

A Survey of Actual Clinical Practice Concerning Blood Pressure Control among Patients with Hypertension in Kanagawa 2014

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We performed a cross-sectional survey to investigate actual clinical practice concerning blood-pressure control among patients with hypertension in Kanagawa. The guidelines of the Japanese Society of Hypertension (JSH) for the management of patients with hypertension were revised in 2014. From October 1 to November 30, 2014, questionnaires on the care of patients with hypertension were sent via post to members of the Kanagawa Physicians Association in Kanagawa Prefecture, Japan. Data on 1,105 patients (mean age: 68.4 ± 12.3 years, 537 men and 568 women) were obtained. The overall mean systolic blood pressure (BP) of these patients was 128.7 ± 12.1 mmHg for home monitoring and 132.9 ± 12.6 mmHg for office monitoring; diastolic BP was 75.7 ± 9.7 for home monitoring and 77.0 ± 9.7 mmHg for office monitoring. According to the JSH 2014 guidelines, the target BP was achieved by 68.1% of all subjects; 89.2% of late-phase elderly patients (75 years or older); 69.1% of young, middle-aged, and early-phase elderly patients (younger than 75 years except in patients with diabetes mellitus [DM] or chronic kidney disease [CKD] with proteinuria); 9.3% of patients with DM except late-phase elderly patients; and 11.9% of CKD patients with proteinuria except DM. Cross-sectional analysis showed that the factors significantly associated with an increased likelihood of achieving the target BP were as follows: 1) good medication compliance even for a small number of antihypertensive agents at small amount of doses in patients 75 years and older; 2) good medication compliance in patients in younger than 75 years; 3) an older age, a larger proportion in the female-to-male ratio and a lower body mass index in patients with DM except late-phase elderly patients; and 4) usage of a large number of antihypertensive agents in CKD patients with proteinuria. Further follow-up surveys are necessary to investigate changes in clinical practice following the introduction of the revised guidelines.

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Key words: blood pressure, physicians, guidelines

Introduction

Elevated blood pressure (BP) is considered a common risk factor for stroke and cardiovascular disease^{1,2}, and it is recognized that the normalization of blood pressure is the most important factor in reducing morbidity and mortality^{3,4}. In this context, several hypertension management guidelines have been established for patients with hypertension^{5–7}.

The Japanese Society of Hypertension (JSH) first published guidelines for the management of hypertension in 2000 (JSH 2000)⁸, with revisions in 2004⁹ and 2009¹⁰. We

investigated clinical practice concerning BP control in patients with hypertension according to the JSH 2009 guidelines in Kanagawa Prefecture on 2008, 2009, and 2011^{11,12}. These studies showed that, in the management of patients with hypertension, the target BP was achieved in 53.9% of patients in 2008, 55.1% in 2009, and 57.1% in 2011. The JSH revised its hypertension guidelines in April 2014. Thus, the aim of the present study was to investigate clinical practice in Kanagawa Prefecture as it concerned BP control in patients with hypertension according to the JSH 2014 guidelines.

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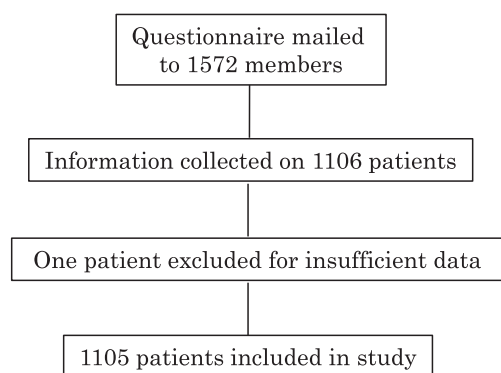


