. Physical function, perceived self-efficacy to adherence, provider-patient communication had a direct effect on adherence to therapeutic regimens; social support from family had both direct and indirect effect through health belief (only perceived severity and barriers) and perceived self efficacy to adherence. Both had a had both direct and indirect effect on perceived self-efficacy to adherence through perceived susceptibility, but had only a direct effect on perceived benefits. Also social support from family had an indirect effect on perceived barriers through provider-patient communication then through knowledge of hypertension. Cognitive function had an indirect effect on adherence to therapeutic regimens through perceived self-efficacy to adherence and also indirect effect on perceived barriers through knowledge of hypertension.

Nurses should be aware of factors predicting adherence to therapeutic regimens and adopt these factors in potential nursing interventions, especially physical function, perceived self-efficacy to adherence, provider-patient communication, social support from family, perceived severity, and perceived barriers.

Pacific Rim Int J Nurs Res 2015; 19(2) 107-121

Keywords: Adherence; Causal model; Hypertension; Thai older adults; Therapeutic regimens

Introduction

Ageing populations are rapidly increasing worldwide leading to a high rate of premature morbidity and mortality from chronic diseases related to advancing age.[1,2] Hypertension is one of the serious diseases increasing drastically with age worldwide.[1] In Thailand, hypertension is a disease which is one of the top five

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diseases leading to a major cause of morbidity and death within a period of eight years.[3] The 4th Thai National Health Examination Survey showed that the prevalence of Thai older adults with hypertension was the highest, ranging from 44.0 to 55.9% and only 22 to 25% can control their blood pressure.[2] The critical impacts from uncontrolled blood pressure in these groups include stroke, heart diseases, and chronic kidney disease which lead to an increased rate of hospitalizations and health care costs.[4-5]

In controlling blood pressure to achieve the optimal goal, older adults with hypertension should be more likely to perform adherence to therapeutic regimens (ATR) which were launched by the World Health Organization (WHO).[6] The definition of ATR defined by WHO refers to the extent to which a person's behavior corresponds with agreed recommendations which emphasizes taking medication, following a healthy diet, and changing lifestyle.[7] Also, it is defined as persistence in the practice and maintenance of desired health behaviors resulting from having active participation and agreement.[8]

The benefits of ATR are clearly evident with the achieving optimal control of blood pressure and preventing its complications. Older adults with hypertension who have a higher rate of ATR can lead to a reduced risk of cardiovascular events and stroke compared to lower adherence.[9,10] When patients adopted the Dietary Approaches to Stop Hypertension (DASH) diet and lowered their sodium intake, their blood pressure could reduce by 2 to 8 mmHg.[11] Also, having a high rate of adherence to medications showed a lower level of systolic and diastolic blood pressure by 23.11and 15.18, respectively.[12] However, impacts of poor ATR contribute to higher health care costs and prolonged hospitalization.[13]

The four models of adherence explaining factors affecting adherence have been developed, the Five Dimensions Model of Adherence (FDMA)[7], the Medication Adherence Model (MAM)[14], the Hill-Levine model[15] and the Medication Adherence Model developed by Park and Jones.[16] The limitations for some factors from both the FDMA and the Hill-Levine model cannot be modified, especially socioeconomic-related factors, condition-related factors and therapy-related factors of the FDMA are unable to be modified by the nursing role. Also, the MAM and the Medication Adherence Model developed by Park and Jones focused on only medication are limited to explain lifestyle modification.

In Thailand, two studies have examined factors affecting directly and indirectly ATR in persons with hypertension. However, both studies had limited practical implications for interventions enhancing ATR among older adults with hypertension. Although one study focused on both medication and lifestyle modification, it has been conducted only in adult persons who have age ranges of 35-59 years.[17] Thus, from this study it is not possible to generalize to older adults with hypertension who are different from adult persons. In general, older adults are more likely to have biologic processes underlying age-related declines in both physical and cognitive functioning which are remarkably different from younger persons. Thus, to enhance ATR among older adults with hypertension, both medication and lifestyle modification may be more difficult tasks because of the complexity of adherence behaviors. As a result, they should be carefully promoted and taken care of by their family members who play an important role in helping them to perform adherence behaviors. Thus, to apply this model may be faulty due to inadequate knowledge of specific factors covering intervention for promoting adherence and may lead to improper hypertension management among older adults with hypertension. Another study was conducted in older adults with hypertension[18], but it focused only on medication adherence and some factors could not be manipulated by the nurses' role.

When focusing on modifiable factors affecting adherence to therapeutic regimens, it is advisable to integrate aforementioned factors into interventions

and for development of strategies to improve adherence.[19] Thus, this study was focused on the modifiable factors affecting adherence to therapeutic regimens among older adults with hypertension. However, it is necessary to test the modifiable factors directly and indirectly affecting ATR among Thai older adults with hypertension.

Review of Literature

Adherence according to the WHO[7] is defined by the extent to which a person's behavior corresponds with agreed recommendations which emphasizes taking medication, and executing changing lifestyle. Also, it refers to persistence in the practice and maintenance of desired health behaviors which focused on an active participation agreement with given recommended treatments and also having mutual responsibility in encounter treatment between patients and health care providers.[8] The four attributes of adherence, based on Cohen[8] who conducted concept analysis of adherence, consist of alignment of patient behavior and health recommendations, mastery of a new behavior and health knowledge, ongoing collaborative relationships between the patient and health care provider, and their perceived ability to meet the outcome targets. Thus, ATR in older adults with hypertension is defined as the extent in which their behaviors have agreement and performance in the recommendation of health behaviors, including antihypertensive drugs taking and lifestyle modification consisting of dietary control, weight control, smoking cessation, physical activity, alcohol intake limitation, and stress management.

