Status of Understanding of the Disease and Self-Management Behavior among Patients with Hypertension

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Abstract

Background: Hypertension is a lifestyle-related disease that has no subjective symptoms but could lead to severe complications. The goals of treatment for hypertension are to maintain blood pressure with medications and prevent complications. Measuring blood pressure at home regularly is critical for patients with hypertension. **Purpose:** This study aimed to 1) clarify the status of patients' understanding of hypertension and self-management, 2) identify nursing practices that could support patients with hypertension in making them aware of the need for understanding hypertension, monitoring blood pressure at home, and engaging in self-management. **Method:** A questionnaire survey on understanding of the disease and self-management behavior was conducted among patients with hypertension who regularly visited outpatient clinics. As for data analysis, descriptive statistics were computed for patients' attributes, clinical findings, understanding of the disease, and self-management behavior. Cross-tabulation and the chi-square test were used for each item on understanding of the disease and self-management behaviors. **Results:** Data were obtained from 150 participants (93 males and 57 females) with a mean age of 70 years. Patients with a higher understanding of the disease and those who were aware of the target blood pressure were more likely to engage in self-management behavior, including monitoring blood pressure at home, ensuring regular outpatient visits, and consulting with nurses or physicians. In addition, the percentage of patients who recognized the need to achieve their target blood pressure was higher among those who had a spouse and lived with their family. **Discussion:** Regular monitoring and recording of blood pressure at home are the most important self-management behaviors. Understanding of the disease and self-management behavior and support from the family are critical for maintaining appropriate self-management. Therefore, in cooperation with physi-

cians, nurses should provide health education to patients and their families to enable them to perform appropriate self-management. Health expenditures increase with age, especially in those aged 65 years and over. The prevalence of hypertension increases with age; patients aged 65 years and over need to engage in self-management to maintain their target blood pressure. Nurses should provide patients with hypertension aged 65 years and over with appropriate nursing care to enable them to measure and record their blood pressure at home appropriately and regularly. Appropriate nursing care may help reduce the health expenditure. This may help reduce the health expenditure.

Keywords

Self-Management Behavior, Hypertension Patient, Patient Education

1. Introduction

Hypertension is a lifestyle-related disease, and its prevalence increases with age. Hypertension is also known as a "silent killer" because severe complications can develop in the absence of subjective symptoms. High blood pressure increases the risk of onset of diseases such as coronary artery disease, cardiovascular system disorders, and cerebrovascular disorder, as well as the risk of mortality [1]. The goals of treatment for hypertension are basically to maintain optimal blood pressure with medications, achieve blood pressure control, and prevent complications. Therefore, patients are required to understand the need for measuring blood pressure, checking blood pressure daily, and monitoring their blood pressure to ensure that it is decreasing to the target they are attempting to reach.

The Japanese Society of Hypertension (JSH) published Guidelines for the Management of Hypertension 2014, which suggest the usefulness of monitoring blood pressure at home in improving the treatment continuation rate and evaluating if antihypertensive medications have been insufficiently or overly effective in reducing blood pressure as prescribed [1]. In addition to the blood pressure levels measured during medical examinations, the guidelines strongly recommend that blood pressure records from patients' home monitoring should be taken into consideration when deciding on a treatment plan. It strongly recommends that patients record their blood pressure regularly on record sheets.

Previous studies reported that blood pressure measurements from home are better predictors of the prognosis or onset of cardiovascular diseases as compared to the measurement of blood pressure during medical examinations [2]-[9]. Thus, it is critical for patients with hypertension to measure blood pressure at home and to continue to maintain records. Monitoring blood pressure at home by patients themselves may contribute to achieving targeted lower blood pressure levels; prevent the onset of diseases including coronary artery disease, cardiovascular disease, or cerebrovascular disease; maintain healthy life expec-

tancy, and maintain/improve quality of life.

The present study aimed to 1) clarify the status of patients' understanding of hypertension and self-management, 2) identify nursing practices that could support patients with hypertension in making them aware of the need for understanding hypertension, monitoring blood pressure at home, and engaging in self-management.

2. Methods

1) Study period: April 1 to September 30, 2015.

2) Study site: The outpatient clinic of the Department of Cardiology at Tokyo Medical University Hospital.

3) Participants: Patients with hypertension who visited the outpatient cardiology clinic regularly Selection criteria of the participants were as follows: outpatients were diagnosed with hypertension, who regularly booked their next appointment and visited the hospital for follow-up examinations. Subjects were defined as patients with hypertension who regularly visited the outpatient cardiology clinic.

4) Study context

a) Background of participants

Sex, age, duration of disease, presence or absence of taking antihypertension medications, type of antihypertension medication, blood test results, height, weight, blood pressure during medical examination.

b) Survey on understanding of the disease and self-management behavior

A questionnaire developed by the authors was used to examine participants' understanding of the disease and self-management behavior. Items were scored on a dichotomous scale based on *yes* or *no* responses.

