An Audit of Blood Pressure Control in Clinical Practice in Thailand†

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To gain "real life" data on the BP control of hypertensive patients in clinical practice in Thailand, a multi-centre cross-sectional study was carried out. Demographic data, cardiovascular risk factors, and antihypertensive regimens were collected. A total of 1,259 patients were enrolled between October 2003 and December 2003, 924 cases from 6 regions of different levels of health care and 335 cases from 4 medical training centres and a tertiary care hospital in Bangkok. Eighty one percent of the patients, age ranged from 45 to 75 years (61.2 ± 11.6). Forty four percent of patients in audit had a BP < 140/90 mm Hg and only 12.3% of DM patients had attained a JNC 7 recommended BP target of 130/80 mm Hg. Hypercholesterolaemia (65.3%) was the most prevalent risk followed by DM (27.7%). Antihypertensive drug used at the initial visit compared with the last visit were ARB (0.9% vs 6.1%), ACE Inhibitors (30.1% vs 40.0%), β-blockers (27.3% vs 46.7%), CCBs (23.2% vs 37.7%), and diuretics (46.0% vs 53.5%). In addition, the numbers of antihypertensive drugs used at the initial visit compared with the last clinic visit were one drug (62.0% vs 33.0%), two drugs (29.7% vs 45.8%), three drugs or more (3.7% vs 20.4%), with an average of 1.3 ± 0.6 vs 1.9 ± 0.8 drugs per patient. Two thirds of patients (66.2%) were on 2 or more antihypertensive drugs. Among the type 2 DM, 5% had records of microalbuminuria, and 50.6% and 9.8% were receiving ACE Inhibitors and ARBs, respectively at the last clinic visit.

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High blood pressure (BP), a major cause of cardiovascular mortality, is one of the leading medical problems found in the outpatient clinic[1]. The primary goal of BP control is to achieve the maximum reduction, in the long term, of total risk of cardiovascular morbidity and mortality. Although, current BP control rates i.e. systolic blood pressure (SBP) < 140 mm Hg and diastolic blood pressure (DBP) < 90 mm Hg have been improved, they are generally far below the goal of treatment[2,3]. Moreover, many patients are still unaware of their high BP's[2-4]. It is hoped that the use of simple and straight forward guidelines will improve standards of care and confer consistency in patient management. After JNC 6 and the WHO/ISH guidelines were published in 1999, similar guidelines were developed for Thai hypertensive patients under the consensus of many societies involved and the Ministry of Public Health, endorsed by the Royal College of Physician of Thailand[5]. Nevertheless, the availability of guideline nationwide does not guarantee the use of them. Moreover, the effectiveness of antihypertensive treatment in terms of patient outcomes as a result of regular audits has rarely been studied. In the mean time, there are only limited data available on patients and the level of BP control as a result of hypertensive pharmacotherapy at the community level. Therefore, this study was carried out to investigate the effectiveness of antihypertensive treatment provided by different levels of health care. This will provide a baseline for future improvement in BP control.

The objective of the study was to gain "real

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life" data on BP control among hypertensive patients in clinical practice as a whole in Thailand, including demographic data, risk factors, and antihypertensive drugs used.

Material and Method

Study design

A retrospective cross-country epidemiological study was carried out from July 2002 to December 2003 by using a single page, carefully constructed questionnaire. The questionnaires were filled-in by well-trained medical personnel who participated in this study. A province, as a representative of each region of the country, was randomly selected for data collection from a community hospital (primary health care) and a provincial hospital (secondary health care). A regional hospital (tertiary health care) was also randomly selected from another province of the region. There were 6 regions in the country i.e. north, northeast, east, west, south and central. Another 4 medical training centres and a tertiary health care hospital in Bangkok were also selected. Physicians in the selected hospitals were invited to participate. Approximate 50 patients were enrolled from each hospital after verbal informed consents were obtained. Primary care hospitals have a limited capacity and facility to cover a population at a district level. Secondary care hospitals have more capacity and facilities to cover a population at a province level. Tertiary care was divided into 2 groups, i.e. regional hospitals with nearly full capacity and facilities to cover a population in a part of a region, since there may be more than one regional hospital in a whole region, and medical training centres. Both are referral centres.

