



Knowledge and Behaviors Toward Health Care for Elderly Patients with Hypertension, and Quality of Life Among Informal Caregivers in Northern Thailand

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Background: Informal caregivers play an important role in caring for patients with chronic conditions. Little is known about the quality of life among caregivers of patients with chronic illnesses in Thailand. The purpose of this study was to investigate the relationships among knowledge and behaviors toward health care for elderly patients with hypertension, and the quality of life among informal caregivers.

Methods: A total of 402 informal caregivers for their elderly co-habitants suffering from hypertension were randomly selected to participate in this cross-sectional study. Data collection was performed in rural areas of Phayao province, located in the northern part of Thailand. Self-administered questionnaires were employed, which covered knowledge and behaviors toward health care for elderly patients with hypertension, and the Thai version of the World Health Organization Quality of Life Brief Version (WHOQOL-BREF) questionnaire.

Results: The scores of knowledge and behaviors toward health care for elderly patients with hypertension, and the quality of life were at low and fair levels. In the multivariable linear regression model, the results showed that four variables – age, caregiver's relationship to the patient, knowledge, and behaviors toward health care for elderly patients with hypertension – were significantly related to quality of life among caregivers ($p < 0.05$).

Conclusion: Knowledge and behaviors toward health care for hypertensive patients influence the quality of life among informal caregivers. The caregivers in rural communities should be encouraged to become educated on the stages of hypertension, preparation for taking care of the elderly with high blood pressure, and effective behavioral care for patients, in order to improve the quality of life of both caregiver and patient. In addition, health care providers should have clear guidelines for development of the health care system to enhance the potential care and quality of life among informal caregivers.

Keywords: quality of life, caregiver, knowledge, behaviors, health care, elderly

Introduction

Hypertension (HT) is a major health problem worldwide.¹ According to the World Health Organization Thailand, one-fourth of Thai people are affected by high blood pressure.² In Thailand, more than 10 million elderly persons (approximately 1 in 10) have HT.^{1,3} It is one of the leading causes of death for over 50,000 Thai people annually.³ Because of unstable circulatory control, high blood pressure can affect any organ in the body, leading to serious complications over time.^{1,3}

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Phayao province, a rural area is located in the northern part of Thailand, the elderly population has shown a steady increase in numbers. The prevalence of HT in that province was 19.5% in 2017 and 36.2% in 2018.⁴ Moreover, 35.4% of new HT cases occur in the 60–70 year age group, which has shown the greatest increase.⁴ Aged individuals are at a high risk of health complications associated with HT, such as cardiovascular diseases and coronary artery disease (at 26%).^{3,4} A previous study showed that common chronic conditions, including HT (41.4%) and diabetes (18.2%), are most common among the elderly.⁵ It is estimated that 90% of these patients live at home and are cared for by family members.^{3,6} Therefore, it is necessary for such individuals to receive more assistance and care from caregivers, especially family members (such as a husband, wife, children, or other relatives). Caregivers can also be community/village health volunteers or neighbors.^{6,7} These people play an important role in caring for the elderly with HT, because they may be related or have a close relationship with the patient.

In order to respond to the needs and changes in health conditions of the elderly with HT, caregivers may experience psychological stress and physical effects. According to a number of studies, chronic illness such as HT has negative effects on both patients and their caregivers, including health conditions, increased severity of illness, side effects, and treatment and mental health problems.^{7–9} Caring for patients with a chronic illness at home often leads to significant changes in family roles and responsibilities. This situation may create a burden and increased stress among family caregivers. If they have to provide care for extended periods of time, resulting in a reduced quality of life among caregivers.⁷ Prior study has shown that the unpaid caregivers taking care of hypertensive patients had low quality of life with high stress levels.¹⁰

Quality of life is an important concept for health status among patients and caregivers.¹¹ The concept should be in accordance with the perceptions of people, way of life, community context, social environment, and cultures as

they relate to individuals' life goals.^{11,12} The quality of life among caregivers is associated with positive perceptions regarding the health of the elderly, disturbance of daily activities, positive life adjustments, concerns about the costs of living and caring, household budget, among other issues related to care.^{11–13} These matters may directly impact caregivers' confidence in dealing with problems, increase feelings of overwhelm and fatigue, create increased financial burden, and adversely affect the health and well-being of caregivers, leading to lower quality of life.^{11,14}

However, there are few studies regarding the quality of life among caregivers of elderly patients with chronic illnesses in Thailand. Knowledge and behaviors among informal caregivers toward health care for hypertensive patients have not been documented. Therefore, the researcher was interested in studying the relationships among knowledge and behaviors toward health care for elderly patients with HT, and the quality of life among relatives and family members who provide care for elderly patients with HT in rural areas of northern Thailand. This information will be used to promote health empowerment and support caregivers in rural communities in order to potentially promote more effective and efficient care for patients and increase their quality of life, as well as strengthen the community and sustain its development.