5) Analysis methods

Simple tabulation and descriptive analyses were used for examining patients' basic attributes and clinical findings. Additionally, descriptive statistics were computed for participants' understanding of the disease and self-management behavior. Cross-tabulation and the chi-square test were performed to examine each item pertaining to understanding of the disease and self-management behavior. Data were analyzed using IBM SPSS Statistics Ver.24.

3. Ethical Considerations

This study was approved by the Ethics Review Committee of the School of Nursing at Tokyo Medical University and Tokyo Medical University Hospital. The researcher orally explained the research objectives and participation details using instructions sheets to each participant. They were informed that participation in the study was voluntary and that they could withdraw consent at any time, even after agreeing to participate. They would receive no disadvantage as a result of leaving the study. It was also explained that personal information would be protected, that the research data would not be used for anything other than

for the present study, and that all the data collected would be shredded after the completion of the study. Subsequently, those who agreed to participate in the study signed the consent form and completed the questionnaire. The survey was anonymous and participants did not need to fill in the questions they did not want to answer. The patients were asked to place the completed questionnaire in a collection box after completing their medical examination at the outpatient clinic.

4. Results

4.1. Background of the Study Population

Data were obtained from 150 participants (93 males and 57 females). The mean age was 70 ± 10.6 years, with a range of 46 - 92 years. The participants' educational level was distributed as follows: middle school: 16 (10.7%), high school: 49 (32.7%), college/vocational school: 26 (17.3%), and undergraduate/graduate school: 58 (38.7%). Further, 72 participants currently employed, and among them, 35 participants (38.7%) were categorized as "office worker/public officials/staff member of association/teachers," 27 (18%) as "runs private company/freelance business/small business," 1 participant (0.7%) as "engaged in agricultural/fishing industry," and 9 participants (6%) as "work part-time job." Additionally, 120 participants (80%) were married, 30 (20%) lived by themselves, and 120 (80%) lived with their family.

The average disease duration was 8.4 ± 5.8 years. All participants took antihypertension medications and the average number of medications prescribed per participant was 2.1 ± 1. The average systolic and diastolic blood pressures were 139.1 ± 18.1 mmHg and 74.6 ± 13 mmHg, respectively. The average body mass index (BMI) was 26.4 ± 4 kg/m^2. Further, 91 (60.7%) reported that they had a drinking habit, while 59 (39.3%) reported that they did not have a drinking habit. Regarding smoking status, 20 (13.3%) participants currently smoked, 63 (45.3%) had smoked previously, and 62 (41.4%) had never smoked. The average blood test results were as follows: total cholesterol level, 185.2 ± 36.9 mg/dl; triglycerides level, 144.6 ± 74.9 mg/dl; high-density lipoprotein (HDL) cholesterol level, 50.1 ± 13.6 mg/dl; low-density lipoprotein (LDL) cholesterol, 96.4 ± 27 mg/dl; urea nitrogen level, 16.1 ± 4.6 mg/dl; creatinine level, 1.5 ± 8.4 mg/dl; uric acid level, 5.7 ± 1.3 mg/dl; sodium level, 142 ± 3.8 mEq/L; potassium level, 4.4 ± 3.5 mEq/L; chlorine level, 105.9 ± 2.4 mEq/L; blood glucose level, 119.4 ± 36 mg/dl; HbA1c level, 6.2% ± 0.9% (Table 1).

4.2. Understanding of Hypertension

For the question "Do you know what hypertension is?", 135 (90%) participants answered "I do" and 15 (10%) answered, "I don't." For the question "Do you know the risk factors that exacerbate hypertension?", 125 (83.4%) answered "I do" and 25 (16.6%) answered "I don't." For the question "Do you know the complications that can occur due to hypertension?", 118 (78.7%) participants

Table 1. Background of research.

