

## Research Article

# Association between hypertension knowledge and medication adherence in Vietnamese patients: A cross-sectional study

Thao Huong Nguyen<sup>1</sup>, Hanh Hong Nguyen<sup>1</sup>, Toan Thanh Vo<sup>2</sup>, Thanh Van Vo<sup>2</sup>, Nguyet Kim Nguyen<sup>3</sup>, Suol Thanh Pham<sup>3</sup>, Thang Nguyen<sup>3\*</sup>

<sup>1</sup> Department of Clinical Pharmacy, University of Medicine and Pharmacy at Ho Chi Minh City, Ho Chi Minh City, Vietnam

<sup>2</sup> Faculty of Pharmacy, Can Tho University of Medicine and Pharmacy, Can Tho City, Vietnam

<sup>3</sup> Department of Pharmacology and Clinical Pharmacy, Can Tho University of Medicine and Pharmacy, Can Tho City, Vietnam

## ABSTRACT

Hypertension knowledge and medication adherence are the success of treatment. We aimed to determine the association between knowledge about hypertension and medication adherence in hypertensive patients. A cross-sectional study was conducted in in-person interviews with 360 hypertensive patients using a pre-designed questionnaire. The Hypertension Knowledge-Level Scale (HK-LS) assessed patients' knowledge about hypertension. The Morisky Medication Adherence Scale assessed patients' medication adherence. Patients' characteristics and medication usage data were obtained from medical records or prescriptions. The mean age of the patients was 59.3±9.55 years. Most patients used only one antihypertensive medication (74.7%), and a calcium channel blocker was the most used (46.4%). Many patients in this study had poor knowledge about hypertension, accounting for 65.28%, though most patients adhered to medication (81.94%). Patients' knowledge of hypertension had a statistically significant association with medication adherence ( $p=0.002$ ). This research indicated the association between knowledge and medication adherence, so medical personnel consultation is crucial to raise patients' knowledge and improve treatment safety.

### Keywords:

Adherence, Relative factor, Antihypertension

## 1. INTRODUCTION

Hypertension is considered a “silent killer” because it has no obvious warning signs or symptoms. According to the World Health Organization (WHO), the number of adults worldwide with hypertension has increased from 594 million people (1975) to 1.13 billion (2015). By 2025, the number of hypertensive patients will be 1.56 billion<sup>1</sup>. According to a study by Sarki Ahmed, 1 in 3 adults has hypertension in developing countries. This study also showed that hypertension was a major public health problem and possessed a significant burden in low- and middle-income countries<sup>2</sup>. In Vietnam, hypertension prevalence is increasing rapidly; the hypertension percentage of those aged 25 years or older is 47.3%<sup>3</sup>.

Hypertension is one of the most common causes of

death; it leads to dangerous cardiovascular events such as stroke, myocardial infarction, heart failure, kidney failure, etc. An important principle in hypertension treatment is regular blood pressure monitoring and long-term treatment to achieve targeted therapy, minimizing cardiovascular risk. Achieving treatment goals depends on various factors such as medication regimens, knowledge, medication adherence, etc. According to WHO, medication adherence is one of the prerequisites affecting the treatment results. Abundant studies also demonstrate that adherence to antihypertensive medicines leads to better blood pressure control and a reduced risk of cardiovascular complications (CVDs)<sup>4-6</sup>. A systematic review and meta-analysis of medication nonadherence in low- and middle-income economies (a study of 92,443 patients) found that 63.35% did not adhere to medication<sup>7</sup>. Therefore, we conducted

### \*Corresponding author:

\*Thang Nguyen Email: ntrang@ctump.edu.vn



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this study to investigate their knowledge, adherence rate, and relationship to hypertension treatment.

## 2. MATERIALS AND METHODS

### 2.1. Study design

We conducted a cross-sectional study through in-person interviews with patients at the hospital's examination department to collect hypertension knowledge and medication adherence data using a pre-designed questionnaire. The data about personal information and medication use was obtained from medical records or prescriptions.

### 2.2. Study population

The selected patients had been diagnosed with hypertension. They were being treated with at least one drug for 03 months or more and came to the examination department of a hospital in Binh Thuan Province from 02/2020 until 09/2020.

Inclusion criteria: 1) outpatients with a diagnosis of hypertension; 2) being treated with at least one drug for three months or more.

Exclusion criteria: 1) patients refused to participate in the study; 2) the patient was not Vietnamese; 3) the patient was participating in another intervention-related study on knowledge and antihypertensive medication.