Factors affecting ATR, are derived from five dimensions adherence model of WHO[7] which includes social and economic factors, health care team-related factors, condition-related factors, therapy-related factors, and patients-related factors. Because, several factors from other dimensions cannot be modified by nurses' roles and controlled by patients, specifically, demographic data such as age, marital status, educational level, income. Also, these factors do not exactly determine the direction in causal pathways. Selecting modifiable factors are advisable to integrate into interventions and developing strategies to improve ATR.[19] These dimensions include patients-related factors and health care team-related factors. Patients-related factors are composed of cognitive function, physical function, perceived self-efficacy to adherence, knowledge of hypertension, health belief and perceived social support from family, whereas health care team-related factors include provider-patients communication. These factors can be described as follows:

Cognitive function refers to the process by which information is acquired, stored, shared and used, mainly including intellectual tasks such as thinking, remembering, perceiving, communicating, calculating, and problem solving.[18,20] One study indicated that reduced cognitive function was associated with poorer adherence to treatment in older adults with heart failure.[21] Cognitive function had a positive direct effect on antihypertensive medication adherence among older adults with hypertension.[18] Also, it had and indirect positive effect on self-management via self-efficacy in Thais' self-management behaviors with chronic kidney disease (CKD).[24]

Physical function is the extent to which persons are able to perform the needed basic activities in daily life (BADL) and instrumental activities of daily living (IADLs).[22] Essentially, IADLs, including handling personal finances, cooking, shopping, traveling, doing housework, using the telephone, and taking medications, are more concerned affecting ATR among older adults with hypertension.[23] Physical function positive direct and indirect affects on self-management via self-efficacy among older adults with CKD.[24]

Knowledge of hypertension refers to information regarding hypertension, medication, adherence to therapy, lifestyle modification, complications, and continuous follow-up visits.[25] The latest systematic review and meta-analysis found that a lack of knowledge of hypertension was the most common barrier to

hypertension management.[26] Also, knowledge of hypertension had a positive direct and indirect effect on self-management via self-efficacy in older adults with CKD.[24]

Health beliefs refer to the perceptions of an individual about susceptibility to a disease, the seriousness of the disease, the benefits of taking specific actions to reduce threat of disease and barriers to manage the illness.[27] In FDMA, health beliefs are expanded and integrated by WHO in relation to the dimension of patient-related factors that refer to patients' belief in their diseases and treatments.[7] These variables are significant factors explaining and predicting health-related behaviors.[28] Specifically, perceived barriers are the strongest predictor of compliance to hypertensive treatment in persons with hypertension.[28] Health beliefs have a direct effect on mediation adherence among older adults with hypertension.[18] As well, these variables indirectly affected ATR via perceived self-efficacy among Thais with hypertension.[17]

Perceived self-efficacy is a belief of persons who have ability to deal with a specific situation to achieve a desired outcome.[29] Some studies found that perceived self-efficacy was significantly related to ATR among persons with hypertension.[17,30] It had a positive direct effect on ATR among persons with hypertension. Also it was the strongest predictor and mediating factor of ATR[17] and self management.[24]

Social support is usually determined by emotional, instrumental, information, and appraisal support from family, friends, and social network in which people are involved with in their life.[31] Social support from family has been found to play a significant role for supporting older adults with hypertension.[31] Social support has a positive direct effect on medication adherence behavior in the elderly with hypertension.[18] Also, social support from family has a positive direct and indirect effect on self-management via self-efficacy among Thai older adults with CKD.[24] Moreover, social support from family may indirectly influence ATR via knowledge of hypertension, provider-patient communication and health beliefs.

Provider-patient communication is the perception of patients about physicians' communication, including general clarity during conversation, explanation by the physician of both the disease and treatment, and active listening during dialogues, and responsiveness to patient problems concerning disease management.[32] It was significantly related to both medication adherence and lifestyle modifications[33] and had a positive direct effect on ATR among persons with hypertension.[17] Provider-patient communication may indirectly influence ATR through knowledge of hypertension, perceived self-efficacy, and health beliefs.

From the literature review, factors affecting ATR, both medication and lifestyle modification among Thai older adults with hypertension were less evidently known. Therefore, developing a causal model of ATR is necessary to enhance better understanding of the modifiable adherence factors that directly and indirectly affect ATR among Thai older adults with hypertension.

Study aim

The aim of this study is to test the causal model depicting the relationship among patient-related factors (cognitive function, physical function, knowledge of hypertension, health belief [perceived susceptibility, perceived severity, perceived benefits, perceived barriers], perceived self-efficacy to adherence, social support from family) and health care team-related factors (provider-patient communication) influencing ATR. The hypothesized model of factors influencing ATR among older adults with hypertension was shown in Figure 1. It was hypothesized that the model fits the