Age	70.0 ± 10.6
Gender n (%)	
Male	93 (62%)
Female	57 (38%)
Disease duration	8.4 ± 5.8
Taking antihypertensive medicine n (%)	
Yes	150 (100%)
No	0 (0%)
Number of antihypertensive medicine	2.1 ± 1.0
Educational Level n (%)	
Undergraduate/graduate school	58 (38.7%)
College/vocational school	26 (17.3%)
High school	49 (32.7%)
Middle school	16 (10.7%)
Employment n (%)	
Yes	72 (48%)
No	78 (52%)
Profession n (%)	
Office worker/public officials/staff member of association/teachers	35 (20%)
Runs private company/freelance business/small business	27 (18%)
Agricultural/fishing industry	1 (0.7%)
Marriage n (%)	
Married	120 (80%)
Unmarried/divorce	30 (20%)
Living n (%)	
Living with family	120 (80%)
Living alone	30 (20%)
Drinking habit n (%)	
Yes	91 (60.7%)
No	59 (39.3%)
Smoking habit n (%)	
Yes (currently)	20 (13.3%)
Yes (previously)	68 (45.3%)
No	62 (41.4%)
BMI (Body Mass Index)	24.6 ± 4.0
Systolic Blood Pressure: SBP (mmHg)	139.1 ± 18.1
Diastolic Blood Pressure: DBP (mmHg)	74.6 ± 13.0
T-Cho (mg/dl)	185.2 ± 36.9
TG (mg/dl)	144.6 ± 74.9
HDL-C (mg/dl)	50.1 ± 13.6
LDL-C (mg/dl)	96.4 ± 27.0
BUN (mg/dl)	16.1 ± 4.6
Cre (mg/dl)	1.5 ± 8.4
UA (mg/dl)	5.7 ± 1.3
Na (mEq/L)	142 ± 3.8
K (mEq/L)	4.4 ± 3.5
Cl (mEq/L)	105.9 ± 2.4
BS (mg/dl)	119.4 ± 36.0
HbA1c (%)	6.2 ± 0.9

answered "I do" and 32 (21.3%) answered "I don't." For the question "Do you know the symptoms of high blood pressure?", 104 (69.3%) answered "I do" and 46 (30.7%) answered "I don't." For the question "Do you know the need for reconsidering your lifestyle?", 127 (84.7%) answered "I do" and 23 (15.3%) answered "I don't." For the question "Do you know the types of prescribed drugs and their effects?", 120 (80%) answered "I do" and 30 (20%) answered "I don't." (Table 2).

4.3. Self-Management Behaviors

For the question "Do you have your own sphygmomanometer?", 142 (94.7%) answered "I do" and 8 (5.3%) answered "I don't." For the question "Do you measure your blood pressure at home?", 117 (78%) answered "I do" and 33 (22%) answered "I don't." For the question "Do you record your blood pressure in a notebook?", 91 (60.7%) answered "I do" and 59 (39.3%) answered "I don't." For the question "Do you know the appropriate blood pressure?", 140 (93.3%) answered "I do" and 10 (6.7%) answered "I don't." For the question "Do you visit your physicians as scheduled?", 149 (99.3%) answered "I do" and 1 (0.7%) answered "I don't." For the question "Do you show your blood pressure records to your physicians during the medical examination?", 67 (44.6%) answered "I do" and 83 (55.4%) answered "I don't." For the question "Do you consult with physicians or nurses?", 131 (87.3%) answered "I do" and 19 (12.7%) answered "I don't." (Table 3).

4.4. Cross-Tabulation

1) Understanding of each item on knowledge of disease/understanding of disease and self-management behaviors

Table 2. Understanding of hypertension (n = 150).

		Frequency	(%)
Do you know what hypertension is?	I do	135	90.0%
	I don't	15	10.0%
Do you know the risk factors that exacerbate hypertension?	I do	125	83.4%
	I don't	25	16.6%
Do you know the complications that can occur due to hypertension?	I do	118	78.7%
	I don't	32	21.3%
Do you know the symptoms of high blood pressure?	I do	104	69.3%
	I don't	46	30.7%
Do you know the need for reconsidering your lifestyle?	I do	127	84.7%
	I don't	23	15.3%
Do you know the types of prescribed drugs and their effects?	I do	120	80.0%
	I don't	30	20.0%

Table 3. Self-management behaviors (n = 150).

		Frequency	(%)
Do you have your own sphygmomanometer?	I do	142	94.7%
	I don't	8	5.3%
Do you measure your blood pressure at home?	I do	117	78.0%
	I don't	33	22.0%
Do you record your blood pressure in a notebook?	I do	91	60.7%
	I don't	59	39.3%
Do you know the appropriate blood pressure?	I do	140	93.3%
	I don't	10	6.7%
Do you visit your physician as scheduled?	I do	149	99.3%
	I don't	1	0.7%
Do you show your blood pressure records to your physician during the medical examination?	I do	67	44.6%
	I don't	83	55.4%
Do you consult with physicians or nurses?	I do	131	87.3%
	I don't	19	12.7%

Understanding of the disease (7 items) and self-management behaviors (5 items) were cross-tabulated (Table 4). "Understanding of hypertension" was significantly associated with "recording blood pressure," "showing the records to physicians during medical examination," and "consulting with physicians or nurses." "Understanding of the risk factors that exacerbate hypertension" was significantly associated with "measuring blood pressure at home," "recording blood pressure," and "consulting with physicians or nurses." "Understanding of complications led to by hypertension" was significantly associated with "measuring blood pressure at home," "recording blood pressure," and "consulting with physicians or nurses." "Understanding of subjective symptoms when experiencing high blood pressure" was significantly associated with "measuring blood pressure at home" and "consulting with physicians or nurses." "The necessity of reconsidering lifestyle" was significantly associated with "measuring blood pressure at home," "showing the records to physicians during medical examination," and "consulting with physicians or nurses." "Understanding of prescribed medications" was significantly associated with "measuring blood pressure at home" and "consulting with physicians or nurses." "Understanding of target blood pressure" was significantly associated with "measuring blood pressure at home."