Fig. 1 Patient registration and flow chart

Patients and Methods

Data and Subjects

The present study was performed in Kanagawa Prefecture, Japan, from October 1 to November 30, 2014. The survey was based on our previous studies, which have been described in detail^{11,12}. A questionnaire was mailed to 1,572 members of the Kanagawa Physicians Association. The questionnaire contained questions on patients' age, sex, body-mass index, concomitant disorders (diabetes mellitus [DM], coronary artery diseases [CAD], stroke, and chronic kidney disease [CKD]), alcohol consumption, current smoking habits, office-measured systolic and diastolic BPs, home BP monitoring, types of antihypertensive agents and their doses, who measured the office BP and what kind of equipment was used, who judged the BP levels, and how effective the medication compliance was. To avoid selection bias, patients were selected as follows: if the final number of the patient's identification number or telephone number matched the final number of the patient's consultation date, he or she was enrolled in the study. To enable dose analysis, the doses of all antihypertensive drugs were adjusted to standard doses that were in accordance with Japanese clinical practice. For example, the standard dose of valsartan is 80 mg, which was counted as 1.0 point¹².

Data Analysis

We divided patients into four groups according to the JSH 2014 guidelines: 1) late-phase elderly patients (75 years or older) including patients with DM and CKD with or without proteinuria; 2) young, middle-aged, and early-phase elderly patients (younger than 75 years) without DM and CKD with proteinuria, including patients with CAD and CKD without proteinuria; 3) patients with DM who were not late-phase elderly; and 4) CKD patients with proteinuria but not DM who were not

late-phase elderly. Within these groups, we analyzed which patient BP targets, according to the JSH 2014 guidelines, were and were not achieved. If there was a difference in achievement in target BP levels between office and home BP measurements, the achievement of the target BP level at home was preferred. In cases where home BP data were absent, they were determined by office BP (46 cases).

Statistical Analysis

All data were entered into a computer and analyzed with the IBM SPSS Statistics 22.0 software program (IBM Inc., Armonk, NY, USA). Means and standard deviations were calculated for continuous variables and proportions were calculated for categorical variables. The chi-square test was used for comparisons between categorical variables. The Student's *t*-test was used for comparisons with continuous variables. For comparing the total number of antihypertensive drugs and scores, a non-parametric method such as the Mann-Whitney test was employed since the data were not met in the normal distribution. A *p* value of less than 0.05 was considered significant.

Results

Data were collected on 1,106 patients. One patient was excluded owing to insufficient patient characteristics (Fig. 1). Thus, the study population consisted of 1,105 patients (537 men and 568 women) (Table 1). The mean patient age was 68.7 ± 12.3 years. There were 198 patients with DM, 70 with non-diabetic proteinuria, 68 with CAD, and 48 with cerebrovascular disease (CVD). The reasons for home BP monitoring were as follows: recommended by physicians, 83.4%; patients voluntarily monitored, 8.1%; and noncontrolled office BP, 4.8%. Office BPs were mostly measured by physicians using manometers (34%). The average home systolic BP was 128.7 ± 12.1 mmHg and average home diastolic BP was 75.7 ± 9.7 mmHg. The average office systolic BP was 132.9 ± 12.6 mmHg and average office diastolic BP was 77.0 ± 9.7 mmHg. The average number of prescribed drugs was 1.99 ± 0.9 . Angiotensin II receptor blockers (ARB) were the most frequently prescribed (78.0%).

Achievement Ratio of Target BP According to JSH 2014 Guidelines

The rate of BP in each of the four groups according to the JSH 2014 guidelines are shown in Table 2. The overall rate of controlled BP was 68.1% (753 out of 1,105). In patients 75 year and older, the rate of controlled BP was 89.2%, which was the highest rate in the groups. The lowest rate was 9.3% in patients with DM. The rate of BP