Medical records of ambulatory hypertensive patients of both sexes, aged $\geq$ 18 years, who had continuously attended at the outpatient department clinics for a duration of 6 months or more were carefully reviewed. Medical history and associated risk factors such as age, gender, smoking habits, hypercholesterolaemia, and diabetes mellitus were looked for and recorded. Concerning hypertension, BP levels and antihypertensive drugs given at the first clinic visit and the last clinic visit were recorded. Therefore, only one BP measurement was obtained in each clinic visit. Records of target organ damage such as left ventricular hypertrophy diagnosed either by physical exam, chest X-ray (cardiothoracic ratio > 0.5) or electrocardiogram (SV1 + RV5 or V6 >38 mm), hypertensive retinopathy, micro and macroalbuminuria, as well as their known cardiovascular complications i.e. cerebrovascular disease, ischemic heart disease and chronic renal failure were also obtained from outpatient files and inserted in the form as presence, absence, no record or untested.

HT was labelled in those patients who had a previous history of hypertension and were not on lifestyle modification or antihypertensive drugs, or those with records of SBP $\geq$ 140 mm Hg and DBP of $\geq$ 90 mm Hg. All of them were considered to be eligible for the study. Elderly were defined as patients aged of 60 years or more. Diabetes mellitus was defined according to the American Diabetes Associations (ADA) guidelines[6]. A previous diagnosis of diabetes or receipt of a hypoglycemic lowering agent was also acceptable. Hyperlipidemia was defined according to the Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP-III)[7]. Patients who received lipid lowering agents were also included. Adequacy of hypertensive control was defined according to the 1999 World Health Organization-International Society of Hypertension (1999 WHO-ISH) Guidelines[8]. Major exclusions were known intercurrent illnesses that might interfere with a dosage adjustment of current medications, such as recent myocardial infarction or stroke (within 6 months), or infections that needed hospitalization. We also excluded patients who had established records of "poor compliance to treatment" previously.

Statistical analysis

Results were demonstrated as mean $\pm$ standard deviation (SD) or percent (%) where appropriate. Statistical analyses were performed using Statistical Packages for Social Sciences (SPSS 9.0). Student's t-tests and Chi-square tests were used to compare the continuous and categorical data between the "good control" and "poor control" groups respectively. A p-value of less than 0.05 was considered statistically significant. Analysis of variance (ANOVA) was used to compare differences among the three groups.

Results

Twenty-five municipal hospitals were selected. One primary and one secondary care hospital were not able to participate since there were time-constraints in recruiting cases. Of the 23 hospitals, there were 412 cases recruited from tertiary hospitals, 568 cases from secondary hospitals, and 279 from primary care hospitals. Overall, 1,259 patients (462 males and 797 females) with an average of 54.7 $\pm$ 14.5 patients per site (range

18 to 100 patients per site), were recruited. Considered individually, there were 335 cases (26.6%) from Bangkok (4 medical schools and one tertiary care hospital), 166 cases (13.2%) from the central region, 152 cases (12.1%) from the north, 189 cases (15.0%) from the west, 100 cases (7.9%) from the east, 179 cases (14.2%) from the northeast, and 138 cases (11.0%) from the south.

The average age was 61.2 ± 11.6 years (range 17-93 years; 61.4 ± 12.1 years in males and 61.0 ± 11.4 years in females) (Table 1). Eighty one percent of the patient ages ranged from 45 to 75 years. Volunteers studied from the tertiary care and secondary care hospitals were significantly older than those from primary care hospitals, especially among females ($p < 0.01$). Patients from the higher care hospitals also received a significantly higher number of elderly patients and provided a significantly longer duration of outpatient service compared to the lower care hospitals ($p = 0.03$ for both). Nevertheless, there was no significant difference in systolic and diastolic BP levels at the first visit or between genders and cases enrolled per site among primary, secondary, and tertiary settings (Table 2).

