Hypertension Audit in Clinical Practice Based in Thailand (HABIT)

Peera Buranakitjaroen MD*

** Division of Hypertension, Department of Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand*

This cross-sectional survey aimed to determine blood pressure (BP) control, risk factors, co-morbidities and end-organ damage among Thai hypertensive patients. Between February and April 2007, we enrolled 2007 out-patient hypertensives who were treated for ≥ 6 months. However, baseline assessment could be obtained from only 1,914 cases (male: female = 4: 3; mean age: 61.9 ± 11.7 years) and 1,807 cases were eligible for BP evaluation (average BP: 140.45 ± 19.99/77.84 ± 12.51 mm Hg). Overall BP normalization (BP < 140/90 mmHg) was 51%, but it was 44% when diabetic patients whose BP's had to be < 130/80 mmHg were taken into account. Common risk factors/co-morbidities were hypercholesterolemia (66%), metabolic syndrome (36%), diabetes mellitus (35%) and obesity (32%). Monotherapy was found in 26%, 2 medications in 44% and ≥ 3 medications in 29%. Calcium channel blockers were prescribed in 49%, diuretics in 45%, beta-blockers in 44% and angiotensin-converting enzyme inhibitors in 38%. Three quarters of physicians were aware of target blood pressure according to the latest hypertension guidelines. In conclusion, BP normalization rate in 2007 audit was better than in the 2003 audit (51% vs. 44%). Campaigns targeting the commonest risk factors, hypercholesterolemia and metabolic syndrome, should be a priority.

Keywords: *Hypertension, Audit*

J Med Assoc Thai 2011; 94 (Suppl. 1): S57-S65
Full text. e-Journal: *http://www.mat.or.th/journal*

Cardiovascular disease (CVD) remains the leading cause of death in both developed and developing nations, *i.e.* ischemic heart disease (IHD) and stroke are altogether responsible for more than one-fifth of all deaths worldwide[1]. Hypertension is the most important 'modifiable risk factor' for CVD[2], including coronary artery disease (CAD), stroke, left ventricular hypertrophy (LVH), congestive heart failure, peripheral vascular disease, renal failure and aortic aneurysms[3]. It is also a potent promoter of atherosclerosis and adaptive changes in the vasculature found in hypertension which have severe consequences[4].

Clinical studies have demonstrated the benefit of reducing blood pressure (BP)[5] showing that even small decrease in BP can reduce CV risk[6]. In the last 30 to 40 years, many effective antihypertensive agents have become available, however, arterial hypertension remains uncontrolled in more than 70% of patients worldwide[7,8].

The primary goal of BP control is to achieve the maximum reduction, in the long term, of total risk of CV morbidity and mortality. Although current levels of BP control, *i.e.*, systolic blood pressure (SBP) < 140 mmHg and diastolic blood pressure (DBP) < 90 mmHg have been improved, they are generally far below the goal of treatment[9,10]. Moreover, many patients are still unaware of their high BP[9-11]. In the Third National Health Examination Survey 2003, of those identified as having hypertension in the survey, 69.8% were unaware that they had hypertension. Although 78.2% of those who were aware had been treated, only 36.6% had blood pressure < 140/90 mmHg[12]. Since high BP is an asymptomatic pathology, patients often fail to seek treatment and to comply with life-long treatment recommendations. The problem of drug compliance becomes worse as the number of pills increases and side effects occur[13].

The use of simple and straightforward guidelines may improve standards of care and confer consistency in patient management. According to the

Correspondence to:
Buranakitjaroen P, Division of Hypertension, Department of Medicine, Faculty of Siriraj Hospital Medical School, Mahidol University, 2 Prannok Road, Bangkoknoi, Bangkok 10700, Thailand.
Phone & Fax: 0-2419-7790
E-mail: sipbn@mahidol.ac.th

European Society of Hypertension (ESH)/European Society of Cardiology (ESC) guidelines, optimal BP was defined as <120/80 mmHg[14]. SBP >140 mmHg and DBP > 90 mmHg is classified as Grade 1, 2 and 3 hypertension depending on the SBP and DBP levels. For hypertensive patients, BP goal is < 140/90 mmHg and preferably even lower levels, if tolerated. And for patients with other risk factors like diabetes, established CVD and chronic kidney disease, the guidelines propose achieving BP levels below 130/80 mmHg along with lifestyle modifications.