Table 1 Characteristics and results of 1,105 hypertensive patients

Age (years)	68.4±12.3	
Sex (male/female)	537/568 (48.6%/51.4%)	
Body mass index (kg/m ²)	24.5±5.4	
Current smoker	186 (16.8%)	
Current drinker	329 (29.7%)	
Concomitant disease		
DM	198 (17.9%)	
CKD	152 (13.7%)	
CKD with proteinuria	113 (10.2%)	
Non-DM	70 (6.3%)	
DM	43 (3.8%)	
CAD	68 (6.1%)	
CVD	48 (4.3%)	
Patients measured BP at home for the following reasons:		
recommended	922 (83.4%)	
noncontrolled BP	53 (4.8%)	
voluntarily	90 (8.1%)	
unknown	40 (3.6%)	
Office BP measured by		
physicians using manometers	376 (34.0%)	
physicians using cuff-oscillometric method	287 (25.9%)	
nurses	351 (31.7%)	
patients (self-monitoring)	76 (6.9%)	
unknown	15 (1.4%)	
Home		
Systolic BP (mmHg)	128.7±12.1	
Diastolic BP (mmHg)	75.7±9.7	
Pulse rate (beats/min)	67.7±9.8	
Office		
Systolic BP (mmHg)	132.9±12.6	
Diastolic BP (mmHg)	77.0±9.7	
Pulse rate (beats/min)	74.0±12.6	
Total number of antihypertensive drugs	Number (Ratio)	Score
	1.99±0.90	1.93±1.21
Class of drugs		
Ca channel blockers (CCB)	841 (76.1%)	1.15±0.62
Single ingredient	593	
Compound drug		
ARB/CCB	234	
Amlodipine/ Atorvastatin	20	
(single and compound)	(-6)	
Angiotensin II receptor blockers (ARB)	868 (78.0%)	1.00±0.40
Single ingredient	539	
Compound drug		
ARB/CCB	234	
ARB/diuretics	95	
Diuretics	154 (13.9%)	0.55±0.32
Single ingredient	60	
Compound drug		
ARB/diuretics	95	
(single and compound)	(-1)	
Angiotensin-converting enzyme inhibitors	44 (4%)	1.15±0.52
Beta-blockers	115 (10.4%)	0.83±0.38
(including alpha-beta blockers)	(59)	
Alpha-blockers	95 (8.6%)	0.46±0.25
Aldosteron antagonists	81 (7.3%)	0.73±0.29
Renin inhibitor	5 (0.5%)	1
Other vasodilators	2 (0.2%)	1

The score of antihypertensive drugs was adjusted to the standard dose.

Abbreviations: DM, diabetes mellites; CKD, chronic kidney disease; CAD, coronary arterial disease; CVD, cerebrovascular disease; BP, blood pressure

Table 2 Achievement ratio of target BP according to JSH 2014 guidelines

Category	Number	Office target BP	Achieved	Home target BP	Achieved	Overall achievement ratio
Patients 75 years or older	388	SBP<150 mmHg and DBP<90 mmHg	355 (91.5%)	SBP<145 mmHg and DBP<85 mmHg	324/367 (88.2%)	346 (89.2%)
Patients younger than 75 years	567	SBP<140 mmHg and DBP<90 mmHg	412 (72.5%)	SBP<135 mmHg and DBP<85 mmHg	378/550 (68.2%)	392 (69.1%)
Patients with DM	108	SBP<130 mmHg and DBP<80 mmHg	38 (35.2%)	SBP<125 mmHg and DBP<75 mmHg	16/100 (16.0%)	10 (9.3%)
Patients with CKD but non-DM preteinuria	42	SBP<130 mmHg and DBP<80 mmHg	9 (21.4%)	SBP<125 mmHg and DBP<75 mmHg	4 (9.5%)	5 (11.9%)

Abbreviations: JSH, the Japanese Society of hypertension guidelines for the management of hypertension 2014; BP, blood pressure; SBP, systolic blood pressure; DBP, diastolic blood pressure; CAD, coronary arterial disease; CDV, cerebrovascular disease; CKD, chronic kidney disease; DM, diabetes mellitus.

control in patients younger than 75 years including patients with CAD and CVD was 69.1%. The rate of BP control in CKD patients with non-diabetic proteinuria who were not late-phase elderly was 11.9%. In all cases, the rate of controlled BP in the office was higher than that in the home.