Materials and Methods

A cross-sectional study based on a conceptual model (Figure 1), which was developed from the Pender theory and previous research,^{7,10,15–17} was conducted among informal caregivers. The research was conducted between March and October 2019 in rural areas of Phayao province, which is located over 30 km from the city. The inclusion criteria for selecting participants included 1) male or female individuals who take care of elderly patients with HT (could have been family members, neighbors, or village health volunteers offering care without wages); 2) an absence of any cognitive disorders; 3) ability

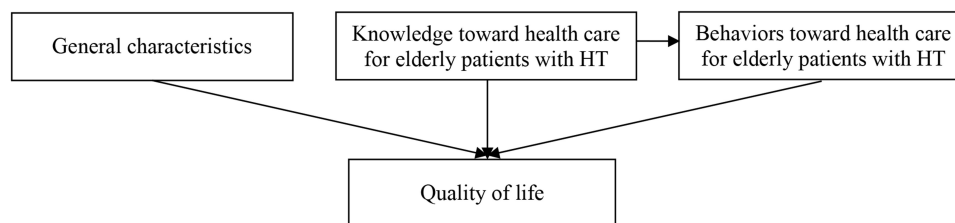


Figure 1 Conceptual framework: association among knowledge and behaviors toward health care for elderly patients with hypertension, and quality of life among informal caregivers.

to read, write, and speak the local language; and 4) willingness to participate in the study.

Simple random sampling was used to select caregivers from the list of elderly patients with HT based on the screening test registered at the Health Promoting Hospitals of Ban Toon and Ban Tom districts, Phayao province between October 2017 and November 2018. The elderly patients with HT were diagnosed with a high risk of systolic blood pressure (SBP) = 130–139 mmHg and/or diastolic blood pressure (DBP) = 85–89 mmHg, and sustained a risk level 1 of SBP of 140–159 mmHg and/or DBP of 90–99 mmHg for more than 1 year.¹⁸ Sample size was calculated based on the formula of $(n/k \geq 30)$, where n = number of samples in the study per variable, and k = number of independent variables, and $n = 30 \times 12 = 360$.^{19,20}

The sample size was increased by 15% to compensate for the potential dropout rate of study participants. The total number of participants was 414 persons, based on the calculation. Twelve persons were eliminated from the study because they did not complete the required information (nine persons), or it was inconvenient to provide the information (three persons). The final number of study participants included 402 caregivers.

The study procedures included 1) recruitment of 10 research assistants who were able to communicate in the local northern language. The researcher ensured that the research teams all had a common understanding of the same processes. The researcher translated the research materials into the local language for the research assistants to better understand the context. The majority of research team assistants were village health volunteers. 2) The researcher organized a research meeting on a single day to clarify the objectives of the study, data collection techniques, schedule appointments, and the rights and privacy of the participants. 3) The researcher contacted and cooperated with the Public Health District Office, directors of Health Promoting Hospitals, and key persons in the community before data collection.

Once written informed consent was given, the research team went to the study area to perform data collection. Caregivers were given self-administered questionnaires. For those who were unable to read, research assistants read the questions and checked the answers in the questionnaire. The process of data collection was conducted during the hours of 9:00 and 17:00. The duration of each interview was approximately 20–30 min.

The questionnaires were checked and validated by three experts on the elderly before they were used in the

data collection process. The questionnaires consisted of four parts: Part 1. General characteristics, including age, gender, marital status, working status, alcohol drinking, smoking, relationship to patient with HT, knowledge of caregivers toward medication, health information, and health complications of patient's disease. Part 2. Knowledge toward health care for elderly patients with HT, questionnaire based on literature reviews and previous research,^{5,18} including 22 items among three domains (Symptoms, severity, and complications, eight items; Causes and factors, seven items; and Prevention and control, seven items) ([Supplementary Table 1](#)). The questions included knowledge of the disease such as health effects, measurements of blood pressure, and health complications. The answers to these types of question were either true or false. The scores were evaluated on a scale of 0–22 points; high scores were ≥ 18 points, fair scores were 13–17, and low scores were ≤ 12 points. The researcher performed a trial of the questionnaire with 30 similar characteristics of caregivers. The Kuder–Richardson formula was applied as follows: KR20 of the questionnaire was = 0.79.

