Original article

Factors related to compliance to high blood pressure therapy among patients with hypertensive crisis

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Background: Non-compliance to antihypertensive medication is a factor associated with a failure in controlling high blood pressure (BP) in the patients with hypertension (HT). To date, patient factors associated with non-compliance in patients with hypertensive crisis have not been investigated in Thai population.
Objective: This study aimed to describe the factors related with compliance to the hypertensive therapy among the patients with hypertensive crisis who visited the emergency department (ED).
Methods: The descriptive-correlational study was conducted at the ED of an urban, tertiary-care hospital. The eligible subjects were asked to respond to a set of questionnaires.
Results: One hundred subjects were recruited to the study. The subjects had low scores on Brief Illness Perception Questionnaire (mean score = 38.5 ± 12.3) and moderate scores of Hill-Bone Compliance to High Blood Pressure Therapy Scale (mean score = 33.1 ± 10.1). However, they had inadequate perception on their HT as a health threat or were not sufficiently concerned on the importance of the treatment. Moreover, they tended not to take medicine (s) without proper instruction. The factors associated with better compliance to high BP therapy were old age and high educational levels.
Conclusion: Subjects had inadequate illness perception towards their underlying HT and the importance of its treatment. Better compliance of treatment of hypertension was associated with higher age group and higher educational level of the patients.

Keywords: Illness perception, hypertension, hypertensive crisis, hypertensive emergency.

Hypertension (HT) is one of the health problems impacting people worldwide. Additionally, the mortality related to HT is still high in low to middle income countries due to underserved health-care infrastructure.[1] Similarly, it continues as a growing nationwide health crisis in Thailand.[2] Patients with severely-elevated blood pressure (BP) are at high risk of developing life-threatening complications and should be emphasized on BP control after detection of their critically high BP.[3,4] Compliance to antihypertensive medication treatment is one of the factors associated with the achievement of BP control. Although the personal factors including age, education, income, social support [5-7] and illness perception [8] have affected the medication compliance, their relationships have not been studied among patients with hypertensive crisis who were likely to fail to control their BP.

The objective of this study was to describe illness perception, social support, and the compliance to high blood pressure therapy and investigate factors related to the compliance to high blood pressure therapy among the patients with hypertensive crisis who attended the emergency department (ED). The findings of this study might help provide appropriate strategies for health care providers to promote better medical compliance in patients with hypertensive crisis.

Materials and methods

This descriptive-correlational study was conducted at the ED of King Chulalongkorn Memorial Hospital, Thailand. This hospital is an urban, 1,333-bed, university-affiliated tertiary-care hospital.[9] Adult patients with severe high BP (> 180 and/or > 120 mmHg) visiting this ED from December, 2018 to March, 2019 were recruited to the study.

The study has been approved by Institutional Review Broad (IRB) of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University (No. MURA 2018/514) and King Chulalongkorn Memorial Hospital (IRB No. 601/61). Written consent was required from all eligible subjects before collecting data.

Selection of subjects

Potential eligible adults aged from 18 years to 65 years with "hypertensive crisis" (see study definitions) were recruited to the study. They were full conscious and able to communicate in Thai language. However, they were excluded if they had a history of psychiatric illnesses or substance abuse, pregnancy, or secondary hypertension including kidney diseases, hyperaldosteronism, thyroid diseases, pheochromocytoma, or renovascular hypertension. [10 - 12]

Study definitions

Hypertensive crisis is categorized into two types of severe high BPs: hypertensive emergency and hypertensive urgency. Hypertensive emergency is defined as a systolic BP (SBP) more than 180 mmHg and/or diastolic BP (DBP) more than 120 mmHg with the sign(s) of an acute end-organ damage while hypertensive urgency is defined as the similar BP numbers of those with hypertensive emergency but without any acute end-organ damage. [3, 4] Subjects with both conditions were enrolled to the study.

Study protocol

Subjects were considered eligible for entering to the study if they had persistent SBP more than 180 mmHg and/or DBP more than 120 mmHg at least 2 times of the BP assessment after taking a 5-minute rest. The evaluation for eligibility criteria was performed in all work shifts. After the eligible subjects were identified and written consent was signed, the demographic data regards to medical history and vital signs were obtained. The subjects were then asked to answer a set of the study questionnaires (see measurement tools section). Subjects completed all the questionnaires after the improvement of their severe high blood pressure or during the time of preparation for discharge with physicians' permission.