Primary care hospitals recruited more female and younger volunteers ($p < 0.01$) (Table 1) and less elderly ($p = 0.03$) than higher level of care hospitals (Table 2). Mean SBP and DBP showed no difference among the 3 levels of care. Mean duration of follow up was shortest in primary care hospitals and longest in tertiary care hospitals ($p = 0.03$).

The prevalence of each cardiovascular risk varied broadly i.e. smoking, 12.3% (range 2.7% - 50.0%), hyperlipidemia, 65.3% (range 25.0% - 83.3%), ischemic heart disease, 16.9% (range 1.5% - 53.7%), left ventricular hypertrophy, 26.6% (range 5.5% - 69.2%), cerebrovascular disease, 10.4% (range 1.8% - 26.3%), diabetes mellitus, 27.7% (range 7.3% - 51.5%), chronic kidney disease, 9.8% (range 1.7% - 30.6%), and macroalbuminuria, 27.9% (range 5.6% - 80.0%) (Table 3). Eye-ground examination was infrequently performed (28.1%); 21.5% in primary care, 18.7% in secondary care and 45.6% in tertiary care hospitals. Microalbuminuria was also in-

Table 1. Mean age of the studied subjects per level of hospital

Level of hospitals	Number of cases (male/female)	Mean age (years)		
		Total	Male	Female
Primary	279 (98/181)	58.9±11.4	60.9±11.0	57.9±11.5
Secondary	567 (199/368)	62.1±11.2	62.8±11.0	61.8±11.3
Tertiary	413 (165/248)	61.3±12.2	59.8±13.8	62.2±10.9
All	1259 (462/797)	61.2±11.6	61.4±12.1	61.0±11.4
[1]*p*-value	-	<0.01*	0.06	<0.01*

* p-value considered significant at < 0.05
[1] p-value between levels of hospital practice

Table 2. Comparative study between primary, secondary, and tertiary care hospitals

Clinical findings	Primary care (n = 279)	Secondary care (n = 568)	Tertiary care (n = 412)	p-value[1]
Age (years)	58.9±11.4	62.1±11.2	61.3±12.2	<0.01*
Female participants (%)	64.9	64.9	59.9	0.22
Elderly participants (%)	52.3	61.6	59.5	0.03*
Cases enrolled per site (n)	55.8±9.2	51.6±14.3	58.9±18.3	0.60
SBP level at first visit (mm Hg)	165.7±20.5	168.8±19.8	167.9±19.2	0.10
DBP level at first visit (mm Hg)	100.0±13.3	98.6±13.1	97.8±13.3	0.10
Duration of follow up (years)	3.44±2.9	4.06±4.1	4.14±4.1	0.03*

* p-value considered significant at < 0.05
[1] p-value between levels of hospital practice

frequently tested in diabetic patients (39.0%); 24.0% in primary care, 66.4% in secondary care and only 15.8% in tertiary care hospitals.

A higher number of risk factors and associated comorbidity were generally observed among the higher care hospitals i.e. coronary heart disease, LVH determined by ECG and/or chest X-ray, hypercholesterolaemia, hypertensive retinopathy, and macroalbuminuria ($p < 0.01$ for all) (Table 3). The prevalence of smoking and diabetes mellitus were higher in primary care as compared to the tertiary and secondary care settings ($p < 0.01$ for all). The prevalence of cerebrovascular disease, microalbuminuria, and chronic kidney disease were higher in the secondary care as compared to the primary and tertiary care hospitals ($p < 0.01$ for all) (Table 3).