a) Understanding of hypertension and self-management behavior

When examining the association between "understanding of hypertension" and "recording blood pressure," participants who reported "yes" to the former had a significantly higher percentage of recording their blood pressure (94.5%, adjusted residual = 2.2). Pertaining to "showing the records to physicians at a medical examination," participants who reported that they had an understanding of hypertension had a significantly higher percentage of showing the records

Table 4. Relationship between knowledge and understanding of disease and self-management behavior.

Understanding of knowledge/understanding of disease	Self-management behavior			
	Measuring blood pressure at home	Recording blood pressure	Showing the records to physicians during medical examination	Consulting with physicians or nurses
Understanding of hypertension		Asymptotic significance probability (0.027) X^2 (2) = 4.882	Asymptotic significance probability (0.026) X^2 (2) = 4.973	Asymptotic significance probability (0.000) X^2 (2) = 18.785
Understanding of the risk factors that exacerbate hypertension	Asymptotic significance probability (0.001) X^2 (2) = 11.818	Asymptotic significance probability (0.028) X^2 (2) = 4.846	Asymptotic significance probability (0.034) X^2 (2) = 4.480	Asymptotic significance probability (0.000) X^2 (2) = 11.222
Understanding of complications led to by hypertension	Asymptotic significance probability (0.022) X^2 (2) = 5.243		Asymptotic significance probability (0.022) X^2 (2) = 5.243	Asymptotic significance probability (0.000) X^2 (2) = 14.099
Understanding of subjective symptoms when experiencing high blood pressure	Asymptotic significance probability (0.000) X^2 (2) = 14.408			Asymptotic significance probability (0.002) X^2 (2) = 9.279
The necessity of reconsidering lifestyle	Asymptotic significance probability (0.007) X^2 (2) = 7.303		Asymptotic significance probability (0.042) X^2 (2) = 4.141	Asymptotic significance probability (0.000) X^2 (2) = 18.737
Understanding of prescribed medications	Asymptotic significance probability (0.000) X^2 (2) = 13.296			Asymptotic significance probability (0.034) X^2 (2) = 4.478
Understanding of target blood pressure	Asymptotic significance probability (0.003) X^2 (2) = 9.016			

$p < 0.05$, versus each respective countenrparts

(95.5%, adjusted residual = 2.2). Pertaining to "consulting with physicians or nurses," those who that they had an understanding of hypertension had a significantly higher percentage of consulting with physicians or nurses (93.9%, adjusted residual = 4.3, P = 0.000) (Table 5).

b) Understanding the risk factors that exacerbate hypertension and self-management behavior

Among those who understood the risk factors that exacerbate hypertension, a significantly higher percentage reported measuring their blood pressure at home (88.9%, adjusted residual = 3.4), recording their blood pressure (92.3%, adjusted residual = 2.2), showing the records to the physicians during a medical examination (89.6%, adjusted residual = 2.1), and consulting with physicians or nurses (87%, adjusted residual = 3.3) (Table 6).

c) Understanding of complications caused by hypertension and self-management behavior

Among those who understood the complications caused by hypertension, a significantly higher percentage reported measuring blood pressure at home

Table 5. Understanding of hypertension and self-management behavior.

		Recording blood pressure		X² Test
Understanding of hypertension		Yes	No	
Yes	frequency (%)	86 (94.5%)	21 (80.8%)	
	adjusted residual	2.2	−2.2	P = 0.027
No	frequency (%)	5 (5.5%)	5 (19.2%)	
	adjusted residual	−2.2	2.2	
		Showing the records to physician at a medical examination		X² Test
Understanding of hypertension		Yes	No	
Yes	frequency (%)	64 (95.5%)	63 (84%)	
	adjusted residual	2.2	−2.2	P = 0.026
No	frequency (%)	3 (4.5%)	12 (16%)	
	adjusted residual	−2.2	2.2	
		Consulting with physicians or nurses		X² Test
Understanding of hypertension		Yes	No	
Yes	frequency (%)	123 (93.9%)	11 (61.1%)	
	adjusted residual	4.3	−4.3	P = 0.000
No	frequency (%)	8 (6.1%)	7 (38.9%)	
	adjusted residual	−4.3	4.3	

Table 6. Understanding the risk factors that exacerbate hypertension and self-management behavior.