The Seventh US Joint National Committee on the Prevention, Detection, Evaluation and Treatment of BP (JNC-VII) guideline has several classifications[15] BP < 120/80 mmHg is classified as normal. Increasing levels of SBP > 140 mmHg and DBP > 90 mmHg is classified Stage 1 and Stage 2 hypertension. The guideline recommends treating to targets that are < 140/90 mm Hg to reduce CVD complications. In hypertensive patients with diabetes or renal disease, the guideline recommends a BP goal of < 130/80 mmHg. The guideline has also introduced a new category termed pre-hypertension to describe people with SBP in the range 120-139 mm Hg and DBP in the range of 80-89 mmHg. Longitudinal data obtained from the Framingham Heart Study have indicated that BP values in 130-139/85-89 mmHg range are associated with a more than 5-fold increased risk of developing hypertension compared with those with BP levels < 120/80 mmHg[16].

In Thailand, guidelines for the management of Thai hypertensive patients were developed with the consensus of many societies involved and the Ministry of Public Health, and endorsed by the Royal College of Physicians of Thailand[17]. Nevertheless, the availability of a national guideline does not guarantee its use. Moreover, only limited data are available on risk factors, organ damage and comorbidity of these hypertensive patients and the level of BP control as a result of hypertensive pharmacotherapy at the community level[17]. In the first Thai hypertension audit of 2003, BP normalization rate (BP <140/90 mmHg) was 44%[18]. Since regular monitoring of BP control is needed to improve medical care, this second hypertension audit in clinical practice based in Thailand (HABIT study) was organized. Therefore, the primary objective of this study was to determine the current levels of BP control in a real-life clinical practice scenario in Thailand and to use this information as a basis for devising strategies to improve BP control in Thai hypertensive patients. The secondary objectives were to obtain information on risk factors, organ damage and comorbidity in this study population.

Material and Method

Study Design

This was a multi-centre, cross-sectional, observational survey of BP control among hypertensive out-patients, conducted from February 1, 2007 to April 30, 2007 at 40 district or provincial hospitals from 25 provinces across the country. All consecutive male or female subjects (≥21 years of age) who presented at the participating centres with hypertension (SBP > 140 mm Hg and/or DBP > 90 mmHg) and have been receiving antihypertensive treatment for at least 6 months were included in this study after obtaining their written informed consent. Subjects were excluded if they were participating in any other clinical study, were those with secondary hypertension or were those who refused to sign informed consent. Antihypertensive drugs were used following the current clinical practice guidelines in hypertension, prescribing information and the availability of drugs. As this was a cross-sectional, observational study, and no follow-up visit was planned.

Study Assessments

The participating physicians completed a questionnaire about risk factors, end-organ damage, co-morbidities, lifestyle modification given by their physicians and current medications. Target BP of each patient, including action to be taken, was also indicated by physicians. The information was acquired by interviewing the patients by medical personal (third party) and data collection from hospital records. An average of BP measurements, 5 minutes apart, by using automatic home BP device (OMRON model IA2), weight and height measurements to assess body mass index (BMI) and abdominal circumference measurements to assess for metabolic syndrome were carried out.

Statistical Considerations

As this was a descriptive registry, no sample size was calculated. It was decided that 2,000 patients (50 patients per site) should be included according to budget availability. Central data processing was performed on behalf of the Thai Hypertension Society. Data were summarised by using percentage and mean ± standard deviation where applicable. All statistical tests were performed by using two-tailed tests at 5% level of significance. Patients' characteristics (demographic data, risk profile, target organ damage,

comorbidities and treatment) were described.