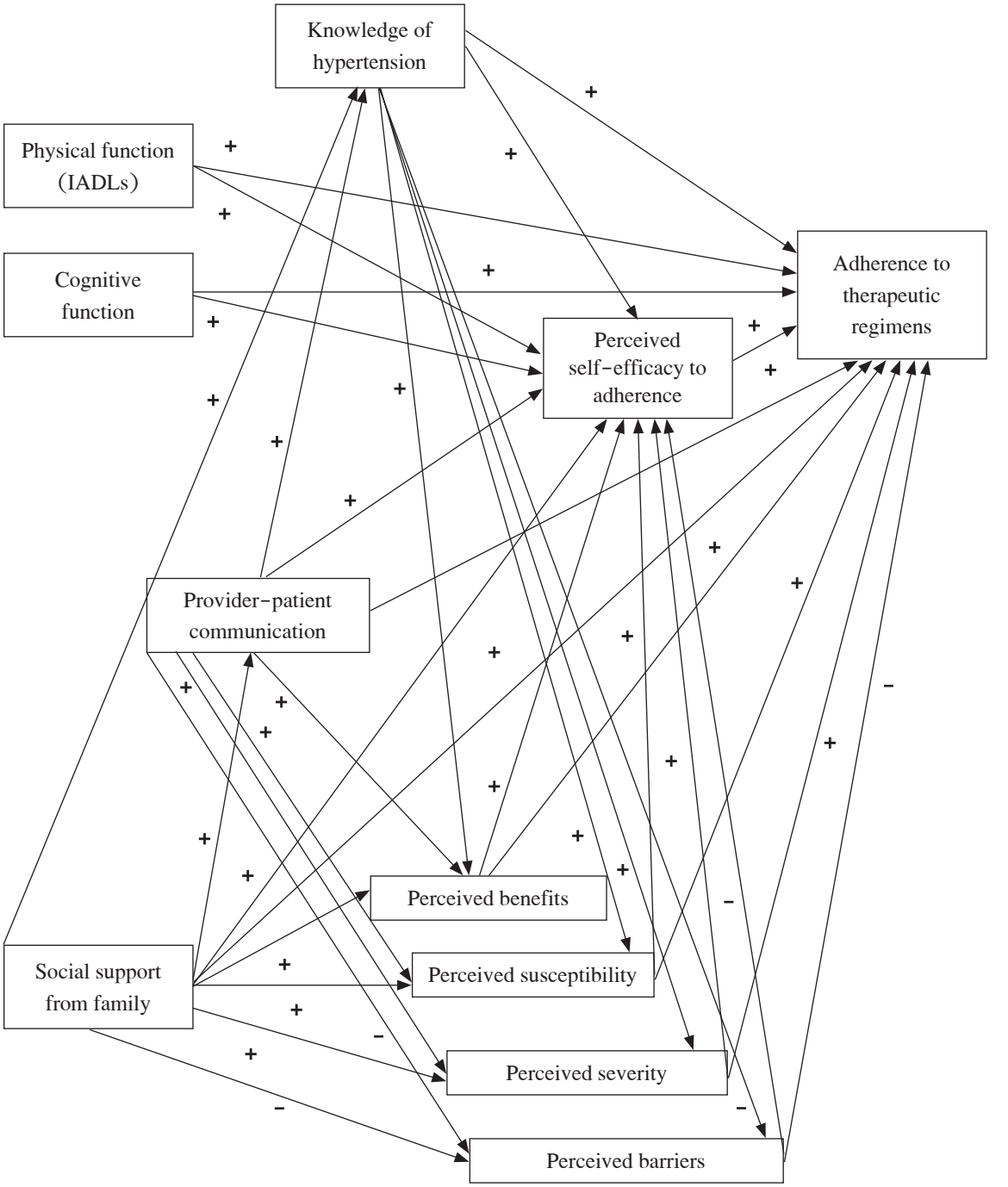


Figure 1 Hypothesized Conceptual Framework for A Causal Model of Adherence to Therapeutic Regimens Among Thai Older Adults with Hypertension

data.

Method

Design: A descriptive, cross-sectional, predictive correlational design was used to test the hypothesized model.

Ethical Considerations: The study was approved by The Research Ethics Committee of Faculty of Nursing, Chiang Mai University and the directors of the five hospitals selected for study sites. Ethical considerations included the nature and processes of the study, anonymity and confidentiality issues, voluntary involvement, and the right to withdraw at any time without repercussions were given to all eligible participants. When all participants agreed to participate, they were asked to sign a consent form.

Setting: The setting was five hypertension clinics of community hospitals located in a northern Thai province.

Sample: The sample size was based on the guideline of the sample size calculation for basic multiple regression[37] and estimated by using 15 observed variables of predicting factors, an acceptable level of power of 0.80, and effect size of 0.075. It was determined to be 310 subjects. An additional 31 (10%) participants were added for a dropout rate, resulting in a desired sample of 341. Simple random sampling technique was used to obtain participants meeting the inclusion criteria of:

1) being an Thai older adult with hypertension aged ≥60 years;

2) diagnosed with hypertension for at least 6 months;

3) taking antihypertensive drug of at least one type;

4) no symptoms that could interfere with patient's ability to respond to self-report questionnaires such as head ache, dizziness, vertigo, blurred vision; and

5) being able to understand the Thai language.

Instrument: Nine instruments were used to collect data:

The personal information sheet, modified from Pinprapapan[17] consisted of information regarding: gender; age; marital status; educational level; personal income; occupation; medical payment; living arrangements; whether an in-patient admitted with hypertension or complications; duration of being diagnosed with hypertension; complications of hypertension; the amount of medication per day; the intervals between follow-up appointments; and blood pressure level.