		Measuring blood pressure at home		X² Test
Understood the risk factors that exacerbate hypertension		Yes	No	
Yes	frequency (%)	104 (88.9%)	21 (63.6%)	
	adjusted residual	3.4	−3.4	P = 0.001
No	frequency (%)	13 (11.1%)	12 (36.4%)	
	adjusted residual	−3.4	3.4	
		Recording blood pressure		X² Test
Understood the risk factors that exacerbate hypertension		Yes	No	
Yes	frequency (%)	84 (92.3%)	20 (76.9%)	
	adjusted residual	2.2	−2.2	P = 0.028
No	frequency (%)	7 (7.7%)	6 (23.1%)	
	adjusted residual	−2.2	2.2	
		Showing the records to physicians at a medical examination		X² Test
Understood the risk factors that exacerbate hypertension		Yes	No	
Yes	frequency (%)	60 (89.6%)	57 (76%)	
	adjusted residual	2.1	−2.1	P = 0.034
No	frequency (%)	7 (10.4%)	18 (24%)	
	adjusted residual	−2.1	2.1	
		Consulting with physicians or nurses		X² Test
Understood the risk factors that exacerbate hypertension		Yes	No	
Yes	frequency (%)	114 (87%)	10 (55.6%)	
	adjusted residual	3.3	−3.3	P = 0.001
No	frequency (%)	17 (13%)	8 (44.4%)	
	adjusted residual	−3.3	3.3	

(82.9%, adjusted residual = 2.4), showing the records to their physicians during medical examinations (88.6%, adjusted residual = 2.3), and consulting with physicians or nurses (83.2%, adjusted residual = 3.8) (Table 7).

d) Understanding of subjective symptoms of high blood pressure and self-management behavior

Among those who understood symptoms of high blood pressure, a significantly higher percentage reported measuring blood pressure at home (76.9%, adjusted residual = 3.8) and consulting with physicians or nurses (74%, adjusted residual = 3.0) (Table 8).

e) Understanding of the need for reconsidering lifestyle and self management behavior

Among those who understood the need for reconsidering their lifestyle, a significantly higher percentage reported measuring blood pressure at home (88.9%, adjusted residual = 2.7), showing their records to their physicians during medical examinations (91%, adjusted residual = 2.0), and consulting with physicians or nurses (89.3%, adjusted residual = 4.3) (Table 9).

f) Understanding of prescribed medications and self-management behavior

Among those who understood prescribed medications, a significantly higher percentage reported measuring blood pressure at home (86.3%, adjusted residual = 3.6) and consulting with physicians or nurses (82.4%, adjusted residual =

Table 7. Understanding of complications caused by hypertension and self-management behavior.

Understood the complications caused by hypertension		Measuring blood pressure at home		X^2 Test
		Yes	No	
Yes	Frequency (%)	97 (82.9%)	21 (63.6%)	
	Adjusted residual	2.4	−2.4	P = 0.022
No	Frequency (%)	20 (17.1%)	12 (36.4%)	
	Adjusted residual	−2.4	2.4	
Understood the complications caused by hypertension		Showing the records to physicians at a medical examination		X^2 Test
		Yes	No	
Yes	Frequency (%)	58 (86.6%)	53 (70.7%)	
	Adjusted residual	2.3	−2.3	P = 0.022
No	Frequency (%)	9 (13.4%)	22 (29.3%)	
	Adjusted residual	−2.3	2.3	
Understood the complications caused by hypertension		Consulting with physicians or nurses		X^2 Test
		Yes	No	
Yes	Frequency (%)	109 (83.2%)	8 (44.4%)	
	Adjusted residual	3.8	−3.8	P = 0.000
No	Frequency (%)	22 (16.8%)	10 (55.6%)	
	Adjusted residual	−3.8	3.8	

Table 8. Understanding of subjective symptoms of high blood pressure and self-management behavior.

Understanding of subjective symptoms of high blood pressure		Measuring blood pressure at home		X^2 Test
		Yes	No	
Yes	Frequency (%)	90 (76.9%)	14 (42.4%)	
	Adjusted residual	3.8	−3.8	P = 0.000
No	Frequency (%)	27 (23.1%)	19 (57.6%)	
	Adjusted residual	−3.8	3.8	
Understanding of subjective symptoms of high blood pressure		Consulting with physicians or nurses		X^2 Test
		Yes	No	
Yes	Frequency (%)	97 (74%)	7 (38.9%)	
	Adjusted residual	3	−3	P = 0.002
No	Frequency (%)	34 (26%)	11 (61.1%)	
	Adjusted residual	−3	3	

Table 9. Understanding of the need for reconsidering lifestyle and self-management behavior.