The formula for estimating the precision of a proportion was applied to calculate the required sample size. Based on previous studies, the proportion of medication adherence was  $P1=0.366^7$ , and the proportion of good-knowledge patients was  $P2=0.370^8$ ; with an allowable error of  $d=0.05$ , we estimated the minimum sample size found on the formula for calculating sample size to carry out the study on medication adherence of 357 subjects; the minimum sample size for the study on hypertension knowledge was 358 subjects. Therefore, the minimum general sample size for our study is 358 subjects.

### 2.3. Methods

Our research process might be summarized in 3 steps, including developing and completing the data collection form, data collection, and data processing.

We collected information on patients' characteristics, knowledge, and medication adherence. Patient characteristics included questions about the patient's name, age, gender, education level, marital status, occupation, disease duration, chronic comorbidities, medicine type, and the number of antihypertensive drugs being taken. Our study used the Hypertension Knowledge-Level Scale (HK-LS)<sup>9</sup>, which was translated into Vietnamese and validated to assess hypertension knowledge. The HK-LS scale consists of 22 questions, with each correct answer getting 1 point

and an incorrect answer getting 0 points; the minimum score was 0 points, and the maximum was 22 points. Patients with  $\leq 17$  points were considered poor knowledge, and 18-22 points were good knowledge. We used the eight-item Morisky Medication Adherence Scale (MMAS-8)<sup>10</sup> to assess the patient's medication adherence. This scale included 8 questions about the patient's adherence to antihypertensive medication. Each answer demonstrating adherence would be awarded 1 point; maximum 8 points and minimum 0 points. Patients with 8 points were high adherence, 6-7 points were average, and those  $< 6$  points were low. Patients with scores in the moderate and high adherence groups were defined as adherent; patients in the low adherence group were identified as non-adherent.

### 2.4. Data collection and analysis

In our study, we collected data through in-person interviews with patients. Patients provided written informed consent prior to participating in the study. Then face-to-face interview with a pretested structured questionnaire was conducted to collect the patients' characteristics, hypertension knowledge and adherence status of patients to antihypertensive medication. The in-person interview was employed using five trained BSc graduate nurses who were working out of the chronic illness clinics.

After collecting enough samples, the data were processed using Excel 2010 and SPSS 25.0 software. We applied descriptive statistics to calculate the frequency and percentage of the characteristics of the study population, knowledge, and medication adherence. Descriptive statistics were also used to calculate the mean and standard deviation to derive the range of patients' ages enrolled in this study. We also used logistic regression to investigate the association between factors with medication adherence. The dependent variable was drug adherence; the independent variables were age group, sex, education level, occupation, marital status, duration of disease, comorbidities, number of drugs used, and hypertension knowledge. In multivariate analysis, variables with a  $P$ -value of  $\leq 0.05$  were considered as statistically significant. There was no collinearity and multicollinearity among the variables.

## 3. RESULTS

### 3.1. Patients' demographic and medication use characteristics

The study was carried out on 360 patients. The mean age of the patients was  $59.3 \pm 9.55$  years old. Most patients were under 65 years old (66.7%) and had a disease duration of fewer than 5 years (62.8%). Male patients accounted for 51.5% and 74.7% of patients treated with monotherapy (Table 1).

**Table 1.** Patient characteristics.

Characteristics		Number (%)
<b>Age</b>	Mean $\pm$ SD	59.3 $\pm$ 9.55
<b>Age group</b>	< 65 years old	240 (66.7%)
	$\geq$ 65 years old	120 (33.3%)
<b>Gender</b>	Female	176 (48.9%)
	Male	184 (51.1%)
<b>Occupation</b>	Working	199 (55.3%)
	Non-working*	161 (44.7%)
<b>Educational level</b>	$\leq$ Elementary school	170 (47.2%)
	$\geq$ Junior high school	190 (52.8%)
<b>Marital status</b>	Single	22 (6.1%)
	Married	338 (93.9%)
<b>Hypertension duration</b>	< 5 years	226 (62.8%)
	$\geq$ 5 years	134 (37.2%)
<b>Comorbidities</b>	Yes	183 (50.8%)
	No	177 (49.2%)
<b>Drug amounts</b>	1 drug	269 (74.7%)
	$\geq$ 2 drugs	91 (25.3%)

\*Non-working: not working for any company or association; not having a salary or retiring.