The13-item *Chula Mental Test (CMT)* developed by Jittapunkul et al[34] was used to assess the cognitive function regarding: remote memory (i.e. "How old are you?"); orientation (i.e. "What time is it?"); immediate memory (i.e. "Registration of umbrella, pan and door"); general knowledge (i.e. "How many kilograms are there in one tang of rice?"); language(i.e. "Follow command clap your hands 3 times and then cross your arms"; judgment (i.e. "What would you do if you forgot a key to your locked house?"); attention (i.e. "Count 10 to 20" and "Subtract 3 from 20 for 3 times"). Response to all items was either 0 = "incorrect" or 1 = "correct". The total score ranged from 0-19. The interpreted scores were shown in four levels, including normal cognitive function (scores 15-19), mild cognitive impairment (scores 10-14), moderate cognitive impairment (scores 5-9), and severe cognitive impairment (scores 0-4). The reliability of this study which tested by test re-test was r = 1.00; $p < .01$.

The 5-item *Chula Activities of Daily Living Index (Chula ADL)* was developed by Jittapunkul et al.[35] It consisted of five complex activities, including 1-item walking outdoors, 1-item cooking, 1-item using public transportation, 1-item doing heavy housework and 1-item money exchange. The possible responses and the examples of items are: "walking outdoors" (0 = "don't walk", 1 = "using a wheel chair or need partial assistance from another", 2 = "walking with help from other person"; or, 3 = "walking independently."); "cooking and using public transportation" (0 = "inability for any activities;" 1 = "need partial assistance from other person"; or 2 = "doing independently by oneself").

The total possible scores ranged from 0 to 9 and were interpreted by the range of total scores, the higher the total score, the greater the physical function whereas the lower the total score, the lower the physical function. The test-retest reliability, in this study, was r = 1.00; $p < .01$.

The 22-item *Hypertension Knowledge-Level Scale (HK-LS)* was developed by Erkoc and colleagues.[25] It is a self-report questionnaire consisting of 22 items with sub-dimensions consisting of the definition of hypertension (2 items), medical treatment (4items), drug compliance (4 items), lifestyle (5 items), diet (2 items), and complications (5 items). The responses are all dichotomous including correct (= 1 point), and incorrect (= 0 point). Examples of items are: "Increased blood pressure can cause premature death if left untreated?" and "For individuals with increased blood pressure, the best cooking method is frying". The total scores ranged from 0 to 22, was obtained by summing the response values across all items. The cut-off point was classified into two levels, including adequate knowledge (≥18) and inadequate knowledge (< 18). In this study, the reliability was 0.799. The reliability of the HK-LS in the actual study was 0.551. The value of reliability was lower than that of preliminary study because it may be that the data were not normally distributed.

The 26-Item *Health Belief for Hypertensive Patient Scale (HBHS)* was developed by Pinprapapan.[17] It consists of 26 items and the response to each item is on a 4-point rating scale. This scale consists of four parts including perceived susceptibility = 7 items, perceived severity = 6 items, perceived benefits = 6 items and perceived barriers = 7 items. Examples of items are: "Having had hypertension induces cardiovascular diseases" and "Taking antihypertensive drugs regularly can control high blood pressure". Possible responses range from 1 = not agree to 4 = mostly agree and negative items range from 1 = mostly agree to 4 = not agree. The total score was obtained by summing the response values across all items, and ranged from 26-104. Higher scores indicated a higher appropriate health belief. In this study, it had its reliability was 0.85. The reliability of HBHS in the actual study, including perceived barriers, perceived benefits, perceived susceptibility, and perceived severity was 0.77, 0.58, 0.73 and 0.89 respectively.

The 26-Item *Hypertensive Self-efficacy Scale (HSS)* was developed by Pinprapapan[17]. It was used to measure the perception of the hypertensive patients about their confidence to perform ATR, including taking medication, dietary modification, weight control, physical exercise, avoiding risk factors, stress control, and follow-up visits to control their blood pressure. Example of an item is "You can visit the doctor/nurse before the follow-update if you have symptoms such as headache, nausea, vomiting and paralysis." The response for each item ranges from 1= less confidence to 4 = most confidence. A total score is obtained by summing the response values across all items, and ranged from 26-104. Higher scores indicated higher perceived self-efficacy. In this study, the reliability was 0.81. The reliability of the HSS in the actual study was 0.837.

The 20-item *Hypertensive Social Support Scale (HSSS)* developed by Pinprapapan[17]. It was used to measure the level of perceived support to perform recommended behaviors, including emotional, informational, instrumentional, and appraisal support. Example of an item is: "You perceive that other people care about your illness and hypertension treatment". Each item had possible responses ranging from 1= not true to 4 = strongly true. A total score is obtained by summing the response values across all items, ranging from 20-80. Higher scores indicated better social support. The reliability of the HSSS was 0.80. The final test for the reliability of the HSSS in the actual study was 0.894.

The 9-item *Provider-Patient Communication Scale (PCS)* was developed by Pinprapapan[17] based on Xu.[32] This scale was used to measure participants' perceptions of providers communication, including general clarity, explanation of related medical care and carefully listening to and responsiveness to patients' problems and concerns. Example of an item is: "Your physician/pharmacist/nurse explained to you how to

take anti-hypertensive drugs (when, how much, and for how long)." Each item had possible responses ranging from 1= never to 4 = always, and 1= always to 4 = never for negative items. The total score was obtained by summing response values across all items, ranging from 9-36. The higher scores indicated better communication between patients and health care providers. The reliability of the PCS was 0.818.The reliability of the PCS in the actual study was 0.475. It was lower than that of the preliminary study because it may be that the data were not normally distributed.