Understanding of the need for reconsidering lifestyle		Measuring blood pressure at home		X^2 Test
		Yes	No	
Yes	Frequency (%)	104 (88.9%)	23 (69.7%)	
	Adjusted residual	2.7	−2.7	P = 0.007
No	Frequency (%)	13 (11.1%)	10 (30.3%)	
	Adjusted residual	−2.7	2.7	
Understanding of the need for reconsidering lifestyle		Showing the records to physicians at a medical examination		X^2 Test
		Yes	No	
Yes	Frequency (%)	61 (91%)	59 (78.7%)	
	Adjusted residual	2	−2	P = 0.042
No	Frequency (%)	6 (9%)	16 (21.3%)	
	Adjusted residual	−2	2	
Understanding of the need for reconsidering lifestyle		Consulting with physicians or nurses		X^2 Test
		Yes	No	
Yes	Frequency (%)	117 (89.3%)	9 (50%)	
	Adjusted residual	4.3	−4.3	P = 0.000
No	Frequency (%)	14 (10.7%)	9 (50%)	
	Adjusted residual	−4.3	4.3	

2.1). (Table 10).

g) Understanding of target blood pressure and self-management behavior

Among those who understood target blood pressure, a significantly higher percentage reported measuring blood pressure at home (96.6%, adjusted residual = 3.0) (Table 11).

Table 10. Understanding of prescribed medications and self-management behavior.

Understanding of prescribed medications		Measuring blood pressure at home		X^2 Test
		Yes	No	
Yes	Frequency (%)	101 (86.3%)	19 (57.6%)	
	Adjusted residual	3.6	−3.6	P = 0.000
No	Frequency (%)	16 (13.7%)	14 (42.4%)	
	Adjusted residual	−3.6	3.6	
Understanding of prescribed medications		Consulting with physicians or nurses		X^2 Test
		Yes	No	
Yes	Frequency (%)	108 (82.4%)	11 (61.1%)	
	Adjusted residual	2.1	−2.1	P = 0.034
No	Frequency (%)	23 (17.6%)	7 (38.9%)	
	Adjusted residual	−2.1	2.1	

Table 11. Understanding of target blood pressure and self-management behavior.

Understanding of target blood pressure		Measuring blood pressure at home		X^2 Test
		Yes	No	
Yes	Frequency (%)	113 (96.6%)	27 (81.8%)	
	Adjusted residual	3	−3	P = 0.003
No	Frequency (%)	4 (3.4%)	6 (18.2%)	
	Adjusted residual	−3	3	

2) Basic attributes of participants and their understanding of the disease, and self-management behavior

Cross-tabulation was performed between the basic attributes of participants and their understanding of the disease (7 items), and their self-management behaviors (5 items) (Table 12). There was a significant association between educational level and three items pertaining to understanding of the disease (understanding of subjective symptoms of high blood pressure, understanding of the need for reconsidering their lifestyle, and understanding of prescribed medications), and one item on self-management behaviors (measuring blood pressure at home). Living situation was significantly associated with the understanding of target blood pressure. Occupational status was significantly associated with measuring blood pressure at home. Age was significantly associated with the understanding of prescribed medications.

a) Basic attributes of participants and understanding of the disease

Participants with an educational attainment level of up to middle school had a significantly higher percentage of those reporting that they did not have an understanding of the symptoms of high blood pressure (62.5%, adjusted residual = 2.9), need for reconsidering their lifestyle (43.8%, adjusted residual = 3.3), and prescribed medications (50%, adjusted residual = 3.2). Housewives/husbands had a significantly higher percentage of individuals who measured blood pressure at home (96.6%, adjusted residual = 2.7). Participants aged 65 years and

Table 12. Basic attributes of participants and their understanding of the disease, and self-management behavior.

Self-management behavior Understanding of knowledge/disease	Participant background			
	Educational Level	Living (living alone/living with family)	Age	Profession
Understanding of subjective symptoms when experiencing high blood pressure	Asymptotic significance probability (0.013) X^2 (2) = 10.7888			
The necessity of reconsidering lifestyle	Asymptotic significance probability (0.007) X^2 (2) = 12.202			
Understanding of prescribed medications	Asymptotic significance probability (0.017) X^2 (2) = 10.232		Asymptotic significance probability (0.049) X^2 (2) = 6.034	
Understanding of target blood pressure		Asymptotic significance probability (0.014) X^2 (2) = 6.027		
Measuring blood pressure at home	Asymptotic significance probability (0.021) X^2 (2) = 9.778			Asymptotic significance probability (0.014) X^2 (2) = 15.996

younger had a significantly higher percentage of individuals who reported understanding prescribed medications (91.1%, adjusted residual = 2.2) (Table 13).

b) Basic attributes of participants and self-management behaviors

Participants who lived with their family reported a significantly higher percentage of understanding target blood pressure (95.8%, adjusted residual = 2.5) (Table 14).