Measurement tools

The questionnaires used in the study were detailed as follows:

1. Brief Illness Perception Questionnaire (BIPQ) was developed and permitted by Broadbent E, et al. [13] and the Thai translated version was permitted by Sowattanangoon N.[14] It comprised of an 8-item with numerical evaluation ranged from 0 to 10 and one open-ended question to assess the "cause" of illness perception. The possible cumulative score ranged from 0 to 80. The internal consistency reliability was 0.57.

2. Social support scale was developed and permitted by Toljamo M. and Hentinen H.[15] and the Thai translated version with minor modification was permitted by Leelacharas S, et al. [8] It consisted of 12 questions with a 5-point Likert scale (strongly agree = 5; strongly disagree = 1). The cumulative score ranged from 12 to 60. A higher score indicated a better social support in a patient. The internal consistency reliability was 0.77.

3. Hill-Bone Compliance to High Blood Pressure Therapy Scale (HBCBS) was developed and permitted by the Hill-Bone Scale Team [16] and the Thai translated version was permitted by Leelacharas S, et al.[17] It consisted of 14 questions with 3 subscales to evaluate the patient compliance to HT therapies according to the aspects of 1) diet; 2) appointment keeping; and 3) medication compliance. Each assessment was performed with a 4-point rating scale (4 = at all time; 1 = none of the time). Of all questions, one selected item not relevant with Thai health care system was omitted. The cumulative score ranged from 13 to 52. The internal consistency reliability of this modified version was 0.89.

Sample size calculation

The purposive sampling method was used to recruit subjects. Sample size was determined using G*Power program and target number would be 84 subjects. However, 100 subjects with allowing a loss of a follow-up or those with incomplete data were enrolled.

Statistical analysis

The data were analyzed, using Statistical Package for the Social Sciences (SPSS) provided by Mahidol University. Descriptive statistical analysis was used to describe demographic information. Pearson's correlational analysis was used to analyze variables if normal distributed whereas Spearman's rank

correlation was used to analyze variables if not normal distributed. A *P* - value < 0.05 was considered as statistical significance.

Results

One hundred subjects were recruited to the study. The demographic data are shown in Table 1.

Table 1. The demographic data of the subject (n = 100).

Information	Mean ± SD	Percentage
Age (year) *ranged from 26 – 65 years	51.7 ± 9.4	
Gender		
Female		51.0
Body weight (kilograms)	70.2 ± 16.4	
Height (centimeters)	162.1 ± 8.2	
Body mass index	26.6 ± 5.4	
First blood pressure measurement		
Systolic (mmHg)	202.3 ± 17.0	
Diastolic (mmHg)	117.1 ± 16.1	
Second blood pressure measurement		
Systolic (mmHg)	198.8 ± 15.7	
Diastolic (mmHg)	112.6 ± 14.9	
Chief complaints		
Chest discomfort		23.0
Body numbness		15.0
Headache		16.0
Dizziness		16.0
Referred from OPD		23.0
High BP monitored from home		7.0
Previous diagnosis with hypertension		
Yes		88.0
History of smoking		
Yes		22.0
History of alcohol consumption		
Yes		70.0
Other comorbidities		
Yes		52.0
Highest educational level		
Primary school or lower		26.0
Junior high school		15.0
High school		23.0
Higher than diploma level or Bachelor degree		36.0
Personal income per month / Thai baht		
Lower than 10,000 THB		38.0
10,000 - 20,000 THB		32.0
20,000 - 30,000 THB		18.0
30,000 - 40,000 THB		6.0
More than 40,000 THB		6.0
Occupations		
Business owners		38.0
Official employees		23.0
Construction workers, shift workers		10.0
Senior citizens, pensioners, unemployed		29.0
Health care expense coverage		
Universal health coverage in Bangkok area		33.0
Universal health coverage outside Bangkok		26.0
Social security welfare		12.0
Governmental welfare		28.0
Private or third party insurance		1.0
Family living status		
Living alone		17.0
Living with family members who are relatives		80.0
Living with family members who are not relatives e.g. friends or caregivers		3.0

Results from the questionnaire response

Regards to the BIPQ scale, the mean total score was 38.5 ± 12.3 from the maximum score of 80, implying that the participants had benign (good) perception of considering their HT as the health threat. Even though they reported extremely low scores on the perception of treatment controllability, they perceived the medical treatment effectively help control their BP as displayed in Table 2.