Wide variability in BP control was found among the 23 practices. The last SBP reading of below 140 mm Hg was found in 51.9% of all patients (range 22.2% - 80.0%) and the last DBP reading of below 90 mm Hg was 70.1% (range 32.2% - 92.0%). Both SBP and DBP were controlled (< 140/90 mm Hg) in 44.2% of all patients (range 22.2% - 66.7%). When BP controls were classified according to levels of care i.e. primary, secondary and tertiary care settings, the last SBP reading of below 140 mm Hg was 54.8% (range 36.05% - 69.6%), 45.3% (range 22.2% - 80.0%) and 59% (range 31.5% - 76.0%), the last DBP readings of below 90 mm Hg were 57% (range 32.2% - 83.9%), 68.3% (range 40.8% - 84.6%), and 81.6% (range 64.0% - 92.0%), and both SBP and DBP were controlled (< 140/90 mm Hg) in 42.3% (range 28.8% - 58.9%), 38.8% (range 14.0% - 66.7%), and 52.9% (range 31.5% - 64.0%), respectively ($p < 0.001$ in all) (Table 4). When BP controls were examined according to the JNC 7 guidelines, only 12.3% of DM patients had attained the recommended BP target of less than 130/80 mm Hg. Elderly patients, age $\geq$ 60 years were found to be a positive risk, while hypertensive retinopathy and dosage escalation after the first visit were found to be a negative risk associated with poor BP controls (Table 5).

At the first clinic visit, 4.6% of cases were on lifestyle modification only and 62% of cases were on monotherapy. One-third of them were put on $\geq$ 2 drugs.

Table 3. The comparison of the prevalence of cardiovascular risk factors between primary, secondary, and tertiary care hospitals

Risk factors	Primary care	Secondary care	Tertiary care	p-value[1]
[2]Smoking (%)	15.7	9.8	13.0	<0.01*
[3]Coronary heart disease (%)	7.7	18.2	21.0	<0.01*
[4]Diabetes mellitus (%)	28.4	26.9	28.2	<0.01*
[5]Cerebrovascular disease (%)	9.2	11.6	9.5	<0.01*
[6]Chronic renal failure (%)	8.4	10.9	9.1	<0.01*
[7]LVH by ECG and/or Chest X-ray (%)	14.8	21.3	39.4	<0.01*
[8]Hypercholesterolemia (%)	51.5	67.4	68.8	<0.01*
[9]Hypertensive retinopathy (%)	0	2.8	35.6	<0.01*
[10]Macroalbuminuria (%)	6.9	29.1	31.4	<0.01*
[11]Microalbuminuria (%)	38.9	52.8	44.4	<0.01*
[12]Microalbuminuria tested in diabetic patients (%)	24.0	66.4	15.8	<0.01*

* p-value considered significant at < 0.05

[1] p-value between levels of hospital practice

[2] from 166, 316, and 308 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[3] from 167, 460, and 375 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[4] from 264, 510, and 405 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[5] from 250, 545, and 402 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[6] from 203, 497, and 386 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[7] from 142, 343, and 269 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[8] from 246, 507, and 404 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[9] from 60, 106, and 188 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[10] from 261, 282, and 188 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[11] from 18, 91, and 18 cases obtained from primary, secondary, and tertiary care hospitals, respectively

[12] from 75, 137, and 114 cases obtained from primary, secondary, and tertiary care hospitals, respectively

Table 4. Comparative studies on the BP control between primary, secondary, and tertiary care hospitals

Clinical findings	Primary care (n = 279)	Secondary care (n = 568)	Tertiary care (n = 412)	p-value[1]
SBP level at last visit (mm Hg)	135.5±19.3	139.1±18.9	134.9±16.3	<0.01*
DBP level at last visit (mm Hg)	82.9±11.8	81.0±10.4	79.7±9.7	<0.01*
SBP difference between the first and last clinic visit (mm Hg)	30.2±26.2	29.7±26.5	32.9±22.3	0.13
DBP difference between the first and last clinic visit (mm Hg)	17.1±16.2	17.7±15.6	18.1±14.0	0.61
Overall BP levels <140/90 mm Hg at last clinic visit (%)	42.3	38.8	52.9	<0.01*
BP levels <140/90 mm Hg at last clinic visit among non-diabetic/non-chronic renal failure patients (%)	40.2	42.4	55.3	<0.01*
BP levels <130/80 mm Hg at last clinic visit among diabetic patients (%)	13.3	12.5	11.4	0.92
Number of antihypertensive drugs used at the last visit	1.67±0.7	1.95±0.8	2.00±0.9	<0.01*