5. Discussion

When considering the association between self-management behaviors and understanding of the disease, participants who measured their blood pressure at home were more likely to understand hypertension, the risk factors that exacerbate it, related complications, subjective symptoms, types and effects of prescribed medications, and the importance of lowering blood pressure to targeted values. According to the recommendations of the Guidelines for the Management of Hypertension 2014, better understanding and self-management has been achieved when physicians stress on the importance of measuring blood pressure and providing guidance at each visit for patients to measure at home

Table 13. Basic attributes of participants and understanding of the disease.

Understanding of the symptoms of high blood pressure		Educational Level				X^2 Test
		Middle school	High school	College/vocational school	Undergraduate/ graduate school	
Yes	Frequency (%)	6 (37.5%)	33 (67.3%)	22 (84.6%)	42 (72.4%)	
	Adjusted residual	−2.9	−0.3	1.9	0.7	P = 0.013
No	Frequency (%)	10 (62.5%)	16 (32.7%)	4 (15.4%)	16 (27.6%)	
	Adjusted residual	2.9	0.3	−1.9	−0.7	

Understanding of the need for reconsidering lifestyle		Educational Level				X^2 Test
		Middle school	High school	College/vocational school	Undergraduate/ graduate school	
Yes	Frequency (%)	9 (56.3%)	41 (83.7%)	24 (92.3%)	52 (89.7%)	
	Adjusted residual	−3.3	−0.2	1.2	1.4	P = 0.007
No	Frequency (%)	7 (43.8%)	8 (16.3%)	2 (7.7%)	6 (10.3%)	
	Adjusted residual	3.3	0.2	−1.2	−1.4	

Understanding of prescribed medications		Educational Level				X^2 Test
		Middle school	High school	College/vocational school	Undergraduate/ graduate school	
Yes	Frequency (%)	8 (50%)	42 (85.7%)	21 (80.8%)	48 (82.8%)	
	Adjusted residual	−3.2	1.2	0.1	0.7	P = 0.017
No	Frequency (%)	8 (50%)	7 (14.3%)	5 (19.2%)	10 (17.2%)	
	Adjusted residual	3.2	−1.2	−0.1	−0.7	

Measuring blood pressure at home		Profession						X^2 Test
		Office worker/public officials/staff member of association/teachers	Runs private company/ freelance business/ small business	Agricultural/ fishing industry	Part-time job	Housewife (professional)/ husband (stay home)	Unemployed	
Yes	Frequency (%)	24 (68.6%)	22 (81.5%)	1 (100%)	5 (55.6%)	28 (96.6%)	34 (81%)	
	Adjusted residual	−1.5	0.5	0.5	−1.7	2.7	0.5	P = 0.014
No	Frequency (%)	11 (31.4%)	5 (18.5%)	0 (0%)	4 (44.4%)	1 (3.4%)	8 (19%)	
	Adjusted residual	1.5	−0.5	−0.5	1.7	−2.7	−0.5	

Understanding of prescribed medications		Age			X^2 Test
		Aged 65 years or below	Early-stage elderly individuals	Late-stage elderly individuals aged 75 years or over	
Yes	Frequency (%)	41 (91.1%)	37 (71.2%)	42 (79.2%)	
	Adjusted residual	2.2	−2	−0.2	P = 0.049
No	Frequency (%)	4 (8.9%)	15 (28.8%)	11 (20.8%)	
	Adjusted residual	−2.2	2	0.2	

Table 14. Basic attributes of participants and self-management behavior.

| Understanding target blood pressure | | Living | | X^2 Test |
		Living alone	Living with family	
Yes	Frequency (%)	25 (83.3%)	115 (95.8%)	
	adjusted residual	−2.5	2.5	P = 0.014
No	Frequency (%)	5 (16.7%)	5 (4.2%)	
	adjusted residual	2.5	−2.5	

[1]. In addition, due to the long duration of hypertension (8.4 ± 5.8 years) in the present sample, most participants understood the disease, measured their blood pressure at home, and understood the need to achieve the target blood pressure. In addition, the present participants' mean age was 70 years, which suggests that the age at which physiological functions decrease and the risk of exacerbating hypertension or developing complications increases may also contribute to patients' tendency to measure blood pressure at home. On the other hand, in the present sample, participants who recorded their blood pressure at home comprised only those who responded that they understood the risk factors that exacerbate hypertension. Imai *et al.* suggested that home records could help medical staff to understand their blood pressure [10]. Okubo *et al.* also reported that blood pressure measurements from home were a better predictor to assess prognosis, as compared to blood pressure measurements taken during medical examinations [11]. Thus, physicians need to provide patients with clear explanations about measuring and recording blood pressure at home and they should supply a record notebook during medical examinations. After seeing the physician, nurses need to provide patients with health guidance on how to measure and record blood pressure at home corresponding to their individual abilities, such as the level of patients' understanding or their actual practice of self-management behaviors. In other words, it is critical for physicians and nurses to cooperate and strengthen health guidance depending on patients' individual characteristics in order to enable them to measure and record blood pressure appropriately at home on a daily basis.