Results

Baseline Characteristics

A total of 2007 patients were enrolled into this study, of whom baseline characteristics were assessed in 1914 patients because 72 patients were treated for < 6 months and data of 21 patients was lost during data handling. For BP evaluation, BP of 107 patients were not taken into account due to failure to use home BP device provided, since the preferred "0" last digit of both SBP and DBP were detected in all cases from 2 sites (Fig. 1). Baseline characteristics of enrolled patients are presented in Table 1. The male:female ratio was 4: 3 and mean age was 61.9 $\pm$ 11.7 years. Average duration of hypertension was 6.23 $\pm$5.23 years (range 6 months-50 years). The mean SBP and DBP values were 158.24 $\pm$ 23.89 mm Hg and 91.91 $\pm$ 14.95 mmHg, respectively. Isolated systolic hypertension was observed in 18%, while isolated diastolic hypertension was observed in 3% (data not shown). Average duration of treatment was 4.95 $\pm$ 3.73 years (range 7 months-10 years).

Risk Factors, Co-morbidities and End-organ Damage

A high prevalence of many CV risk factors, co-morbidities and end-organ damage were noted, such as hypercholesterolemia (65%), metabolic syndrome (36%), diabetes mellitus (35%) and obesity (32%), etc (Fig. 2).

For some of these conditions, there were marked differences in the prevalence among those who achieved target BP and those who did not achieve target BP, such as for metabolic syndrome (27% vs. 41%), diabetes mellitus (18% vs. 49%) and obesity (27% vs. 36%). However, the two groups did not differ much in terms of the prevalence of other conditions.

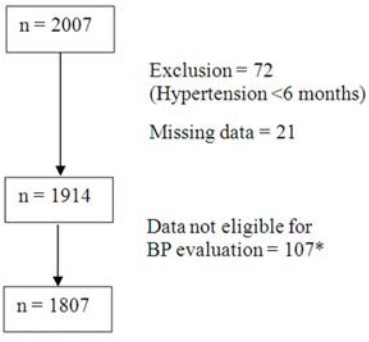

Fig. 1 Enrollment of the study population

Management of Hypertension

Lifestyle modifications

A majority of the patients (95%) were recommended lifestyle modifications in the past. These included dietary changes (85%), exercise (73%), smoking cessation (59%) and weight reduction (36%).

Antihypertensive medications

Patients were prescribed a broad range of antihypertensive medications such as diuretics, beta-blockers, calcium channel blockers (CCB), alpha-blockers, angiotensin receptor blockers (ARB), angiotensin-converting enzyme inhibitors (ACEI), aldosterone antagonists and fixed dose combinations. The rate of usage of each type of antihypertensive drug was listed in Table 2. The number of antihypertensive medications according to level of last clinic BP is presented in Fig. 3.

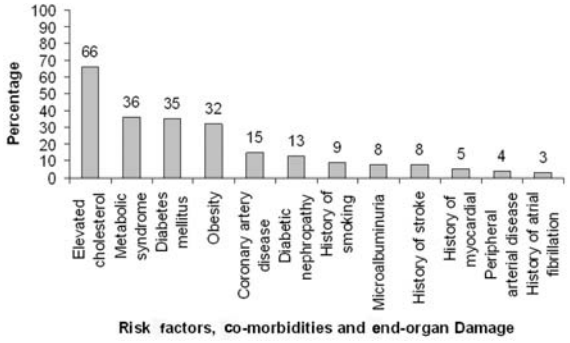

Fig. 2 Prevalence of risk factors, co-morbidities and end-organ damage (n = 1,914)