* p-value considered significant at < 0.05
[1] p-value between levels of hospital practice

Table 5. Univariate analyses on the overall BP controls

Clinical parameters	[1]p-value	OR	95%CI
Male	0.40	1.1	0.9-1.4
Age >60 years	0.01*	1.4	1.1-1.7
Smokers	0.81	1.1	0.7-1.6
Hyperlipidemia	0.42	0.9	0.7-1.2
Ischemic heart disease	0.42	0.9	0.7-1.1
Cerebrovascular disease	0.49	0.9	0.6-1.3
Diabetes mellitus	0.24	1.2	0.9-1.5
Chronic renal failure	0.69	1.1	0.7-1.6
Left ventricular hypertrophy	0.15	1.3	0.9-1.8
Hypertensive retinopathy	0.02*	0.5	0.3-0.9
Macroalbuminuria	0.40	0.9	0.6-1.2
Microalbuminuria	0.12	0.6	0.3-1.2
Dose escalation after first visit	0.02*	0.7	0.6-0.9

* p-value considered significant at < 0.05
[1] p-value between levels of hospital practice

Table 6. Number of antihypertensive drugs prescribed for 1,259 patients with hypertension at initial and last visit

Number of antihypertensive drugs prescribed	Initial visit		Last visit	
	Number of patients (%)	Range (%)	Number of patients (%)	Range (%)
0	58 (4.6)	0-24.0	10 (0.8)	0-6.0
1	780 (62.0)	41.0-87.5	415 (33.0)	13.0-52.5
2	374 (29.7)	10.0-54.0	577 (45.8)	30.8-66.0
3	43 (3.4)	0-10.0	208 (16.5)	6.0-34.0
≥ 4	4 (0.3)	0-1.9	49 (3.9)	0-11.5

Table 7. Antihypertensive drug by class prescribed for 1,259 patients with hypertension at initial and last visit

Antihypertensive drug class	Initial visit		Last visit	
	Number of patients (%)	Range (%)	Number of patients (%)	Range (%)
Diuretic	579 (46.0)	16.0-92.0	673 (53.5)	16.4-90.0
β-blocker	344 (27.3)	8.3-50.0	588 (46.7)	20.0-71.2
Calcium channel blocker	292 (23.2)	4.0-41.8	475 (37.7)	6.0-69.1
ACE inhibitor	379 (30.1)	5.8-61.0	503 (40.0)	13.3-60.0
Angiotensin II receptor blocker	11 (0.9)	0-4.8	77 (6.1)	0.0-20.0
α_1-blocker	22 (1.7)	0-11.1	41 (3.3)	0.0-13.5
Others	39 (3.1)	0-16.7	31 (2.5)	0.0-13.3

Table 8. Average number of antihypertensive drug prescribed and BP control rate in each condition