The 29-item *Hypertensive Adherence to Therapeutic Regimens Scale (HATRS)* was developed by Pinprapapan[17]. It was used to measure the extent of agreement and performance of persons with hypertension regarding behavioral recommendations. The scale includes medication taking, dietary modifications, weight control, smoking cessation, physical activity, alcohol intake limitation, and stress management and four attributes of adherence. Example of an item is: "You can prevent complications of hypertension such as paralysis, heart disease or kidney disease by your self-care." Each item had possible responses ranging from 1= not true to 4=strongly true. A total score was obtained by summing the response values across all items, ranging from 29-116. A higher score level indicates a higher level of ATR. The reliability of the *HATRS* was 0.80. The reliability of the HSSS in the actual study was 0.835.

Most instruments were originally written in Thai, whereas, the HK-LS was originally written in English. It required a translation and back-translation to confirm accuracy. The PI translated from English to Thai and then it was back-translated from Thai to English by the bilingual expert, then this was compared to the original English version by the PI and advisors.

Procedure: The sample meeting the inclusion criteria were selected randomly in each hospital and were informed clearly regarding the study and ethical considerations. When participants agreed to join the study, they were asked to sign a consent form for protection of human subjects. They were given the 9 self-reported questionnaires to complete in privacy, answering in order to the ease of use, using total time to complete around 60-80 minutes and were allowed to take a break of around 10-15 minutes.

Data analysis: The relationships among all variables were analyzed by Pearson's product moment correlation. After testing multiple regression assumption, most of the variables did not meet multivariate normal distribution, the generalized least squares (GLS) technique was needed to estimate all parameters and test the model fit. Thus the relationship between ten factors and ATR was tested by structural equation modeling (SEM) using the GLS technique in the LISERL 8.80 (Student edition) program.

Results

Participants had a mean of age of 69.36 (SD = 6.09; Mode = 67; Median = 69). Most were women (62.17%); married (63%); unemployed (57.77%) and agriculturists (30.50%); completed elementary school (72.73%); living with their spouse (29.91%) and living with spouse and legitimate children 29.03%; income < 5,000 baht/month (80.94%). Most of participants had the elderly health care coverage insurance (80.94%). Their duration of hypertensive diagnosis ranged from 0.75 to 35 years and the mean of 7.57 years (SD = 5.50; Mode = 3.00; Median = 7.00). Fascinatingly, 91.79% had not been admitted to hospital with hypertension or its complications and 72.43% had no complications of hypertension. They received a number of medications at least one out of four possible types: 44.57% of participants took antihypertensive drugs, 1.5 to 3 pills per day, and 65.69% took their drugs once daily. The mean duration of a follow-up visit was 3.04 (S.D. = 0.50; Mode = 3.00; Median = 3.00) months. Approximately 80% of those had good control blood pressure by keeping them under 140/90 mmHg.

After the hypothesized model was tested, all of the fit indices showed the model did not fit with the actual data. Therefore, modification of the model was performed based on both reasonability of statistical findings and theoretical knowledge until it fit the data well. For the modified model, the twelve pathways

which were not significant and negative in direction relationship were deleted such as the paths from knowledge of hypertension, cognitive function, and perceived benefits, whereas, the path from cognitive function to knowledge of hypertension was added to the model based on suggestions of the modification index to improve indices for a goodness-of-fit. After the final model modification, all coefficients of pathways were statistically significant and showed an improvement of the model fit with the empirical data **(Figure 2).** Results of effects, including direct, indirect and total effects of ATR were presented in **Table 1.** In the final

Table 1 Structural Path Coefficients of the Final Model of Adherence to Therapeutic Regimens (n = 341)

Causal variables	Affected variables											
	Provider-patient communication			Knowledge of hypertension			Perceived benefits			Perceived susceptibility		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE
Knowledge of hypertension	-	-	-	-	-	-	-	-	-	-	-	-
Physical function	-	-	-	-	-	-	-	-	-	-	-	-
Cognitive function	-	-	-	0.51**	-	0.51**	-	-	-	-	-	-
Social support from family	0.03*	-	0.03*	-	-	-	0.04**	-	0.04**	0.07**	0.01	0.06**
Provider-patient communication	-	-	-	0.15**	-	0.15**	0.17**	-	0.17**	0.20**	-	0.20**