In this study, many participants reported that they consulted with physicians or nurses. This may indicate that they recognized the need for understanding their disease and their physical conditions, and they were aware that it takes time to recover once the disease aggravates and that age-related changes affect their health. This result also suggests that providing health guidance thoroughly with the cooperation of physicians and nurses would further facilitate patients' consultation with health personnel and their ability to engage in appropriate self-management behaviors. During medical examinations, physicians and nurses can evaluate the self-management situation at home through the record notebooks or consultation. They could use this information to provide words of encouragement and appreciation of patients' efforts, and to provide positive feedback on what patients have done, which would in turn increase patients'

confidence and motivate their self-management. Thus, healthcare professionals can foster patients' continuation of self-management and increase their self-efficacy.

Considering the association between the participants' basic attributes and understanding of the disease, and their self-management behaviors, the present study found that participants with higher education tended to understand the disease and measure blood pressure at home. Such patients may be able to obtain information about the disease and methods of self-management more effectively, which could deepen their knowledge about the disease and self-management. Based on this knowledge, they may have a greater ability to understand and identify important self-management that match their lifestyle.

Kubota *et al.* analyzed lifetime risk of developing cardiovascular diseases according to educational achievement, using results of a large-scale cohort study that followed 13,948 participants for 26 years [12]. They reported that participants with higher educational attainment had a lower risk of developing cardiovascular diseases, and those with an educational attainment of graduate school level showed the lowest risk. These findings suggest that educational level may possibly be a factor related to health disparities, and they support our findings that participants with higher educational level understood the disease and measured blood pressure at home.

Participants who lived with their family were more likely to understand the need for achieving their target blood pressure. Previous studies indicated that existence and support from the family are necessary for patients to perform appropriate self-management [13] [14] [15] [16] [17]. Hara *et al.* claimed that living with their spouse and having family bonds offered a physiologically stable treatment environment for patients and helped maintain a high self-esteem level, leading to better self-management [18]. In the present study, 120 participants (80%) who had a spouse and live with their family were in an environment where they received support from their family for self-management. This may explain the higher percentage of understanding the need for achieving their target blood pressure among this group of participants. In addition, target blood pressure is an explicitly "visualized" value that families can easily understand, and they may be able to give specific advice or help depending on patients' situation. Therefore, patients living with their family had higher percentage in understanding the need for achieving their target blood pressure.

In Japan, the health expenditures on hypertension were 1,798,100,000,000 JPY in 2016. Further, health expenditures increase with age, especially in those aged 65 years and over [19]. The prevalence of hypertension increases with age; thus, especially patients aged 65 years and over need to engage in self-management to maintain their target blood pressure. Accordingly, nurses should provide patients with hypertension aged 65 years and over with appropriate nursing care to enable them to measure and record their blood pressure at home appropriately and regularly. This practice may in turn help reduce the health expenditure in this group.

The Guidelines for the Management of Hypertension 2014 suggest the usefulness of measuring blood pressure at home for improving treatment continuation rate, evaluating the effectiveness of antihypertensive medications on decreasing blood pressure, and determining an effective treatment plan [1]. Therefore, it is critical for patients with hypertension to perform self-management behaviors, such as regular measurement of blood pressure at home. Consequently, nurses are required to comprehend patients' level of understanding of their disease, insufficient parts of self-management, and patients' feelings. Based on this information, nurses can then create a cooperative system by working with physicians to identify the contents and methods of patient education to enable them to continue appropriate self-management according to their individual abilities. In addition, nurses need to encourage patients to bring their family members to medical examinations and implement educational sessions that include family members so that they also understand the disease, self-management, and the importance of support from the family. Finally, to enhance patients' self-management, it is important to make patients and their families feel that nurses will always be available to support them.

6. Conclusion

A survey was conducted with patients with hypertension treated at an outpatient clinic to examine their understanding of the disease and self-management behavior. When considering the association between understanding of the disease, self-management behavior, and basic attributes, participants who reported that they understood the disease and the need to achieve their target blood pressure tended to exhibit more self-management behaviors, including measuring blood pressure at home, visiting physicians regularly, and consulting with physicians and nurses. In addition, participants who had a spouse and lived with their family had a higher rate of understanding the need to achieve their target blood pressure. Measuring and recording blood pressure are the most important self-management behaviors. To maintain appropriate self-management, it is essential that patients have an optimal understanding of the disease and self-management behaviors, and they receive support from their family. Therefore, the present findings emphasize the importance of the role of nurses, in cooperation with physicians, in providing patient education to improve their understanding of the disease and self-management, and including their families in discussions as much as possible.

Acknowledgements

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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