**Table 2.** Antihypertensive medication use characteristics.

Group	Group 1	Group 2	Group 3	Number (%)	Total (%)
<b>CCB</b>	Amlodipine			161 (44.7%)	46.4
	Nifedipine			6 (1.7%)	
<b>ACEI</b>	Captopril			8 (2.2%)	9.7
	Enalapril			27 (7.5%)	
<b>ARB</b>	Irbesartan			4 (1.1%)	18.6
	Losartan			63 (17.5%)	
<b>CCB + beta blocker</b>	Amlodipine	Bisoprolol		26 (7.2%)	8.6
	Amlodipine	Carvedilol		3 (0.8%)	
	Nifedipine	Bisoprolol		2 (0.6%)	
<b>ARB/ACEI + CCB</b>	Losartan	Amlodipine		14 (3.9%)	8.6
	Valsartan	Amlodipine		1 (0.3%)	
	Irbesartan	Amlodipine		4 (1.1%)	
	Enalapril	Amlodipine		10 (2.8%)	
	Captopril	Amlodipine		1 (0.3%)	
	Captopril	Nifedipine		1 (0.3%)	
<b>ACEI/ARB + beta blocker</b>	Enalapril	Bisoprolol		15 (4.2%)	6.7
	Losartan	Bisoprolol		6 (1.7%)	
	Valsartan	Bisoprolol		3 (0.8%)	
<b>CCB + beta blocker + ARB</b>	Amlodipine	Bisoprolol	Losartan	3 (0.8%)	1.4
	Amlodipine	Bisoprolol	Irbesartan	1 (0.3%)	
	Nifedipine	Bisoprolol	Losartan	1 (0.3%)	
<b>Total</b>				360 (100%)	100

ACEI = Angiotensin-converting enzyme inhibitor; ARB = Angiotensin receptor blocker; CCB = Calcium channel blocker.

**Table 3.** Knowledge on hypertension and adherence to medications results.

		Number (%)
<b>Hypertensive knowledge</b>	Poor knowledge	235 (65.28%)
	Good knowledge	125 (34.72%)
<b>Medication adherence</b>	Non-adherence	
	Low adherence	65 (18.06%)
	Adherence	
	Moderate adherence	136 (37.78%)
	High adherence	159 (44.17%)

**Table 4.** Results of logistic regression analysis on the association between knowledge and medication adherence in hypertensive patients.

Characteristics		OR (95% CI)	p
Age group	< 65 years old	1.036 (0.572 – 1.879)	0.906
	≥ 65 years old		
Gender	Female	1.531 (0.875 – 2.677)	0.136
	Male		
Occupation	Non-working*	0.937 (0.522 – 1.682)	0.828
	Working		
Marital status	Single	2.117 (0.471– 9.510)	0.328
	Married		
Hypertension duration	< 5 years	1.137 (0.633 – 2.043)	0.667
	≥ 5 years		
Comorbidities	Yes	0.935 (0.522 – 1.674)	0.821
	No		
Antihypertensive drug amounts	1 drug	0.725 (0.364 – 1.442)	0.359
	≥ 2 drugs		
Hypertension knowledge	Good knowledge	2.963 (1.506 – 5.828)	0.002
	Poor knowledge		

\*Non-working: not working for any company or association; not having a salary or retiring.

CCB group had the highest proportion of drugs in monotherapy, accounting for 46.4%, and the ACEI/ARB group (28.3%) was ranked behind. 23.9% of patients indicated using a combination of drugs of two classes. The most common indications were the combination of CCBs and beta blockers, ACEI/ARB and CCBs, ACEI/ARB, and beta blockers. Only 1.4% of patients were indicated to use a combination of three drugs, including CCB, ACEI/ARB, and beta blockers. The results of medication use are presented in Table 2.

### 3.2. Knowledge and medication adherence characteristics

The HK-LS scale assessed the knowledge of 360 patients participating in this study, and it showed poor hypertension knowledge prevalence was very high, up to 65.28%. The MMAS-8 Vietnamese version assessed patients' medication adherence, and the results demonstrated that most patients adhered to the indication (81.94%). In the adherents' group, the proportion of high adherence was 44.17%, and 37.78% was moderate (Table 3).

### 3.3. Association between knowledge and medication adherence

The logistic regression analysis between hypertension knowledge and medication adherence demonstrated that only the independent variable, hypertension knowledge, was significantly related to medication adherence ( $p=0.002$ ). Table 4 shows the patients' characteristics and the logistics regression analysis result.