Clinical conditions		Item used (n)	[1]p-value	BP<140/90 mm Hg (%)	[2]p-value
Smokers	Yes	2.0±0.9	0.85	44.3	0.81
	No	1.9±0.9		45.7	
Hyperlipidemia	Yes	2.0±0.9	<0.01*	46.5	0.42
	No	1.9±0.8		43.8	
Ischemic heart disease	Yes	2.1±0.9	<0.01*	48.0	0.42
	No	1.8±0.8		44.8	
Left ventricular hypertrophy	Yes	2.1±0.9	<0.01*	41.0	0.15
	No	1.9±0.8		46.9	
Cerebrovascular disease	Yes	1.9±0.9	0.49	47.6	0.49
	No	1.9±0.8		44.3	
Hypertensive retinopathy	Yes	2.3±1.0	0.02*	60.0	0.02*
	No	2.0±0.9		44.7	
Diabetes mellitus	Yes	2.0±0.9	0.09	42.5	0.24
	No	1.9±0.8		46.3	
Chronic renal failure	Yes	2.1±1.0	0.08	43.4	0.69
	No	1.9±0.8		45.5	
Macroalbuminuria	Yes	2.0±1.0	0.31	53.5	0.40
	No	1.9±0.8		49.5	
Microalbuminuria	Yes	2.3±0.9	0.10	42.9	0.12
	No	2.0±0.8		29.7	

* p-value considered significant at < 0.05

[1] p-value between diseases and non-diseases, independent sample-t-test

[2] p-value between diseases and non-diseases, chi-square test

By contrast, at the last clinic visit only one-third were put on monotherapy (Table 6). The type of drug treatment also varied widely between the first and the last clinic visit (Table 7). Nevertheless, diuretics (53.5%) and β-blockers (46.7%) remained the two most common drugs prescribed in general practice at the last clinic visit. ACE inhibitors (40.0%) and calcium channel blockers (37.7%) were the next two most commonly prescribed drugs. Among diabetic patients, ACE inhibitors (50.6%) were the most common drug prescribed, followed by diuretic (45.4%), calcium channel blockers (42.6%), and β-blockers (41.4%). Angiotensin receptor blocker was infrequently prescribed in either diabetes (9.8%) or non-diabetes subgroups (5.2%) (data not shown).

The average number of antihypertensive drugs prescribed was 1.3 ± 0.6 at the initial clinic visit and 1.9 ± 0.8 at the last clinic visit. The average number

of antihypertensive drug prescribed for those who had cardiovascular risks and target organ damage was higher than for those who did not. However, only hyperlipidemia, ischemic heart disease, LVH, and hypertensive retinopathy reached a statistical significance ($p < 0.01$ and $p = 0.02$ where appropriate) (Table 8). The overall BP normalization rate among patients either with or without cardiovascular risks and target organ damage was similar except for patients with hypertensive retinopathy. These patients received a higher number of antihypertensive drugs and achieved a better control rate compared to those without them.

Discussion

Our data confirmed that hypertensive patients who attended at the outpatient clinics generally exhibited a higher rate of cardiovascular risk and target organ damage when compared to the data observed in the general population ($p < 0.01$) i.e. diabetes mellitus (27.7% vs 9.6%), cerebrovascular diseases (10.4% vs 0.7%), left ventricular hypertrophy (26.6% vs 13.0%), and cardiovascular diseases (16.9% vs 1.1%)[3,9-11]. Therefore, strict BP control alone is not good enough in the management of hypertension. A holistic approach should be adopted to minimize all the cardiovascular risks which will determine the prognosis of these patients.

Smoking, one of the modifiable risks, should be abandoned in all hypertensive patients. Despite all the patient education given by physicians, nurses and health personnel, the overall smoking rate among treated hypertensive patients enrolled in our study was 12.3%. However, it was much lower than the smoking rate studied in the general population reported from the National Statistics Office in 2001 (22.5%)[3]. The accomplishment of a "quit smoking" campaign among diabetic patients was confirmed by the reduction of the smoking rate found among known diabetes (12.1%) compared with newly diagnosed diabetes (25%) from the Inter ASIA sub-study in Thailand[9]. Moreover, the higher prevalence of patients who smoked in the primary care hospitals than in the higher care hospitals implies a need for health care workers to enforce a series of "quit smoking" activities for the community. However, it seems that efforts to tackle dyslipemic problems failed. As expected, patients dwelling in a better socioeconomic area had a higher rate of hypercholesterolaemia[9]. There was a considerably higher rate of patients with hypercholesterolaemia as compared to the general population (65.3% vs 11.3%)[12]. It implied that interventional programs offered by the Ministry of Public Health have not been taken up by the better socioeconomic population group.