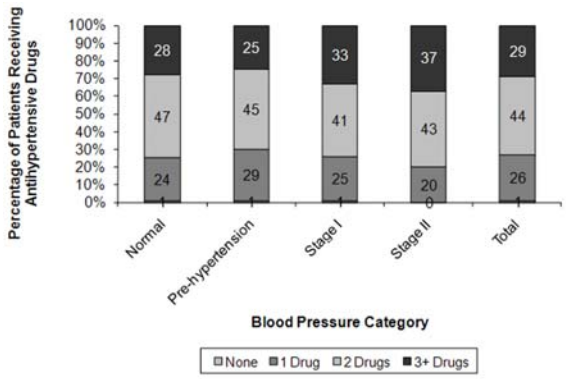

Fig. 3 Number of antihypertensive medications according to blood pressure category (n = 1,807)

Table 1. Baseline Characteristics

Parameter*		%
Gender (n = 1,897)	Male	58
	Female	42
Age (yrs) (Mean ± SD)	61.9 ± 11.7	
Age (yrs) (n = 1,820)	21-40	4
	41-60	41
	61-80	51
	>80	4
Duration of hypertension (yrs) (Mean ± SD)	6.23 ± 5.23 (range 0.5-50 years)	
Duration of hypertension (months) (n = 1,856)	6-12	5.7
	13-24	10.7
	25-36	13.7
	> 36	69.9
Systolic blood pressure (mmHg) (Mean ± SD)	158.24 ± 23.89	
Diastolic blood pressure (mmHg) (Mean ± SD)	91.91 ± 14.95	
Blood pressure category** (n = 1,464)	Normal	3
	Pre-hypertension	11
	Stage I	26
	Stage II	60
Duration of treatment (yrs) (Mean ± SD)	4.95 ± 3.73 (range 0.6-10 years)	
Duration of treatment (months) (n = 1,399)	6-12	7.2
	13-24	14.2
	25-36	13.6
	> 36	65.0

NB: *n = 1914, unless specified otherwise,

** BP category determined as per The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. Baseline systolic/diastolic blood pressure was initial blood pressure obtained from the out-patient files which could be found only in 1464 patients.

Awareness of guidelines

Overall, three quarters of all physicians were aware of guidelines for hypertension management. However, more than half of their patients did not achieve target BP levels. There was no statistical difference in the percentage of patients whose BP was normalized based on whether their physicians were aware of target BP or not (43.3% vs. 48%).

Achievement of Target Blood Pressure

A total of 1807 patients were eligible for BP evaluation. Their mean SBP and DBP values were 140.45 ± 19.99 mmHg and 77.84 ± 12.51 mmHg, respectively. Target BP level (< 140/90 mmHg) was achieved by 51% of all patients (10% normal and 41% pre-hypertension). However, when BP normalization prevalence was assessed for both non-diabetics (< 140/90 mmHg) and diabetics (< 130/80 mmHg), the prevalence was 44%. Isolated systolic hypertension was observed in 33%, while isolated diastolic hypertension was observed in 2%. BP normalization according to age (Table 3) and risk factors, co-mrbilities and end organ damage (Fig. 4) is presented.

Physicians' responses to those patients who did not achieve target BP (n = 1,000) were only to follow-up 37% , to add a new drug class 27%, to increase drug dosage 26%, to switch to other drug class 2% and to choose more than one alternative 8%.

Discussion

The second Thai hypertension audit (HABIT) showed improvements in hypertension control as compared to the first audit: the BP normalization rate increased from 2003 to 2007 (44% vs. 51%)[18]. Our data also confirmed that hypertensive Thai patients who attended the out-patient clinics exhibited a high prevalence of CV risk, co-morbidities and end-organ damage such as hypercholesterolemia, smoking, obesity, diabetes mellitus (DM) and the metabolic syndrome (MS), coronary artery disease (CAD),

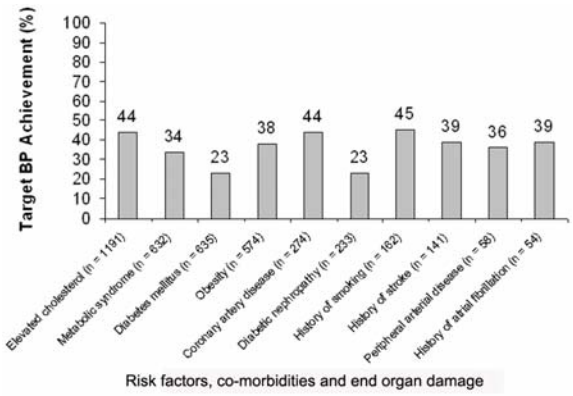

Fig. 4 Target blood pressure achievement in hypertensive patients with risk factors, comorbidities and end organ damage (n = 1,807)