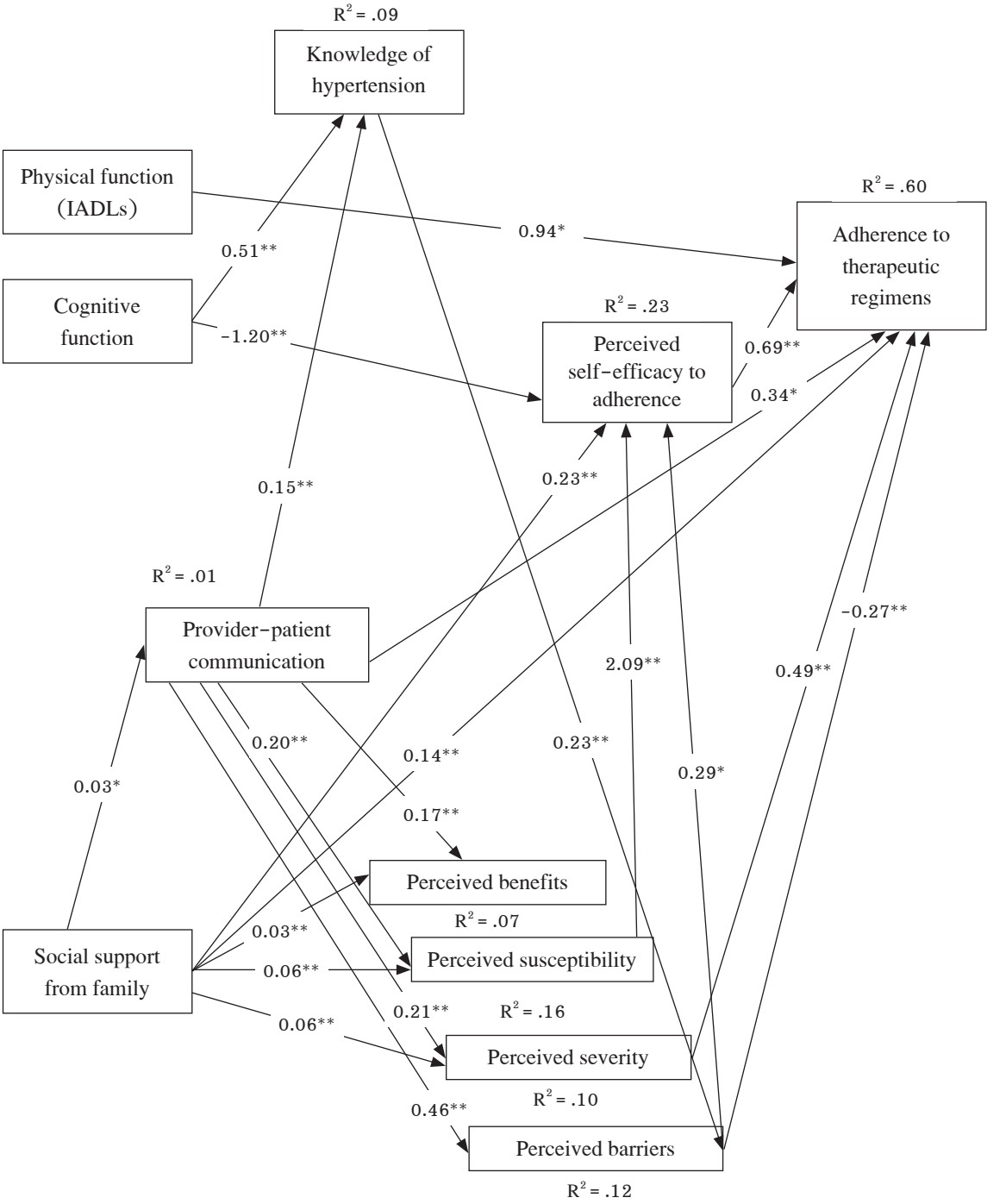
Note. TE = Total effect, IE = Indirect effect, DE = Direct effect, **p< .01, *p< .05

Causal variables	Affected variables											
	Perceived severity			Perceived barriers			Perceived self-efficacy to adherence			Adherence to therapeutic regimens		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE
Knowledge of hypertension	-	-	-	0.23**	-	0.23**	0.07	0.07	-	-0.02	-0.02	-
Physical function	-	-	-	-	-	-	-	-	-	0.94*	-	0.94*
Cognitive function	-	-	-	0.12*	0.12*	-	-1.16**	0.03	-1.19**	-0.84**	-0.84**	-
Social support from family	0.06**	0.01	0.06**	0.01	0.01	-	0.38**	0.15**	0.23**	0.44**	0.30**	0.14**
Provider-patient communication	0.21**	-	0.21**	0.49**	0.03*	0.46**	0.55**	0.55**	-	0.69**	0.35**	0.34**

Note. TE = Total effect, IE = Indirect effect, DE = Direct effect, **p< .01, *p< .05

Causal variables	Affected variables											
	Perceived severity			Perceived barriers			Perceived self-efficacy to adherence			Adherence to therapeutic regimens		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE
Perceived benefits	-	-	-	-	-	-	-	-	-	-	-	-
Perceived susceptibility	-	-	-	-	-	-	2.09**	-	2.09**	1.45**	1.45**	-
Perceived severity	-	-	-	-	-	-	-	-	-	0.49**	-	0.49**
Perceived barriers	-	-	-	-	-	-	0.29*	-	0.29*	-0.07	0.20*	-0.27**
Perceived self-efficacy to adherence	-	-	-	-	-	-	-	-	-	0.69**	-	0.69**

Note. TE = Total effect, IE = Indirect effect, DE = Direct effect, **p< .01, *p< .05



Chi-square (c^2) = 23.73, *df* = 16, *p* = .10, RMSEA = 0.038; GFI = 0.98; AGFI = 0.95; SRMR = 0.037
**p < .01, *p < .05

Figure 2 Final Modified Model of Adherence to Therapeutic Regimens Among Thai Older Adults with Hypertension

model (**see Figure 2**), 60% of total variance in ATR was explained by nine predicting variables.

Discussion

With regard to the results, all of independent variables, except perceived benefits, could explain 60% of variability of ATR in Thai older adults with hypertension. According to nine variables affecting ATR in this study, two out of five dimensions of WHO were modified by the nursing role. These factors can be divided into two groups, including patient-related factors and health care team-related factors. In general, patient-related factors in older adults with hypertension are concerned with their specific characteristics differentiated from adult persons, principally cognitive function and physical function. In this study, patient-related factors can be delineated into three groups.