For the social support scale, the mean total score was 45.7 ± 7.3 from the maximum score of 52. This finding indicated that overall, they had satisfaction of social support. However, the scores of peer support was lowest as shown in Table 3.

Table 2. Mean, standard deviation, and percentage of reported scores of Brief Illness Perception Questionnaire (BIPQ) (n = 100).

Illness perception	Mean ± SD	Percentage of reported score > 5 (more threatened)
How much does your illness affect your life? (consequences)	5.9 ± 3.1	58.0
How long do you think your illness will continue? (timeline)	6.2 ± 3.5	57.0
How much control do you feel you have over your illness? (personal controllability)*	4.6 ± 2.6	29.0
How much do you think your treatment can help your illness? (treatment controllability)*	2.3 ± 1.9	4.0
How much do you experience symptoms from your illness? (identity)	4.7 ± 3.4	42.0
How concerned are you about your illness? (concern)	4.8 ± 3.3	41.0
How well do you feel you understand your illness? (understanding)*	5.3 ± 3.4	47.0
How much does your illness affect you emotionally? (emotional representation)	4.6 ± 3.3	39.0
Mean total score	**38.5 ± 12.3**	

Notes: SD = Standard deviation; The total score ranged from 0 to 80.
*The scores of item numbers 3, 4, and 7 were reversed.

Table 3. Mean, standard deviation, and percentage of agreement of Social Support Score responded by the subjects (n = 100).

Questionnaires	Mean ± SD	Percentage of agreement				
		1	2	3	4	5
I. Emotional and instrumental support from family and friends						
My family and friends take care of things for me when necessary.	4.0 ± 1.3	10	3	19	16	52
If I am bored, desperate or depressed, I can discuss that with my family or friends.	3.8 ± 1.3	9	8	20	17	46
I have someone close to me who likes me and will take care of me.	4.0 ± 1.3	8	8	14	18	52
If I need help, my family and friends will advise me.	4.0 ± 1.3	7	9	13	20	51
II. Informational support						
I get information from my health care professionals when I need it.	4.4 ± 0.8	0	0	18	19	63
Follow-up visit in the hypertension clinic are very important for getting information.	4.4 ± 0.9	1	3	16	17	63
I always get help with arranging my care when I need it.	4.3 ± 1.0	3	3	14	23	57
III. Peer support						
I have an opportunity to discuss issues concerning hypertension with another person with hypertension.	2.1 ± 1.4	53	9	16	14	8
When I need, I get help from other people with hypertension.	1.8 ± 1.2	64	11	13	7	5
IV. Negative support						
My family and friends are overprotective towards me.*	4.5 ± 0.9	3	0	12	15	70
Doctors and nurses interfere too much in my care.*	4.8 ± 0.6	0	1	5	11	83
V. Financial support						
I get enough financial support for my care and the instruments.	3.7 ± 1.4	6	18	22	11	43
Mean total score	**45.7 ± 7.3**					

Notes: SD = Standard deviation; The total score ranged from 12 to 60.
*Scores were reversed; Percentage of agreement: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree

The mean score of HBCBS was 33.1 ± 10.1 from the maximum score of 52. The top most items indicated the poor compliance behaviors and the proportion of the subjects who reported extremely low scores on those items were as follows: 1) Miss taking pills when they feel better (47.0%); 2) Forgetting to take medicine (46.0%); 3) Decide not to take pills (43.0%); and, 4) Miss taking pills due to carelessness (43.0%) as shown in Table 4.

Regarding the associations of involved variables and HBCBS, the results showed the increase the age ($r_{xy} = 0.246$; $P < 0.05$) and educational level ($r_s = 0.235$; $P < 0.05$), the increase the higher of the compliance of blood pressure as shown in Table 5.

Table 4. Mean, standard deviation, and percentage of rating the scale of Hill-Bone Compliance to High Blood Pressure Therapy Scale (HBCBS) responded by the subjects (n = 100).