Comparisons between Patients in whom BP was Controlled or Non-Controlled in Patients 75 Years and Older, and in Patients Younger than 75 Years (Table 3)

Among patients 75 years and older, the total number of antihypertensive agents and the scores used for the treatment of hypertension in patients were significantly higher in the noncontrol group. However, the medication compliance was significantly greater in the BP control group than in the non-control group (91.0% vs. 76.2%) in patients 75 years and older, and it was similar in the patients younger than 75 years group. In patients younger than 75 years, the total number of antihypertensive drugs and their scores were not significantly different. The average age and sex ratio were significantly different in that the non-control group was younger than the control group and the ratio of males to females was larger in the non-control group.

Comparisons between Patients in whom BP was Controlled or Non-Controlled in Patients with DM, and Non-Diabetic CKD with Proteinuria (Table 4)

There were different patient characteristics in patients with DM. For example, the average age was older, the female-to-male ratio was larger, and the body mass index (BMI) was smaller in the control group than in the non-control group. The other factors were not significantly different. In patients with non-diabetic CKD with proteinuria, the total number of antihypertensive drugs was significantly larger in the control group than in the non-control group. In terms of the classes of drugs, the usage

of beta-blockers was higher in the control group than in the non-control group.

Discussion

The JSH 2014 guidelines have been revised and differ from the previous JSH 2009 guidelines. In young and middle-aged, low-risk patients with hypertension, the target level for BP control was less than 130/85 mmHg in the JSH 2009 guidelines. Thus, there was a gap between the criteria for the initiation of antihypertensive agent therapy and the target level of BP control. Since some research¹³ has demonstrated a significantly decreased number of cardiovascular events in young and middle-aged hypertensive patients when the goal BP levels were lower than 140/90 mmHg, the target level of BP control was established as less than 140/90 mmHg in the JSH 2014 guidelines¹⁴.

The target level of BP control in patients with DM and non-diabetic proteinuria in CKD is less than 130/80 mmHg, because these patients are at high risk of CVD¹⁵⁻¹⁷. The Kidney Early Evaluation Program Observational Study¹⁸ reported that the incidence of end-stage renal disease was lowest in patients with a systolic BP of 130 to 140 mmHg. Thus, the target level of BP control in non-diabetic CKD patients without proteinuria is less than 140/90 mmHg.

The target level of BP control in patients with stroke or CAD is less than 140/90 mmHg. Although evidence regarding the target level of BP in hypertensive patients with CAD is insufficient, the JSH 2014 guidelines recommend it based on the results of the ACTION and JMIC-B trials¹⁹⁻²¹. The target level for patients with stroke remains the same as that in the JSH 2009 guidelines.

Organ damage is frequently observed in late-phase elderly patients, who are older than 75 years. The recom-

Table 3 Comparisons between target BP achieved and non-achieved groups in patients 75 years or older, and patients younger than 75 years.