## 4. DISCUSSION

This research directly demonstrated a relationship

between knowledge and medication adherence in the treatment of hypertension. The other factors, such as age, gender, education level, occupation sector, etc., did not make a statistically significant difference. In addition, the survey results showed patients did not seem aware of the consequences of having hypertension (up to 65.28% of patients in this study had poor hypertension knowledge). Therefore, it affected the treatment's effectiveness. Medical personnel must not only diagnose and indicate exactly but also supply important basic information about the disease, guide patients to have a healthy lifestyle, and prompt patients to adhere to the treatment.

### 4.1. Patients' demographic

In this research, patients' mean age was  $59.3\pm 9.55$ , almost homologous to most studies<sup>8</sup>. Nevertheless, it was higher than the results of Razan ( $53\pm 15$ )<sup>11</sup>. 66.7% of patients were older than 65 years old, proper to previous research (62.5%)<sup>12</sup>. The gender rate was approximate (48.9% males and 51.1% females), and it was not different from some studies before<sup>8,13</sup>. According to a pooled analysis, there were no relationships between gender and hypertension rate<sup>2</sup>. However, the latest research by Lana Meigari manifested males had a pronouncedly higher rate than females<sup>14</sup>.

47.2% of the study population had just completed the elementary levels, however, this result was lower than a study in Türkiye (the proportion of patients with an educational level ≤ primary school was 67.8%). The reason may be because Turkish education is divided into 4 main levels, including preschool education, primary education, secondary education and university education. In particular, the primary level is from 6 to 14 years old (including 5 years of primary school and 3 years of secondary school<sup>15</sup>). Therefore, the difference in this proportion may be due to the division of Turkish education levels, which

is different from Vietnamese education.

The proportion of patients with a job was much higher than non-working patients (55.3% and 44.7%), diverse from a study of Eshah (25.7% of patients had a job)<sup>16</sup>. Generally, the disease duration was lower than five years (62.8%), though higher than in the previous studies (28.28%)<sup>13</sup>. This result demonstrates that the majority of patients in our study had a shorter disease duration than in Karaeren and Pan's study. The reason may be because the majority of patients in our study suffered from disease at a younger age (the proportion of patients <65 years old in our study was 66.7%, in Pan's study it was 43.26%)<sup>13</sup>. Patients having chronic comorbidities accounted for 50.8%, proper to the rate in previous research<sup>17</sup>, but different from Pan's study outcome (22.54%)<sup>13</sup>.

#### 4.2. Antihypertensive medication use characteristics

Monotherapy (74.7%) was indicated more frequently than drug combinations (25.3%). CCB drugs (46.4%) and Amlodipine (44.7%) in this group were the most used, while a previous study showed beta-blocker (76.1%) was the most consumed<sup>18</sup>. According to the 2018 Vietnamese National Heart Association/Vietnamese Society of Hypertension (VNHA/VSH) Guidelines for Diagnosis and Treatment of Hypertension in Adults, diuretics, ACEI/ARB, and CCB (or CB if compulsory) were indicated in monotherapy for hypertension level I as well as low-risk cases. These guidelines also recommended the combination of two drugs for almost patients at the initial treatment, especially prioritizing the incorporation of ACEI or ARB with CCB or diuretic<sup>19</sup>. We also found that changing at least one type of antihypertensive medicine considerably decreased the patient's adherence to therapy<sup>18</sup>. In addition, those taking more than one drug ( $p < 0.005$ ) were 3 times more likely to be non-adherent<sup>20</sup>. In our research, we just recorded information about the classification and antihypertensive drug amounts, so there were not enough details to evaluate the medicine used in each patient.

#### 4.3. Knowledge and medication adherence characteristics

Many patients had a good knowledge of hypertension (34.7%), approximate to some previous studies<sup>8,11</sup>, though low knowledge patients seized up to 65.2%. It was because our patients' education level was not high, while the academic level was related to the knowledge of the disease. Most patients understood the complication, lifestyle, and daily diet well, while they had a low perception of the definition and treatment regimen. This result was similar to Eshah's research outcome<sup>16</sup>. The reason might be because patients' psychology when suffering from illness motivates them to learn more and to have a plan to control and prevent the disease and its complica-

tions. However, the "definition" and "treatment regimen" bring a highly professional meaning, so it is hard for patients to compass. Due to sociodemographics being associated with hypertension<sup>16</sup>, we must consider patients' characteristics and supply necessary information about the disease for specific subjects to improve treatment effectiveness.