Part 3. The questionnaire on behaviors toward health care for elderly patients with HT was applied, based on the literature review of previous research, and considered to be suitable^{7,15,18,21} and appropriate within the context of caregivers in rural communities ([Supplementary Table 2](#)). It included 20 items among three domains (Control risk factors, eight items; Prevention and control, nine items; and Self-care behaviors, three items). The questions covered type of food intake; daily activities (household work, farming, and gardening); exercise (walking or biking 30 min per day); and medication. The questionnaire used rating scales that included rarely, occasionally, sometimes, and regularly. The scores were divided into three levels, and scores of 80% or above (≥ 64) were considered at a high level; scores from 60% to 79% (48–63) were considered fair, and 60% or less (≤ 47) was considered low. The internal consistency of the questionnaire based on Cronbach's alpha was = 0.81.

Part 4. The short version of the questionnaire (WHOQOL-BREF-THAI)^{12,13} was developed from the WHOQOL-BREF originally published by the World Health Organization.²² The questionnaire was used to assess the quality of life of caregivers for the elderly with HT. It consisted of 26 items, divided into four domains including physical health with seven items (DOM1); psychological health with six items (DOM2); social relationships with three items (DOM3); and

environmental health with eight items (DOM4). Each item of the WHOQOL-BREF is scored on a scale from 1 to 5. The scores are divided into three levels, including scores of 26–60, which are considered a poor quality of life; 61–95, considered a fair quality of life; and 96–130, considered a good quality of life.^{12,13} The reliability of the questionnaire was analyzed with a Cronbach's alpha coefficient of 0.83.

Statistical Analysis

Data were analyzed by the SPSS Version 17 software, licensed from Chiang Mai University (SPSS Inc., Chicago, IL, USA). Associations among general characteristics, knowledge and behaviors toward health care for elderly patients with HT, and the quality of life among caregivers were determined by linear regression analysis. The factors that were associated with outcome variables at the 0.15 level in univariable analysis were included in the multivariable analysis. The predictors with a p-value <0.05 were entered into the final regression model.

Results

Among 402 caregivers, the average caregiver age was 43.56 years (SD = 8.7), with minimum and maximum values of 28 and 73 years, respectively. Among the caregivers, 61.4% were female, 63.4% were educated, and 61.7% were married. More than half (51.2%) were employed, 42.0% imbibed alcohol, and 35.8% were smokers. The relationship of the caregiver to the patient included child (36.1%), spouse (14.2%), grandchild (19.4%), and other (cousin, sibling, friend, neighbor, health volunteer) (30.3%). Most of the caregivers had no knowledge about the patients' medication (53.7%), and 51.2% were not informed about hypertension. As shown in Table 1, 143 hypertensive patients (35.6%) had complications associated with the disease.

Table 2 presents the scores of knowledge, behaviors toward health care for elderly patients with HT, and quality of life among informal caregivers. The results showed that knowledge scores ranged from 8 to 22, mean = 13.9, SD = 3.3. The majority of participants (39.6%) had overall scores at a low level; 38.8%, at a fair level; and 21.6%, at a high level. Behaviors toward health care for elderly patients with HT yielded scores ranging between 42 and 71, mean = 50.8, SD = 7.8. Participants' overall scores were at a fair level (45.8%), low level (36%), and high level (18.2%). In terms of quality of life among caregivers, the scores ranged

Table 1 General Characteristics of Informal Caregivers (n = 402)