	Patients 75 years or older (n=388)			Patients younger than 75 years (n=567)			
	Number	Achieved	Non-achieved	Statistics	Achieved	Non-achieved	Statistics
Age (years)		81.0±4.5	81.0±4.4	ns	62.1±9.6	59.3±9.8	p=0.001
Sex (male/female)		137/209 (39.6%/60.4%)	17/25 (40.5%/59.5%)	ns	178 (45.4%)/ 214 (54.6%)	107 (61.1%)/ 68 (38.9%)	p=0.001
Body mass index (kg/m ²)		25.4±5.5	24.0±5.7	ns	24.1±5.2	23.6±5.6	
Office BP							
	Systolic BP (mmHg)	132.2±12.2	140.7±12.2	p<0.0001	130.6±11.6	136.5±12.8	p<0.0001
	Diastolic BP (mmHg)	72.2±9.1	74.7±9.0	ns	78.5±8.0	82.9±9.7	p<0.0001
	Pulse rate (/min)	66.3±10.3	71.8±10.3	ns	73.4±12.3	71.7±13.2	ns
Home BP							
	Systolic BP (mmHg)	127.5±11.0	146.9±10.9	p<0.0001	123.2±9.4	137.4±9.0	p<0.0001
	Diastolic BP (mmHg)	70.4±8.1	81.0±9.0	p<0.0001	74.8±7.5	85.3±7.9	p<0.0001
	Pulse rate (/min)	66.3±10.3	71.8±10.3	p=0.002	66.8±9.2	69.3±8.4	p=0.005
Concomitant disease							
	DM	81 (23.4%)	9 (21.4%)	ns			
	CKD with non-DM proteinuria	25 (7.2%)	3 (7.1%)	ns			
	CAD	36 (10.4%)	2 (4.8%)	ns	9 (2.3%)	1 (0.6%)	ns
	CVD	27 (7.8%)	2 (4.8%)	ns	3 (1.7%)	9 (2.3%)	ns
Total number of antihypertensive drugs		1.96±0.91	2.23±0.85	p=0.02#	1.88±0.82	2.00±0.92	ns#
	Score	1.89±1.16	2.18±0.97	p=0.03#	1.74±1.06	1.97±1.25	ns#
Class of drugs							
	Ca channel blockers	273 (78.9%)	33 (78.6%)	ns	284 (72.4%)	129 (73.7%)	ns
	Score	1.16±0.59	1.17±0.59	ns	1.09±0.61	1.16±0.60	ns
	Angiotensin II receptor blockers	259 (74.9%)	39 (92.9%)	p=0.011	302 (77.0%)	143 (81.7%)	ns
	Score	1.01±0.38	1.06±0.40	ns	0.96±0.43	1.01±0.38	ns
	Diuretics	48 (13.9%)	14 (33.3%)	p=0.002	38 (9.7%)	23 (13.1%)	ns
	Score	0.51±0.14	0.53±0.13	ns	0.46±0.13	0.55±0.18	p=0.026
	Angiotensin-converting enzyme inhibitors	12 (3.5%)	0	ns	14 (3.6%)	8 (4.5%)	ns
	Score	1.25±0.58	0	ns	1.00±0.48	1.12±0.58	ns
	Beta-blockers	37 (10.7%)	3 (7.1%)	ns	40 (10.2%)	11 (6.3%)	ns
	Score	0.79±0.40	0.70±0.50	ns	0.76±0.25	0.89±0.47	ns
	Alpha-blockers	9 (2.6%)	0	ns	37 (9.4%)	13 (7.4%)	ns
	Score	0.43±0.14	0	ns	0.42±0.29	0.48±0.23	ns
	Aldosterone antagonists	21 (6.1%)	5 (11.9%)	ns	21 (5.4%)	21 (12.0%)	p=0.008
	Score	0.64±0.23	0.90±0.22	p=0.034	0.69±0.28	0.71±0.25	ns
	Renin inhibitors	0	0	ns	2 (0.5%)	2 (1.1%)	ns
	Score	0	0	ns	1	1	ns
Using compound drugs		111 (32.1%)	20 (47.6%)	ns (p=0.057)	111 (28.3%)	57 (32.6%)	ns
Good medication compliance		315 (91.0%)	32 (76.2%)	p=0.017	376 (95.9%)	159 (90.9%)	p=0.003
Non-achieved judged by				p=0.002			p<0.0001
	patients	11 (3.2%)	6 (14.3%)		4 (1.0%)	27 (15.4%)	
	physicians	335 (96.8%)	36 (85.7%)		388 (99%)	148 (84.6%)	

Abbreviations: BP, blood pressure; DM, diabetes mellitus; CKD, chronic kidney disease; CAD, coronary arterial disease; CVD, cerebrovascular disease. The score of antihypertensive drugs was adjusted to the standard dose. #: The comparison between the groups was calculated by a non-parametric method using the Mann-Whitney test.

mended target level of BP control in these patients is less than 150/90 mmHg, and if possible, a further reduction to the final target level of less than 140/90 mmHg. If the

age-based target BP differs because of the presence of concomitant disease, the age-based target BP should be set as the first goal. Of course, if these late-phase elderly

Table 4 Comparisons between target BP achieved and non-achieved groups in DM patients, and CKD with proteinuria but not DM.