Higher rates of target organ damage of the studied population were found in secondary and tertiary care hospitals e.g. coronary heart disease, LVH, hypertensive retinopathy and microalbuminuria. This implied that hypertensive patients who attended at the secondary and tertiary care hospitals were more severely affected than at the primary care hospitals. The rate of request for MAU detection in diabetic patients was still low, especially in tertiary care hospitals. This may arise from the idea that the detection of MAU will not change the treatment, since most of these diabetic patients will be given ACE inhibitors/ ARB's from the start. However, this should not be a reason for not performing the test, since aggressive treatment with higher dosages of ACE inhibitor/ARB treatment or even a combination of them can result in uncontrolled albuminuria. Moreover, it is an independent cardiovascular risk that physicians have to be aware of.

The known prevalence of hypertension in Thailand reported from the national epidemiological survey performed by the Thailand Health Research Institute and the National Health Foundation in 1997-1998 was 11.0%[3] (diagnostic criteria of hypertension was $\geq$ 140/90 mm Hg). There were only 26.6% from all hypertensive patients detected who acknowledged their hypertension, 50.8% of them had their blood pressure normalized[3]. In this study, the BP normalization rate (< 140/90 mm Hg) in primary, secondary and tertiary care hospitals was 42.3%, 38.8% and 52.9%, respectively. The lower BP control rate in secondary health care hospitals compared to primary health care hospitals were possibly due to the severity of hypertension evidenced by more target organ damage found (Table 3) or due to ignorance of physicians to adjust antihypertensive drugs, since they were probably too busy to do so. As expected, those tertiary health care hospitals achieved the best BP control rate, since all of them were medical schools. Therefore, continuous monitoring of the BP control rate is needed in all levels of health care hospitals to improve the quality of care. Improvement of BP control rate is possible found in many reports[13-15]. Cuspidi and associates demonstrated an increment of their control rate from 1997 to 2000 (range 34% to 44.1%)[14]. Ohta and colleagues also showed an improvement of blood pressure control after a 10-year follow-up study, from 31% in 1991 to 43% in 1996, and to 57% in 2001[15].

Optimizing BP control still represents a major

challenge for physicians today. It must be tackled, if we are to reduce the burden of cardiovascular and renal disease from hypertension in the years ahead. It is almost certain that a lower target BP will be proposed in the future guidelines and that should bring about lower cardiovascular risks. A wide variability of BP control presented among the studied groups was observed in this study. Barriers to effective treatment could result from a lot of causes[16-17], such as a short duration of treatment, ignorance of physicians to the drug titration, and limitation in the number of antihypertensive drug used etc. Continuation of medical education, audit and feedback should be implemented to improve clinical practices[18-20]. Encouragement in using more antihypertensive drug combinations or an escalation of antihypertensive dosage to attain the recommended BP target should be stressed. More epidemiological research should be encouraged and applied in clinical practices[13,21]. Certainly, drug compliance is another key factor in achieving target BP control. Appropriate treatment regimens, availability of drugs, and efficient patient education are all important determinants of drug compliance that should be closely monitored to achieve a better BP control rate[22-23].

Conclusion

At last visit, 66% of patients were on 2 or more antihypertensive drugs. In spite of this, only 44.2% of patients had a BP < 140/90 mm Hg, and only 12.3% of DM patients had attended the JNC-7 Guidelines recommended BP target of < 130/80 mm Hg. Hypercholesterolaemia and diabetes mellitus were the two major cardiovascular risks found. Types and numbers of antihypertensive drugs used across the country were also examined.