Questionnaires	Mean ± SD	Percentage of rating the scale*			
		1	2	3	4
How often do you forget to take your medicine?	2.1 ± 1.1	46	12	28	14
How often do you decide not to take your HBP medicine?	2.3 ± 1.3	43	12	14	31
How often do you take salty food?	2.6 ± 1.1	23	21	27	29
How often do you shake salt on your food before you eat it?	2.7 ± 1.1	23	17	29	31
How often do you eat fast food?	2.4 ± 1.1	29	18	33	20
How often do you make the next appointment before you leave the doctor's office? *	2.6 ± 1.2	22	30	12	36
How often do you miss schedule appointments?	2.5 ± 1.2	30	19	20	31
How often do you run out of HBP pills?	2.6 ± 1.3	36	5	18	41
How often do you skip your HBP medicine before you go to the doctor?	2.6 ± 1.3	30	20	14	36
How often do you miss taking your HBP pills when you feel better?	2.3 ± 1.3	47	12	9	32
How often do you miss taking your HBP pills when you feel sick?	2.5 ± 1.3	34	20	9	37
How often do you take someone else's HBP pills?	3.8 ± 0.7	4	12	10	84
How often do you miss taking your HBP pills when you are careless?	2.1 ± 1.1	43	16	27	14
Mean total score	**33.1 ± 10.1**				

Notes: SD = Standard deviation; The total score ranged from 13 to 52.
*Scores of all items except item 6 were reversed; HBP = High blood pressure; Percentage of agreement: 1= strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree

Table 5. Correlations of the related variables and HBCBS.

Variable	r	P-value
Age	$r_{xy} = 0.246$	0.014
Education level	$r_s = 0.235$	0.018
Income	$r_s = -0.048$	0.639
Illness perception	$r_{xy} = 0.036$	0.721
Social support	$r_{xy} = 0.193$	0.054

Note: r_{xy} = analyzed by Pearson's correlational analysis
r_s = analyzed by Spearman's rank correlation

Discussion

A number of studies reported the association between personal profiles and behaviors and patients' medication adherence on chronic diseases. [5 - 7, 17, 18] This study examined the relationships of the BIPQ, Social Support, and HBCBS in participants with hypertensive crisis. The findings revealed most participants perceived hypertension as a chronic illness, affected their life, and needed long term therapy. However, they responded fewer scores in knowledge regards to diseases and concern of negative effects of hypertensive crisis. This is consistent with a previous publication reporting that personal concern and understanding about the illnesses could affect the compliance to treatment [13] and the patients' perception toward chronic diseases characterized as "asymptomatic" could lead negative impacts on the compliance to medical treatment. [18] The findings found no association between the perception and medication compliance which was different from the findings of the previous literature. [8, 19, 20] It is possible because subjects in this study had less chances to discuss information of hypertension with persons or friends with hypertension. Furthermore, the majority lived with their relatives who might not have helpful information of hypertension, making them have less concern of hypertension which has no clear symptoms to notice. Nurses or other health care providers could help assess more information of hypertension to effectively help patients with hypertensive crisis to have better control of blood pressure level.

Additionally, the finding showed participants frequently missed taking their antihypertensive medications when they felt better or just forgot taking them. Similar findings have been reported in the literature. [18, 21] The reasons causing them miss their pills were carelessness. That is, they left their medication (s) and went out home. Thus, the importance of taking pills should be emphasized to help improve medication compliance.

This current finding found the association of increased age and higher education with better medication compliance. These findings support the previous literature reporting that older persons tended to have better dietary habits, regular exercise, and medication compliance compared with younger persons. [6, 17] Younger persons with their stressful life with many responsibilities could distract their attention to take care of their health. Health care providers should encourage to promote appropriate health promotion to the younger persons with hypertension. Our findings also found the association of higher educational level with better compliance which was similar to a previous study. [22] Patients with higher educational level are able to access the updated and helpful information in order to improve their better health. Health care providers should provide proper information to improve their better health behaviors.

The findings showed no association between personal income and the compliance to high BP therapy. This is not surprising although most participants had low income, Thailand has had the health care policy for all Thais to have at least one type of the basic health care coverages (e.g. social welfare, governmental reimbursement, etc.) to support their medical expenses.

There are some limitations in this study. The study was conducted only at the ED patients with hypertensive crisis. The findings might not be generalizable to the larger populations with the different socio-cultural environments. The hospital environment might affect participants' responses. They might not report the fact of taking care of themselves due to the fear of negative impact of the treatment received. Furthermore, some other factors, like doctor-patient relationships and difficulty of taking medications (multiple types of medications or taking many medications more than once a day) were not investigated in this study and they might impact the findings of the study. Future exploration is needed.

Conclusion

Better compliance of treatment of hypertension was associated with old age and higher educational level of the patients. Future research should further explore tailored types of information of hypertension and assessing family support of hypertension knowledge in patients with hypertensive crisis should be aware of in order to have better medication compliance to decrease risks of the recurrence of hypertensive crisis.

Conflict of interest

The authors, hereby, declare no conflict of interest.

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