First, patients' characteristics focusing on physical function was the strongest predictor directly affecting ATR in this study. It is important factor contributing to increase the ability of hypertensive older adults to engage in adherence behaviors.[36] When, they have impairment of physical function in instrument activities of daily living (IADLs), mainly walking out doors, transportation, patients mostly are at risk of reducing medication adherence.[36] In this study, physical function directly affected ATR. Consistent with a prior finding which found that IADLs had a positive direct effect on self-management behaviors in older persons with pre-dialysis chronic kidney disease.[24]

Second, factors-related patients' perception significantly affecting ATR consists of perceived self-efficacy to adherence, perceived susceptibility, severity, barriers and perceived social support from family. Among older adults with hypertension who believe in their ability to deal with their problems, especially adherence behaviors, they tend to perform ATR. Perceived self-efficacy is well known as the most powerful predictors of ATR among the chronically ill patients.[17,24] Persons who have higher perceived self-efficacy can enhance their ability to overcome various barriers and perform good behaviors for achieving the desired health outcomes.[29] In this study, self-efficacy to adherence was a good mediator between social support from family, provider-patient communication, perceived susceptibility and perceived barriers and ATR. As a result, these factors affecting perceived-self efficacy to ATR have acted as the powerful predictors of ATR.

Perceived severity, perceived barriers directly affected ATR. When older adults with hypertension have higher levels of perceived severity of disease and complications from uncontrolled blood pressure which may lead to serious impacts on their health outcomes and lower level of perceived their barriers to perform recommended behaviors such as the complexity of taking pills, inconvenience of follow-up visits, they are more likely to perform ATR to achieve optimal control blood pressure. Our findings were congruent with previous studies which revealed that perception of severity of complicated hypertension were positively correlated with adherence behaviors[18, 28] and that perceived severity had a direct effect on medication adherence among older adults with hypertension.[18] As well, perceived barriers directly affected medication adherence in the elderly with hypertension.[18] One meta-analysis revealed that it was the strongest predictor in the negative direction of health behaviors.[38]

In addition, perceived social support from family is necessary for assisting older adults with hypertension to perform adherence behaviors. In this study, it had a direct and an indirect effect on ATR via perceived self-efficacy to adherence, provider-patient communication, perceived susceptibility, perceived severity, knowledge of hypertension, and perceived barriers. Also, social support from the family directly influenced perceived benefits. When they have a higher level of perceived and received social support from family, they are more likely to perform ATR. It is congruent with many previous studies which found that social support had a positive direct and indirect effect

on adherence behaviors in chronic diseases.[18, 17, 24, 31] Social support can be helpful for older adults with hypertension by promoting and empowering them to solve their problems, supporting them to make decisions related to their treatments and giving full responsibility to take care of themselves.[39] Social support from family was a predictor of perceived self-efficacy to adherence. It can be explained that emotional support from families can promote and empower older adults by enhancing their ability to overcome barriers and lead to increase perceived self-efficacy to adherence. In addition, information support provided from family members, mainly giving information, suggestions, and advice may provide clear knowledge of hypertensive treatment and its complications, understand of their risk and severity of hypertensive complications, the advantages of appropriate hypertensive treatments, and overcoming obstacles for performing recommended behaviors. Essentially, to promote ATR among older adults with hypertension, nurses should be aware of social support from family affecting ATR to achieve better ATR and lead to optimal blood pressure control.

Lastly, patients' cognitive function and knowledge of hypertension was also significantly related to ATR. Most older persons with hypertension are more likely to have some deficits from their cognitive function and also may have limited knowledge of hypertension. In this study, cognitive function had a positive direct effect on knowledge of hypertension and negative indirect effect on ATR via perceived self-efficacy to adherence, knowledge of hypertension, and perceived barriers. To enhance ATR, it could be explained that older adults with hypertension who have a lower level of cognitive function are more likely to have a lower level of knowledge of hypertension and perceived barriers and this leads to a higher level of ATR. In another pathway, when they have a lower level of cognitive function, they are more likely to have a higher level of perceived self-efficacy to adherence and this may lead them to have a higher level of ATR.

Another dimension is the health care team related-factors consisting of provider-patient communication which is a crucial factor affecting ATR among older adults with hypertension, especially, giving clear explanation, active listening and taking responsibility for patients' problem. Older adults with hypertension should necessarily be given correct and adequate information regarding ATR because of its complex behaviors. Having paramount good communication styles between providers and patients can cause increased understanding of disease and its treatments, patients' satisfaction and may lead to be better ATR.[40] This is congruent with many previous studies which found that provider-patients communication significantly affected ATR in hypertensive patients[33] and had a positive direct and indirect effect on ATR via perceived self-efficacy.[17] Therefore, health care providers should focus on enhancing better communication with patients to improve patients' understanding regarding their illness and treatment and leading to have better adherence behaviors.

Limitations and Recommendations

The results may be limited in terms of the ability to generalize because of four issues related to methodology of research. First, most of participants could control their blood pressure, thus this model may be limited application for older adults with uncontrolled blood pressure. Second, the findings may be limited in terms of generalization to older adults with hypertension who did not meet with similar characteristics elsewhere regarding inclusion criteria of this study. Third, the instruments measuring health beliefs may be limited by the number of items to evaluate four subscales of perception (benefits, susceptibility, severity and barriers). Lastly, this study conducted as cross-sectional design, thus causal interpretation must be caution.

For further study, the health belief scale should be further developed in order to adequately examine four variables based on health belief model. This would effectively improve determining the causal

relationship of ATR as well as other effects of those variables. Also, this model should be tested for the causal relationship of ATR among older adults with uncontrolled blood pressure to confirm application for these groups. Finally, the next model should be conducted as longitudinal study to validate ATR testing model stability.