Variables	n	%
Gender		
Male	155	38.6
Female	247	61.4
Age		
<40 years	122	30.3
40–49 years	205	51.0
50–59 years	51	12.7
≥60 years	24	6.0
Min = 28, Max = 73, mean (SD) = 43.6 (8.8)		
Education		
No	147	36.6
Yes	255	63.4
Marital status		
Single/widowed/divorced/separated	154	38.3
Married	248	61.7
Working status		
Not working	196	48.8
Currently working	206	51.2
Alcohol drinking		
No	233	58.0
Yes	169	42.0
Smoking		
No	258	64.2
Yes	144	35.8
Relationship to the patient		
Spouse	57	14.2
Child	145	36.1
Grandchild	78	19.4
Others (other relative, friend, neighbor, health volunteer)	122	30.3
Complication in patient		
No	259	64.4
Yes	143	35.6
Diabetes mellitus (DM)	49	12.2
Stress	10	2.5
Low-density lipoprotein (LDL)	55	13.7
Stroke	29	7.2
Patient's drug knowledge		
No	216	53.7
Yes	186	46.3
Receiving information about hypertension		
No	206	51.2
Yes	196	48.8
By public health officer	100	24.9
By health volunteer	51	12.7
By online media	45	11.2

Table 2 Knowledge and Behaviors Regarding Health Care for Elderly Hypertensive Patients and Caregivers' Quality of Life (n = 402)

Variables	n	%
Knowledge toward health care for elderly patients with hypertension		
Low level (scores ≤12)	159	39.6
Moderate level (scores 13–17)	156	38.8
High level (scores ≥18)	87	21.6
Min = 8, Max = 22, mean (SD) = 13.9 (3.3)		
Behaviors toward health care for elderly patients with hypertension		
Low level (scores ≤47)	145	36.0
Moderate level (scores 48–63)	184	45.8
High level (scores ≥64)	73	18.2
Min = 42, Max = 71, mean (SD) = 50.8 (7.8)		
Quality of life		
Low level (scores 26–60)	212	52.8
Moderate level (scores 61–95)	109	27.1
High level (scores 96–130)	81	20.1
Min = 56, Max = 108, mean (SD) = 71.5 (16.6)		

between 56 and 108, mean = 71.5, SD = 16.6. More than half of the participants showed a quality of life at a low level (52.5%), followed by a fair level (27.1%), and a high level (20.1%).

Associations Among Knowledge and Behaviors Toward Health Care for Elderly Patients with HT, and Quality of Life Among Caregivers

The results of univariable analysis revealed that almost all variables, except gender and marital status, were associated with behaviors toward health care for elderly patients with HT ($p < 0.05$) (Table 3). In the final multivariable analysis, the results showed that three variables – education, caregiver's relationship to the patient, and knowledge about health care for patients with HT – were significantly related to behaviors toward health care for patients with HT ($p < 0.05$). The score of behaviors about health care for patients with HT was significantly higher among caregivers who had formal education than those who did not, and higher in spousal caregivers than other caregivers. In addition, a positively significant relationship was noted between scores of knowledge about health care for patients with HT and scores of behaviors about health care for patients with HT (beta = 0.107).

Similarly, almost all variables, except gender and marital status, were associated with quality of life among informal caregivers in univariable regression analysis ($p < 0.05$) (Table 4). In the multivariable regression model, the results showed that four variables – age, caregiver's relationship to the patient, knowledge, and behaviors toward health care for elderly patients with HT – were significantly related to quality of life among informal caregivers ($p < 0.05$). An inversely significant relationship was noted between age and quality of life scores (beta = -0.109). The quality of life score was significantly higher in children and grandchildren than in other caregivers. A strong relationship between scores of knowledge about health care for patients with HT and scores of quality of life was also observed. Each score for knowledge could have increased the quality of life score by about 3.93 points (beta = 0.770, $p < 0.001$). Moreover, a positively significant relationship was noted between scores of behaviors about health care for patients with HT and scores of the quality of life (beta = 0.058, $p = 0.037$).

Discussion

These findings emphasize the need for comprehensive supportive services for caregivers alike. The overall knowledge among caregivers toward health care for patients with HT was at a low level. The caregivers had inadequate knowledge regarding symptoms and complications, causes and risk factors, and prevention and control of hypertension. Based on a review of the literature, family caregivers need to understand the disease, how to prevent recurrence of the disease, medication, and treatment, as well as other health problems and complications of the patients.^{16,23} Therefore, an education program among informal caregivers should be considered to increase HT-related knowledge regarding the stages of disease, factors influencing the disease, prevention and control, and medication details (such as type of medication, appropriate timing of doses, and side effects).