	DM (n=108)			CKD with non-DM proteinuria (n=42)			Statistics
	Achieved	Non-achieved		Achieved	Non-achieved		
	Number	10	98	5	37		Statistics
Age (years)		70.1±2.6	63.8±8.0	p=0.017	66.6±7.0	58.4±10.9	ns
Sex (male/female)		3 (30.0%)/ 7 (70.0%)	68 (69.4%)/ 30 (30.6%)	p=0.015	2 (40.0%)/ 3 (60.0%)	25 (67.6%)/ 12 (32.4%)	ns
Body mass index (kg/m ²)		21.0±5.2	24.8±5.0	p=0.027	21.5±3.5	25.4±4.5	ns
Office BP							
Systolic BP (mmHg)		119.9±5.2	135.4±14.3	p=0.001	133.9±11.0	134.8±14.7	ns
Diastolic BP (mmHg)		68.5±3.8	77.7±9.7	p=0.004	75.9±6.6	82.4±10.7	ns
Pulse rate (/min)		74.0±11.5	77.2±12.0	ns	77.8±7.8	77.6±13.0	ns
Home BP							
Systolic BP (mmHg)		116.6±6.6	130.9±11.6	p=0.001	105.1±22.4	134.1±13.0	p<0.0001
Diastolic BP (mmHg)		65.6±5.4	75.9±9.8	p=0.004	85.1±7.5	60.4±13.9	p<0.0001
Pulse rate (/min)		67.8±8.7	69.6±9.3	ns	67.2±15.2	71.9±12.0	ns
Total number of antihypertensive drugs		2.50±1.08	2.29±1.01	ns#	3.20±1.09	2.05±0.88	p=0.041#
Score		2.13±1.55	2.44±1.54	ns#	3.10±1.02	2.26±1.63	ns
Class of drugs							
Ca channel blockers		9 (90.0%)	80 (81.6%)	ns	4 (80.0%)	29 (78.4%)	ns
Score		1.12±0.58	1.32±0.71	ns	1.50±0.57	1.41±0.87	ns
Angiotensin II receptor blockers		8 (80.0%)	82 (83.7%)	ns	5 (100%)	30 (81.1%)	ns
Score		0.82±0.34	1.00±0.36	ns	1.20±0.44	1.08±0.47	ns
Diuretics		2 (20.0%)	18 (18.4%)	ns	1 (20.0%)	10 (27.0%)	ns
Score		1.12±1.23	0.79±0.73	ns#	0.5	0.57±0.23	ns
Angiotensin-converting enzyme inhibitors		1 (10.0%)	9 (9.2%)	ns	0 (0%)	0 (0%)	ns
Score		1	1.33±0.50	ns	0	0	ns
Beta-blockers		3 (30.0%)	16 (16.3%)	ns	3 (60.0%)	2 (5.4%)	p=0.008
Score		0.83±0.28	0.96±0.49	ns	1	1.25±1.06	ns
Alpha-blockers		0	3 (4.4%)	ns	0	0	ns
Score		0	0.66±0.28	ns	0	0	ns
Aldosterone antagonists		0 (0%)	9 (9.2%)	ns	0	4 (10.8%)	ns
Score		0	0.94±0.46	ns	0	0.87±0.25	ns
Renin inhibitors		0 (0%)	1 (1.0%)	ns	0	0	ns
Score		0	1	ns	0	0	ns
Using compound drugs		4 (40.0%)	48 (49.0%)	ns	4 (80.0%)	13 (35.1%)	ns (p=0.055)
Good medication compliance		7 (70.0%)	87 (88.8%)	ns	4 (80.0%)	30 (81.1%)	ns
Non-achieved as judged by				ns			ns
patients		0	7 (7.1%)		0	1 (2.7%)	
physicians		10 (100%)	91 (92.9%)		5 (100%)	36 (97.3%)	