Table 2. Current Antihypertensive Medication

Antihypertensive drug use (n = 1,914)	%
Calcium channel blockers	49
Diuretics	45
Beta-blockers	44
Angiotensin-converting enzyme inhibitors	38
Angiotensin receptor blockers	22
Alpha-blockers	7
Fixed-dose combinations	5
Aldosterone antagonists	1

Table 3. Blood pressure goal achievement for different age groups

Age group	Number	BP achievement, n (%)
21-40 years	68	27 (39)
41-60 years	736	367 (50)
61-80 years	930	382 (41)
> 80 years	73	31 (42)
Total	1,807	807 (44)

microalbuminuria (MAU), diabetic nephropathy (DN), previous stroke, post-myocardial infarction (post MI), peripheral arterial disease (PAD) and atrial fibrillation (AF). Therefore, management of hypertension should not be restricted simply to strict BP control, but a comprehensive approach should be adopted to tackle the CV risk factors that determine the long-term prognosis in these patients.

When compared to the general population, there was a considerably higher prevalence of patients with hypercholesterolemia (11.3% vs. 66%) in our study[19]. This could be explained because patients enrolled in this study were all hypertensive patients. They were selected group of patients. In addition, most of them lived in urban areas where a higher prevalence of hypercholesterolemia and diabetes were reported[20]. However, the prevalence of hypercholesterolemia found in this study was similar to that found in the previous audit[18] (66% vs. 65.3%). This study included all hypertensive patients who usually had multiple risk factors[21]. Also, despite the well known risks of smoking, about 9% patients in our study recorded a history of smoking. However, this was much lower than the incidence of smoking (12.3%-23.7%) noted in other Thai studies[12,18,22]. This can be explained by lifestyle modification according to physicians' advice. The prevalence of microalbuminuria (8%) was lower in this study than the 18.6% reported among Thai hypertensive patients[23] or 43.3% reported among Thai hypertensive patients with type 2 diabetes[24]. This is because of the high rate of ACEI/ARB usage which can convert microalbuminuria to normoalbuminuria. They were used by 60% of the studied population since they were prescribed alternatively in clinical practice. In our study, the prevalence of CV risk factors such as metabolic syndrome, diabetes, hypercholesterolemia, obesity, etc. was higher than that reported in the first hypertension audit[18]. More importantly, there was marked difference in the prevalence of diabetes (18% vs. 49%), metabolic syndrome (27% vs. 41%) and obesity (27% vs. 36%) among those who achieved target BP and those who did not achieve target BP. An earlier Thai study has shown that increased BMI was an important factor for hypertension, as overweight men had double the risk of hypertension when compared with leaner men, while Thai obese women were associated with a 3-fold increase in hypertension risk[25]. Obesity and weight gain contribute to progression of hypertension[16], however, control of overweight and obesity has low priority on Thailand's health agenda[26]. Since excess body weight, dyslipidemia, glucose intolerance and hyperinsulinemia are frequently interrelated and represent independent predictors of hypertension[27], there is a need to ensure better control of hypertension as well as the other CV risk factors.

The BP normalization rate (< 140/90 mmHg) of 51% in this study is higher than that reported in the first Thai hypertension audit (44%), but slightly lower than that reported in other Asian studies (59%-60.6%)[19,23,28]. However, when BP normalization rate was assessed for both non-diabetics (<140/90 mmHg) and

diabetics (< 130/80 mm Hg), the prevalence was 44%. Among diabetic subjects, the BP normalization rate (BP < 130/80 mm Hg) was 23%, which is higher than that reported (14%-15%) in earlier studies[29,30]. There was no statistical difference in the percentage of patients that achieved target BP levels based on whether their physicians were aware of hypertension guidelines or not (43.3% vs. 48%).