According to WHO, improving patient medication adherence for chronic conditions such as hypertension and diabetes will provide significant health and economic benefits to patients because medication adherence is an extremely important factor leading to the effectiveness of drug treatment<sup>20</sup>. To investigate patients' adherence, we used the MMAS-8 questionnaire. As a result, 81.9% of patients adhered to medication. This was quite similar to previous research<sup>8,21-22</sup> but higher than the study results of Algabbani (42.2%)<sup>17</sup>.

An assistant-administered questionnaire survey was given to multi-ethnic Asian adults aged 31-80 years who had hypertension according to their electronic health records (EHR) at a primary care clinic. The results revealed that nearly half of the patients did not adhere to at least one anti-hypertensive medication<sup>23</sup>. Although our study sample percentage with medication adherence was quite high, interventions are still necessary to maintain and improve patients' adherence.

#### 4.4. Association between knowledge and medication adherence

Our study outcomes showed that good knowledge patients have a higher ability to adhere to medication than poor knowledge (OR=2.963, 95% CI 1.506-5.828,  $p=0.002$ ). This result was similar to Beata Jankowska in Polish: knowledge was an important independent factor affecting drug adherence ( $p=0.001$ )<sup>8</sup>. Previous studies also announced the same consequence that patients with better knowledge had better compliance<sup>11,16</sup> and got higher MMAS-8 scores<sup>11</sup>. According to Mohamed's research results, 91.7% of patients had good knowledge, and 84.4% adhered to medication<sup>24</sup>. Although Mohamed's study used a different set of survey questions from ours (The Hypertension Fact Questionnaire (HFQ) to assess knowledge and the Drug Attitude Inventory-10 Questionnaire (DAI-10) to assess adherence), it still showed a positive correlation between knowledge and medication adherence in hypertensive patients.

We did not find an association between independent factors (included age groups, gender, occupation, marital status, duration of therapy, comorbidities, the amount of drugs used) and medication adherence. This may be influenced by other factors that correlate with adherence i.e., the academic level, urban residence setting, social interaction related jobs, and family history of hypertension, according to Pham<sup>18</sup>. This difference might be because that study was conducted in a general hospital

of an urban area, in which, the number of outpatients was greater than in the hospital our research took place, a far-flung area, so the data was more comprehensive than ours.

#### 4.5. Study limitations and implementations

Our study results had several limitations. Firstly, because the study was conducted in a specific area and time, patients were directly recruited at the hospital-based clinic; however, only those who actively attended the clinic were included in the study; as a result, other eligible patients may have been overlooked if they were too preoccupied to make appointments. Hence, the analysis outcomes were only localized and unable to represent all hypertensive patients' characteristics. To solve this deficiency, we can increase the sample size and perform the study in different locations over an extended period. Secondly, due to basing on an available questionnaire setting to assess knowledge and medication adherence, there were possible confounding factors caused by patients' incorrect reporting (For example, some questions in the questionnaire were multiple-choice, and the patients misunderstood could still choose randomly; fortunately, it was the correct answer). We propose further research to develop a set of sub-questions; these questions aim to investigate whether the patient completely understands the problem asked in the main questionnaire or not.

The study advantage was based on the scale of assessing knowledge and medication adherence through the HK-LS and the MMAS-8, which are still new in Vietnam. According to this research outcome, we can generalize our patients' characteristics; therefore, we can improve pharmacists' roles, including prescription management (simplifying therapy, restricting adverse drug reactions, controlling or adjusting medication use), educating patients (giving information about hypertension, lifestyle, diet changes, and self-monitoring of blood pressure), medication reminders (by phone, text, email, compliance treatment devices). Moreover, medical staff can increase appointment scheduling and maintain contact with patients to reduce poor compliance. Future research should focus on interventions to improve hypertension knowledge and increase patient awareness of the importance of therapy.

#### 5. CONCLUSION

Study results showed the proportion of monotherapy (75.5%) in hypertension treatment was approximately threefold higher than the combination of at least two drugs (24.5%). Patients with good knowledge about the disease (34.7%) adhered to using drugs (81.9%) more highly than poor knowledge (OR=2.963, CI 95% 1.506-5.828,  $p=0.002$ ). Patients' characteristics (such as age, gender, marital status, job, disease duration, comorbidities, and drug amounts) were not associated with medication

adherence. The following research can continue to intercede in improving hypertensive patients' knowledge or finding the factors associated with knowledge and medication adherence to aim at the target blood pressure.

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#### Conflict of interest

None to declare.

#### Funding

None to declare.

#### Ethics approval

Our research strictly adheres to ethical criteria in medical research and was approved by the Southern Regional General Hospital Council with decision No. 20200115.

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#### Author contribution

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