Abbreviations: BP, blood pressure; DM, diabetes mellitus; CKD, chronic kidney disease. The score of antihypertensive drugs was adjusted to the standard dose. #: The comparison between the groups was calculated by a non-parametric method using the Mann-Whitney test.

patients can tolerate it, a lower target BP should be aimed for.

The major difference between the JSH 2014 and 2009 guidelines is that, when there is a discrepancy in diagnosis between office BP and home BP, the home BP-based diagnosis has priority. The target levels of home systolic and diastolic BPs are established as 5-mmHg lower than office systolic and diastolic BPs.

Hypertension is the most common lifestyle-related disease. It is primarily managed by clinicians and general practitioners. The JSH 2014 guidelines were prepared for these physicians. It is important to perform a cross-sectional survey to investigate actual clinical practice concerning BP control in patients with hypertension following the revision of the guidelines.

According to the JSH 2014 guidelines, the overall

achievement ratio was 68.1% (753 out of 1,105) in the present study. Although it was based on different management guidelines, this exceeded the ratio of 53.9% in 2008, 55.1% in 2009, and 57.1% in 2011 for surveys in Kanagawa^{11,12}.

The highest rate of achievement in target BP level (89.2%) (Table 2) was seen in the group of late-phase elderly patients. One factor in this achievement of target BP control was good medication compliance (91.0% vs. 76.2%) (Table 3). The achievement ratio in patients younger than 75 years (excluding patients with DM and non-diabetic proteinuria, but including patients with CAD and CVD) was 69.1%. Patients' characteristics such as a relatively older age (62.1 ± 9.6 vs. 59.3 ± 9.8 years) and a larger population of females (54.6% vs. 38.9%) may contribute to good BP control in these patients (Table 3).

In patients with DM, the achievement ratio of the target BP control was very poor, such as only 9.3%. However, the factors that contributed to BP control included a relatively older age (70.1 ± 2.6 vs. 63.8 ± 8.0 years), a larger population of females (70.0% vs. 30.6%), and a smaller BMI (21.0 ± 5.2 vs. 24.8 ± 5.0 kg/m²) (Table 4). However, in non-diabetic CKD patients with proteinuria, the achievement ratio of BP control was also very poor, such as 11.9%. In these patients one factor of success in BP control was more aggressive antihypertensive treatment. The total number of antihypertensive agents was 3.2 ± 1.09 in the control group and 2.05 ± 0.88 in the non-control group (Table 4). Patient characteristics were not significantly different between groups; however, the number of patients in these groups was limited. In these two poor BP control groups, more than 90% of physicians judged these BP levels as permissible (Table 4). The Fukushima research of hypertension²² study pointed out that the necessity of improvement in physicians' awareness concerning the management of hypertension according to treatment guidelines and the importance of a healthy lifestyle to maintain goal BP levels. These poor achievement ratios may be due to the strict target levels of BP control, especially in home BP levels, such as less than 125/75 mmHg. There were no significant differences in office BPs between the two groups but significant differences were seen in home BPs. This may be due to the poorly known new concept that, when there is a discrepancy in diagnosis between office BP and home BP, the home BP-based diagnosis should have priority.

Our study had some limitations. First, this was a cross-sectional analysis. Second, this study was performed only six months after the new JSH guidelines were estab-

lished. Third, CAD and CVD patients were included in the patients younger than 75 years group since the numbers of those patients were very small (CAD in 10 cases and CVD in 12 cases) and they had the same BP criteria. Further follow-up survey data are necessary for a full assessment.

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