The HABIT study is one of the few Thai studies to concentrate on the extent of BP control in a real-world clinical practice setting. The results of this survey are important for the nation because they not only show how well BP was controlled, the prevalence of risk factors and co-morbidities, but they also discover the cause of uncontrolled BP as well. Therefore, the rate of drug combination usage and physicians' awareness of individual target blood pressure of their patients were explored. This will indirectly reflect whether they practice according to the hypertension guidelines.

In the present study, patients were prescribed a broad range of antihypertensive medications and about 73% were prescribed 2 or more drugs. Results of earlier observational studies have confirmed that BP control can be improved in daily clinical practice by increasing the use of drug combinations, as well as by the first-line prescription of ACEI and CCB, and probably also ARB[31]. In addition, there are also reports of greater persistence on treatment among patients treated with ARB, ACEI or CCB when compared to patients taking diuretics or beta-blockers[32-34]. In our study, there were a significant percentage of patients on diuretics and beta-blockers, and therefore poor compliance could be one of the factors for the inadequate BP control. However, individual compliance to drug therapy was not directly assessed in our study, and this was one of the limitations of the study.

Only three quarters of the physicians participating this study were aware of the target BP of their patients. There was no guarantee whether the physicians filled the questionnaires themselves or they were filled by paramedics. However, there were no difference of BP normalization rate of those physicians who were aware of target BP and those who were not. While about three quarters of all physicians were aware of hypertension guidelines in our study, target BP (< 140/90 mm Hg) was achieved only about half of all patients.

The relationship between BP and risk of CV events is consistent, continuous and independent of other risk factors The presence of each additional risk factor compounds the risk from hypertension. The results of Asia-Pacific Cohort Study Collaboration indicate a particularly steep association between BP and stroke in Asia[35]. For every 20 mm Hg rise in SBP or 10 mm Hg rise in DBP, there is a doubling of mortality from both IHD and stroke[6]. Conversely and more importantly, each 10 mm Hg fall in SBP is expected to result in about a one- to two-fifths reduction in CVD[35]. In fact, even a small 2 mm Hg fall in SBP would lead to a 7% lower risk of death from IHD and 10% lower risk of stroke death[6]. Even modest blood pressure reductions, such as the few mmHg that might be expected from reducing salt intake[36,37], if applied across population, could result in reductions of at least a tenth in CVD.

Thus, there is an urgent need to increase awareness among patients with hypertension, to make even minor reductions in BP a high priority and to ensure that BP goals are achieved. Other CV risk factors such as hypercholesterolemia, metabolic syndrome and diabetes must also be tackled on a priority basis to curb the growing burden of chronic cardiometabolic diseases in Thailand.

Acknowledgements

We would like to acknowledge the physicians whose participation made the HABIT survey possible. They are: Apichaiyingyord S from Rachaburi Hospital, Assawapatchara N from Ranong Hospital, Charoenpun A from Maharajnakornrajchasima Hospital, Chiowanich P from Lumpang Hospital, Chirawattanaphan P from Paholponpayuhasena Hospital, Choochumporn S from Thanaraj Hospital, Dutsadeevettakul S from Chaopraya Hospital, Hosintrakarn K from Praputthabat Hospital, Jedsadayanmeta A from Pranang Klao Hospital, Jirarattanasopa P from Yala Hospital, Kamnampung W from Prasat Neurological Institute, Kanjanakul I from Pramongkutklao Hospital, Kitipawong P from Thammasart University Hospital, Kuanprasert S from Maharajnakornchiangmai Hospital, Laothong C from Srisaket Hospital, Malhotra N from Mission Hospital, Ngernwiwatkul M from Chulalongkorn Hospital, Nuntanee K from Nakornpathom Hospital, Pajareya T from Bhumibol Adulyadej Hospital, Pattanaphongsak J from Uthai Thanee Hospital, Pengkaew P from Rajavithi Hospital, Phojanamongkolkij K from Queen Savang Vadha Memorial Hospital, Pithuksutipong T from Prapok Klao Hospital, Pongrithsakda W from Maharajnakornrajchasima Hospital, Pongsurachet V from Chiangrai Prachanukrao Hospital, Poopitaya S from Chao Phraya Abhaibhubate Hospital, Sastrasink P from Surathani Hospital, Sirivatana K from Nakornping