Implications for nursing practice

The new model of ATR can provide nurses with empirical evidence to understand ATR and its predicting factors and also help to develop nursing knowledge of care for older adults with hypertension. Also, the new model can be a guide and be applied for developing interventions enhancing ATR by focusing on the new evidence derived from factors directly and indirectly predicting ATR, especially physical function, cognitive function, perceived self-efficacy to adherence, provider-patient communication, social support from family, perceived susceptibility, perceived severity, perceived barriers and knowledge of hypertension. For a positive health outcome, the model can lead to access to the achievement of the optimal goal for controlling blood pressure among older adults with hypertensive and decrease its severity of complications.

Acknowledgement

The researchers gratefully acknowledge the support provided by the Faculty of Nursing, Chiang Mai University, the Thailand Nursing and Midwifery Council and thank all participants in this study.

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แบบจำลองเชิงสาเหตุของความร่วมมือในการรักษาผู้สูงอายุไทยโรคความดันโลหิตสูง

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บทคัดย่อ: การศึกษาเชิงพรรณนาแบบภาคตัดขวางครั้งนี้ศึกษาเพื่อทดสอบปัจจัยเชิงสาเหตุระหว่างปัจจัยทำนายและความร่วมมือในการรักษาในผู้สูงอายุไทยโรคความดันโลหิตสูง คัดเลือกกลุ่มตัวอย่างโดยวิธีการสุ่มอย่างง่าย คือผู้สูงอายุที่เป็นโรคความดันโลหิตสูงจำนวน 341 ราย ที่มารับบริการที่คลินิกโรคความดันโลหิตสูงโรงพยาบาลชุมชน 5 แห่ง ในภาคเหนือตอนบน การเก็บข้อมูลใช้แบบสอบถามจำนวน 9 ฉบับ ประกอบด้วยแบบบันทึกข้อมูลส่วนบุคคลของผู้สูงอายุโรคความดันโลหิตสูง แบบทดสอบสุภาพจิตของจุฬา แบบประเมินดัชนีจุฬาเอดีแอล แบบวัดความรู้เกี่ยวกับโรคความดันโลหิตสูง แบบสอบถามความเชื่อด้านสุขภาพสำหรับผู้เป็นโรคความดันโลหิตสูง แบบสอบถามการรับรู้สมรรถนะแห่งตนของผู้เป็นโรคความดันโลหิตสูง แบบสอบถามการสนับสนุนทางสังคม แบบสอบถามการติดต่อสื่อสารระหว่างบุคลากรสุขภาพกับผู้ป่วย และแบบสอบถามความร่วมมือในการรักษาในผู้ที่เป็นโรคความดันโลหิตสูง การวิเคราะห์ข้อมูลใช้สถิติสหสัมพันธ์เพียร์สัน และสถิติวิเคราะห์โมเดลสมการโครงสร้าง

ผลการศึกษาพบว่า แบบจำลองสุดท้ายที่ปรับแก้มีความสอดคล้องกับข้อมูลเชิงประจักษ์และสามารถอธิบายความแปรปรวนของความร่วมมือในการรักษาได้ร้อยละ 60 โดยการทำหน้าที่ด้านร่างกาย การรับรู้สมรรถนะแห่งตนในความร่วมมือในการรักษา การติดต่อสื่อสารระหว่างบุคลากรสุขภาพและผู้ป่วยมีอิทธิพลโดยตรงกับความร่วมมือในการรักษา การสนับสนุนทางสังคมจากครอบครัวมีอิทธิพลทั้งโดยตรงและโดยอ้อมกับความร่วมมือในการรักษาผ่านความเชื่อด้านสุขภาพ (การรับรู้ความรุนแรงและการรับรู้อุปสรรค) และการรับรู้สมรรถนะแห่งตนในความร่วมมือในการรักษา และมีอิทธิพลทั้งโดยตรงและโดยอ้อมกับการรับรู้สมรรถนะแห่งตนในความร่วมมือในการรักษาผ่านการรับรู้ความเสี่ยง แต่มีอิทธิพลโดยตรงเพียงการรับรู้ประโยชน์ นอกจากนี้การสนับสนุนทางสังคมจากครอบครัวยังมีอิทธิพลโดยตรงกับการรับรู้อุปสรรคผ่านการติดต่อสื่อสารระหว่างบุคลากรสุขภาพและผู้ป่วย แล้วผ่านความรู้เกี่ยวกับโรคความดันโลหิตสูง การทำหน้าที่ด้านสติปัญญา มีอิทธิพลโดยอ้อมกับความร่วมมือในการรักษาผ่านการรับรู้สมรรถนะแห่งตนในความร่วมมือในการรักษาและยังมีอิทธิพลโดยอ้อมกับการรับรู้อุปสรรคผ่านความรู้เกี่ยวกับโรคความดันโลหิตสูง

การส่งเสริมความร่วมมือในการรักษาพยาบาลควรให้ความสำคัญกับปัจจัยทำนายความร่วมมือในการรักษาและนำปัจจัยดังกล่าวมาจัดกระทำทางการพยาบาล โดยเฉพาะการทำหน้าที่ด้านร่างกาย การรับรู้สมรรถนะแห่งตนในความร่วมมือในการรักษา การติดต่อสื่อสารระหว่างบุคลากรสุขภาพและผู้ป่วย การสนับสนุนทางสังคมจากครอบครัว การรับรู้ความรุนแรงและการรับรู้อุปสรรค

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คำสำคัญ : ความร่วมมือในการรักษา ผู้สูงอายุไทย โรคความดันโลหิตสูง แบบจำลองเชิงสาเหตุ

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