In the present study, the majority of caregivers had fair overall scores of health care behaviors towards the elderly with HT. The results showed that caregivers deemed the prevention and control of factors important, including issues regarding food intake in the elderly. This may be because many caregivers live within the same household as the elderly patient. Therefore, they could pay more focus to food intake, avoidance of salty foods, and alcohol, and the control of blood sugar among the elderly. On the other hand, caregivers did not give as much importance to

Table 3 Factors Associated with Behaviors Toward Health Care for Elderly Hypertensive Patients Among Informal Caregivers (Linear Regression)

Variable	Univariable Analysis			Multivariable Analysis		
	B	Beta	Sig.	B	Beta	Sig.
Gender	0.621	0.039	0.440			
Age (years)	-0.288	-0.322	<0.001			
Marital status	1.509	0.094	0.061			
Education	7.856	0.483	<0.001	6.978	0.429	<0.001
Working status	5.300	0.338	<0.001			
Alcohol drinking	-1.693	-0.107	0.033			
Smoking	-2.543	-0.156	0.002			
Relationship to the patient						
Others	Ref.			Ref.		
Spouse	2.771	0.123	0.028	2.705	0.120	0.014
Child	0.452	0.028	0.638	0.235	0.014	0.779
Grandchild	0.881	0.044	0.438	0.668	0.034	0.500
Complication in patient						
No	Ref.					
Diabetes mellitus	-3.175	-0.133	0.008			
Stress	-6.154	-0.122	0.013			
Low-density lipoprotein	-2.791	-0.122	0.014			
Stroke	-5.534	-0.183	<0.001			
Patient's drug knowledge	4.533	0.288	<0.001			
Receiving information						
No	Ref.					
By public health officer	3.074	0.170	0.001			
By health volunteer	5.455	0.232	<0.001			
By online media	3.755	0.151	0.003			
Knowledge toward health care for hypertensive patients (scores)	0.775	0.321	<0.001	0.259	0.107	0.033

Notes: Variables: gender (male = 0, female = 1); marital status (single/widowed/divorced/separated = 0, married = 1); education (no = 0, yes = 1); working status (not working = 0, currently working = 1); alcohol drinking (no = 0, yes = 1); smoking (no = 0, yes = 1); patient's drug knowledge (no = 0, yes = 1); age, knowledge and behaviors toward health care for hypertensive patients = continuous data.

daily activities, for instance, brushing of teeth, washing of hands, and medication intake among the elderly. Caregivers may assume that the elderly patients with HT are still able to take care of those aspects. Therefore, the promotion of overall health and motivation for caregivers of the elderly should play an important role in modulating health behaviors of patients. Furthermore, training about the specific disease should be offered, in order to enhance caregivers' performance in effectively caring for the elderly.

The findings showed low overall quality of life scores among caregivers for the elderly with HT. This is consistent with the findings of a previous study that reported the majority of caregivers' quality of life scores at a low level.¹⁰ Informal caregivers seemed to perceive caring for patients as a burden, leading to a lower quality of life.

Furthermore, even though the elderly with HT may be able to perform daily activities, and their symptoms may not be severe, caregivers were concerned that the symptoms of the elderly may change from day to day. Similarly, a previous study showed that family members and relatives may be adversely affected by an inability to effectively improve the condition of the patient.²⁴ They may therefore have feelings of guilt and helplessness.^{16,25,26} Caregivers may also have to assume other responsibilities, such as medical and treatment expenses, equipment and facility costs, and the cost of improving the environment or home conditions. This can effectively reduce the income and quality of life of caregivers who are also members of the family.^{16,24}

Caregiving can be seen as a burdensome job. For instance, the majority of caregivers do not take holidays,

Table 4 Factors Associated with Quality of Life Among Informal Caregivers of Elderly Hypertensive Persons (Linear Regression)