Hospital, Somboonsilp W from Chaoprayayommaraj Hospital, Songpanich S from Police Hospital, Thammarat C from Saint Louis Hospital, Thongsri T from Pitsanulok Hospital, Thongthong P from Angthong Hospital, Tianrungroj V from Rachaburi Hospital, Trongritthichaikan P from Chainat Hospital, Vanichaniramol N from Saraburi Hospital, Wangpanngham P from Songkhla Hospital, Yindee V from Lopburi Hospital, and Yomtem K from Narathiwadrachanakarin Hospital. Lastly, we like to thank Sanofi-Aventis (Thailand) Ltd. for their generous grant to do this project.

Potential conflict of interest

None.

References

1. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet 2006; 367: 1747-57.
2. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: a systematic review. J Hypertens 2004; 22: 11-9.
3. Chobanian AV. Vascular effects of systemic hypertension. Am J Cardiol 1992; 69: 3E-7E.
4. Izzard AS, Rizzoni D, Agabiti-Rosei E, Heagerty AM. Small artery structure and hypertension: adaptive changes and target organ damage. J Hypertens 2005; 23: 247-50.
5. Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: results of the HOPE study and MICRO-HOPE substudy. Heart Outcomes Prevention Evaluation Study Investigators. Lancet 2000; 355: 253-9.
6. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. Lancet 2002; 360: 1903-13.
7. Burt VL, Whelton P, Roccella EJ, Brown C, Cutler JA, Higgins M, et al. Prevalence of hypertension in the US adult population. Results from the Third National Health and Nutrition Examination Survey, 1988-1991. Hypertension 1995; 25: 305-13.
8. Chamontin B, Poggi L, Lang T, Menard J, Chevalier H, Gallois H, et al. Prevalence, treatment, and control of hypertension in the French population: data from a survey on high blood pressure in general practice, 1994. Am J Hypertens 1998; 11: 759-62.
9. Khan NA, Wardman D, Campbell NR, Differences in need for antihypertensive drugs among those aware and unaware of their hypertensive status: a cross sectional survey. BMC Cardiovasc Disord. 2005; 5 (1): 4.
10. Egan BM, Zhao Y, Axon RN. US trends in prevalence, awareness, treatment, and control of hypertension, 1988-2008. JAMA. 2010; 303: 2043-2050.
11. Marques-Vidal P, Tuomilehto J. Hypertension awareness, treatment and control in the community: is the 'rule of halves' still valid? J Hum Hypertens 1997; 11: 213-20.
12. Aekplakorn W, Abbott-Klafter J, Khonputsa P, Tatsanavivat P, Chongsuvivatwong V, Chariyalertsak S, et al. Prevalence and management of prehypertension and hypertension by geographic regions of Thailand: the Third National Health Examination Survey, 2004. J Hypertens 2008; 26: 191-8.
13. Cramer JA. Consequences of intermittent treatment for hypertension: the case for medication compliance and persistence. Am J Manag Care 1998; 4: 1563-8.
14. Mancia G, De Backer G, Dominiczak A, Cifkova R, Fagard R, Germano G, et al. 2007 Guidelines for the management of arterial hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). J Hypertens 2007; 25: 1105-87.
15. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA 2003; 289: 2560-72.
16. Vasan RS, Larson MG, Leip EP, Kannel WB, Levy D. Assessment of frequency of progression to hypertension in non-hypertensive participants in the Framingham Heart Study: a cohort study. Lancet 2001; 358: 1682-6.
17. Thanomsap S, Buranakitjaroen P, Ngamukoj P, Ubondejpracharak Y, Bunnak P, Vannasaeng S, et al. Hypertension treatment guidelines in general practice. R Coll Bull 2001; 18: 10-23.
18. Buranakitjaroen P. An audit of blood pressure control in clinical practice in Thailand. J Med Assoc Thai 2006; 89 (Suppl 5): S8-17.
19. Uemura K. SEAMIC health statistics 2002. SEAMIC publication No.86. Tokyo: Southeast Asian Medical Information Center, International