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Appendix

Hypertension Audit Committee

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การตรวจสอบการควบคุมความดันโลหิตในเวชปฏิบัติในประเทศไทย

พีระ บูรณะกิจเจริญ

ได้ทำการศึกษาในหลายสถาบันแบบภาคตัดขวางเพื่อให้ได้ข้อมูลในชีวิตจริงของการควบคุมความดันโลหิตในผู้ป่วยความดันโลหิตสูงในเวชปฏิบัติของประเทศไทย โดยทำการรวบรวมข้อมูลทางประชากรศาสตร์, ปัจจัยเสี่ยงต่อโรคหัวใจและหลอดเลือดและชนิดของยาลดความดันโลหิตที่ใช้ มีผู้ป่วยทั้งสิ้น 1,259 รายที่เข้าร่วมในการศึกษาครั้งนี้ โดยทำการศึกษาระหว่างเดือนตุลาคม พ.ศ. 2546 ถึงเดือนธันวาคม พ.ศ. 2546 มีผู้ป่วย 924 รายจาก 6 ภาค ในศูนย์การแพทย์ต่างระดับ และผู้ป่วย 335 รายจากโรงเรียนแพทย์ 4 แห่ง และโรงพยาบาลระดับตติยภูมิ 1 แห่งในกรุงเทพมหานคร ผู้ป่วยร้อยละ 81 มีอายุระหว่าง 45-75 ปี (เฉลี่ย 61.2 $\pm$ 11.6 ปี) ผู้ป่วยร้อยละ 44 ที่ได้รับการตรวจสอบมีระดับความดันโลหิตต่ำกว่า 140/90 มม.ปรอท และมีเพียงร้อยละ 12.3 ในผู้ป่วย เบาหวานมีระดับความดันโลหิตต่ำกว่า 130/80 มม.ปรอท ซึ่งเป็นความดันโลหิตเป้าหมายตามคำแนะนำของ JNC 7 ภาวะโคเลสเตอรอลสูงในเลือดเป็นปัจจัยเสี่ยงที่พบมากที่สุด (ร้อยละ 65.3) ตามด้วยโรคความดันโลหิตสูง(ร้อยละ 27.7) อุบัติการณ์ของการใช้ยาลดความดันโลหิตในครั้งแรกเทียบกับครั้งสุดท้ายที่พบแพทย์คือ ARB (ร้อยละ 0.9 เทียบกับร้อยละ 6.1), ACE-inhibitor (ร้อยละ 30.1 เทียบกับร้อยละ 40.0), β-blocker (ร้อยละ 27.3 เทียบกับร้อยละ 46.7), CCB (ร้อยละ 46.0 เทียบกับร้อยละ 53.5), และยาขับปัสสาวะ (ร้อยละ 46.0 เทียบกับร้อยละ 53.5) ในขณะเดียวกันจำนวนยาลดความดันโลหิตที่ใช้ครั้งแรกเทียบกับครั้งสุดท้ายของการพบแพทย์ คือ ยา 1 ชนิด (ร้อยละ 62.0 เทียบกับร้อยละ 33.0), ยา 2 ชนิด (ร้อยละ 29.7 เทียบกับร้อยละ 45.8), ยา 3 ชนิดขึ้นไป (ร้อยละ 3.7 เทียบกับร้อยละ 20.4), และมีจำนวนยาที่ใช้เฉลี่ย 1.3 $\pm$ 0.6 ชนิดเทียบกับ 1.9 $\pm$ 0.8 ชนิดต่อผู้ป่วย ผู้ป่วย 2 ใน 3 (ร้อยละ66.2) ใช้ยาลดความดันโลหิตตั้งแต่ 2 ชนิดขึ้นไป ในการพบแพทย์ครั้งสุดท้าย ผู้ป่วยเบาหวานชนิดที่ 2 มีเพียงร้อยละ 5 ที่มีข้อมูลของการส่งตรวจไมโครแอลบูมินในปัสสาวะ, ร้อยละ 50.6และร้อยละ 9.8 ของผู้ป่วยได้รับยา ACE inhibitor และยา ARB ตามลำดับ