Variable	Univariable Analysis			Multivariable Analysis		
	B	Beta	Sig.	B	Beta	Sig.
Gender	-1.692	-0.050	0.320			
Age (years)	-1.002	-0.530	<0.001	-0.206	-0.109	<0.001
Marital status	2.561	0.075	0.132			
Education	16.416	0.477	<0.001			
Working status	15.581	0.470	<0.001			
Alcohol drinking	-4.839	-0.144	0.004			
Smoking	-8.312	-0.241	<0.001			
Relationship to the patient						
Others	Ref.			Ref.		
Spouse	0.341	0.007	0.898	0.249	0.005	0.857
Child	3.308	0.096	0.104	2.062	0.060	0.050
Grandchild	4.703	0.112	0.050	3.355	0.080	0.007
Complication in patient						
No	Ref.					
Diabetes mellitus	-13.145	-0.260	<0.001			
Stress	-12.357	-0.116	0.015			
Low-density lipoprotein	-10.648	-0.221	<0.001			
Stroke	-12.136	-0.190	<0.001			
Patient's drug knowledge	13.570	0.409	<0.001			
Receiving information						
No	Ref.					
By public health officer	7.756	0.202	<0.001			
By health volunteer	8.662	0.174	<0.001			
By online media	17.444	0.332	<0.001			
Knowledge toward health care for hypertensive patients (scores)	4.332	0.849	<0.001	3.927	0.770	<0.001
Behaviors toward health care for hypertensive patients (scores)	0.719	0.340	<0.001	0.123	0.058	0.037

Notes: Variables: gender (male = 0, female = 1); marital status (single/widowed/divorced/separated = 0, married = 1); education (no = 0, yes = 1); working status (not working = 0, currently working = 1); alcohol drinking (no = 0, yes = 1); smoking (no = 0, yes = 1); patient's drug knowledge (no = 0, yes = 1); age, knowledge and behaviors toward health care for hypertensive patients, and quality of life = continuous data.

have little free time to themselves, and are limited in their travels, because they must assume diligent responsibility for the patients. Caregivers may also become worried about the occurrence or exacerbation of the patients' symptoms during their absence.²⁷ Previous studies have shown that the needs of patients with chronic illness may affect the daily routine of the caregivers.^{24,27} Such patient needs can also lead to changes in the roles and responsibilities of family members. Consequently, caregivers who provide care for the elderly with HT may have a negative impact on their physical and mental health. Therefore, caregivers should be assisted in achieving a heightened awareness of the impact of elderly care on their own health.

In term of general characteristics, significant relationships were noted among age, education, working status, behaviors toward health care for the elderly patients with HT and the quality of life among caregivers. According to Pender's concept, each person has different personal characteristics and life experiences, which could directly and indirectly affect health behaviors. Factors influencing health behaviors included personal factors, biological factors, and socio-cultural factors.^{15,21} Consistent with the literature, the level of education and employment among caregivers may influence the care of patients with HT.⁵ Another study found that increasing age, unemployment status, and low education level have a negative impact on quality of life

among caregivers of hypertensive patients.¹⁰ A reduced household income and job loss due to the burden of caring for patients in the family may ultimately reduce the physical health and quality of life of the caregiver.^{21,28}

Certain behaviors such as alcohol drinking and smoking may also have a negative impact on health care behaviors toward the elderly with HT and the quality of life scores among caregivers. The quality of life scores were lower among caregivers who drank alcohol and smoked, compared with those who did not drink alcohol or smoke cigarettes.²⁸ Caregivers potentially provide physical, mental, emotional, and social dimensions of patient care, and also spend most of their time with patients. Therefore, risk factors for their own health may be obstacles in caring for the elderly patients, which may further lead to a lower quality of life among caregivers.^{24,27}

Their relationship to the patient, behaviors toward health care for elderly patients with HT, and the quality of life of caregivers were significantly related. Spouses had higher scores of behaviors compared with the other relations. The majority of elders whose spouses were still alive, were still being cared for by their spouses, and were mutually concerned about each other. They would have been through many life experiences together, and taking care of each other was regarded as their responsibility.²⁴ Studies have found that caregivers who are children or grandchildren can create a better quality of life than other groups.^{16,24,26} In keeping with Thai social and cultural characteristics, most of the elderly live with their children. In general, when the elderly are sick, family members usually take responsibility for their care. Moreover, emotional support, including feelings of love, caring, sympathy, and commitment from family members, has played an important role in reinforcement and motivation for patients and fostered positive relationships between caregiver and patient.^{29,30} In such cases, good relationships between the elderly and family caregivers can lead to better health care behaviors and quality of life among them, which is consistent with the social support concept.^{16,24,26} The family is the main source of social support, which can have a direct impact on the health of the elderly, followed by support from other relatives, siblings, friends, and neighbors.^{16,24,26} According to a number of studies, family relationships affect caring behaviors toward the patient with chronic conditions.^{16,24,29}

Caregivers who care for elderly patients with HT and other health complications, such as chronic stress, DM, LDL, and stroke are more likely to have lower health care behaviors toward the elderly with HT and quality of life compared with

caregivers who care for elderly patients with uncomplicated HT alone. This is because such caregivers have to provide more care than usual owing to the complications. Furthermore, some elderly patients are unable to control the symptoms of the disease. Thus, they may have to visit the hospital more frequently. Some family members may have to resign from their jobs in order to provide adequate care for patients with chronic conditions.^{21,31} These issues may further increase the economic and emotional burden for family caregivers.^{32,33} Previous studies have shown that caregivers who tend to patients with several chronic health conditions have a lower quality of life, physically and psychologically, compared with those who care for patients with a single chronic illness.^{21,31}

Caregivers who are knowledgeable and receive information on the patients' HT medication through public health officers, village health volunteers, and online media have a better positive impact, compared with caregivers who do not receive any related health information. Previous studies on the types of information needed among family caregivers have shown that while a patient is still hospitalized and preparing to go home, caregivers should acquire four needs: 1) information about the disease and medication and dosing guidelines; 2) health communication; 3) support; and 4) access to health personnel.^{16,24} Moreover, family members need to obtain the most comprehensive knowledge on medication, health behaviors, and emotional management of the patient. Some of this knowledge imparted by health personnel still does not fully address the needs of family members. Therefore, future studies should be focused on the development of training regarding various issues concerning the disease, in order to increase the quality of life among both caregivers and patients.

The present findings showed significantly positive relationships among knowledge and behaviors toward health care for elderly patients with HT, and the quality of life among caregivers. Caregivers are more confident in caring for the elderly with HT when they have more knowledge.⁵ Insufficient health care knowledge among caregivers for the elderly may lead to increased anxiety and stress and directly affect their own health.^{25,27,34,35} Health awareness and education can be communicated through multiple channels, for instance, public health officials, health volunteers, and social media. Once they have gained the required knowledge, caregivers' concerns and fears tend to be reduced regarding the care of elderly patients with chronic conditions, leading to their increased quality of life.¹⁷

Caregivers must have skills in health promotion, caring for patients with chronic conditions, and the ability to provide

adequate care and perform regular daily activities, in order to reduce levels of stress and anxiety. This is consistent with Pender's concept of behavioral outcomes, which explains that when a person is committed to a behavioral action plan (committed to a plan of action), that person can find the best creative way to improve their health, well-being, and quality of life.^{15,21} An individual will use cognitive processes by learning from various sources and experience, which would affect their decision to change to exhibit better health behaviors.^{11,27} As shown in prior studies, caregivers who have good skills and knowledge tend to provide better care for patients with chronic conditions, and tend to have a better quality of life.^{16,17} Therefore, implementing a health promotional program for caregivers to increase their knowledge of prevention and control may have a positive effect on their perceptions, and enhance their skill set of healthy behaviors, and potentially improve care for the elderly. Such an initiative would help to reduce the burden and increase the quality of life among caregivers.

Limitation

This cross-sectional study was limited because it was unable to examine a causal relationship among knowledge, behaviors, and quality of life. Due to the differences among caregivers in different areas, the findings cannot be generalized to other informal caregivers. However, the data obtained can be representative of the population in rural areas of Phayao province, Thailand. For further study, other factors not included in this study, such as the duration of caregiving and hours per day spent caring for patients with HT, should be considered.

Conclusion

The current study showed that most informal caregivers have low to moderate levels of knowledge and behaviors toward health care for elderly patients with HT, as well as a low quality of life. Knowledge and behaviors toward health care for patients with HT were associated with the quality of life among caregivers. These findings suggest the need for a tailored intervention of health care preparation that would empower caregivers through the use of a multidisciplinary team. Public health policy of local government should provide services for informal caregivers, such as an information channel or system for caregiver assistance that would utilize health hotlines or a counseling unit; and short courses or training modules to increase knowledge and skills about health care promotion for elderly patients with non-chronic diseases, to improve behaviors about health care for elderly patients and

the quality of life among caregivers. Furthermore, public relations and communication channels should be implemented for increased access to health care information services among informal or family caregivers via public health officers, health volunteers, and online media.

Ethical Approval and Consent

Ethical consideration was approved by the University of Phayao Human Ethics Committee, Thailand (No. 2/089/61). Participants gave informed consent prior to data collection. This study was conducted in accordance with the Declaration of Helsinki.

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Disclosure

The authors report no conflicts of interest in this work.

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