Medical Foundation of Japan; 2002: 134.
20. InterASIA Collaborative Group. Cardiovascular risk factor levels in urban and rural Thailand—The International Collaborative Study of Cardiovascular Disease in Asia (InterASIA). Eur J Cardiovasc Prev Rehabil 2003; 10: 249-57.
21. Mancia G, Volpe R, Boros S, Ilardi M, Giannattasio C. Cardiovascular risk profile and blood pressure control in Italian hypertensive patients under specialist care. J Hypertens 2004; 22: 51-7.
22. Howteerakul N, Suwannapong N, Sittilerd R, Rawdaree P. Health risk behaviours, awareness, treatment and control of hypertension among rural community people in Thailand. Asia Pac J Public Health 2006; 18: 3-9.
23. Buranakitjaroen P, Phoojaroenchanachai M, Saravich S. Microalbuminuria in Thai essential hypertensive patients. J Int Med Res 2007; 35: 836-47.
24. Buranakitjaroen P, Deerochanawong C, Bunnag P. Microalbuminuria prevalence study (MAPS) in hypertensive patients with type 2 diabetes in Thailand. J Med Assoc Thai 2005; 88: 1624-9.
25. Lee M, Entzminger L, Lohsoonthorn V, Williams MA. Risk factors of hypertension and correlates of blood pressure and mean arterial pressure among patients receiving health exams at the Preventive Medicine Clinic, King Chulalongkorn Memorial Hospital, Thailand. J Med Assoc Thai 2006; 89: 1213-21.
26. Kosulwat V. The nutrition and health transition in Thailand. Public Health Nutr 2002; 5: 183-9.
27. Lembo G, Morisco C, Lanni F, Barbato E, Vecchione C, Fratta L, et al. Systemic hypertension and coronary artery disease: the link. Am J Cardiol 1998; 82: 2H-7H.
28. Chan SC, Chandramani T, Chen TY, Chong KN, Harbaksh S, Lee TW, et al. Audit of hypertension in general practice. Med J Malaysia 2005; 60: 475-82.
29. Aekplakorn W, Abbott-Klafter J, Premgamone A, Dhanamun B, Chaikittiporn C, Chongsuvivatwong V, et al. Prevalence and management of diabetes and associated risk factors by regions of Thailand: Third National Health Examination Survey 2004. Diabetes Care 2007; 30: 2007-12.
30. Bunnag P, Plengvidhya N, Deerochanawong C, Suwanwalaikorn S, Kosachunhanun N, Benjasuratwong Y, et al. Thailand diabetes registry project: prevalence of hypertension, treatment and control of blood pressure in hypertensive adults with type 2 diabetes. J Med Assoc Thai 2006; 89 (Suppl 1): S72-7.
31. Borghi C, Dormi A, D'Addato S, Gaddi A, Ambrosioni E. Trends in blood pressure control and antihypertensive treatment in clinical practice: the Brisighella Heart Study. J Hypertens 2004; 22: 1707-16.
32. Bloom BS. Continuation of initial antihypertensive medication after 1 year of therapy. Clin Ther 1998; 20: 671-81.
33. Conlin PR, Gerth WC, Fox J, Roehm JB, Boccuzzi SJ. Four-Year persistence patterns among patients initiating therapy with the angiotensin II receptor antagonist losartan versus other artihypertensive drug classes. Clin Ther 2001; 23: 1999-2010.
34. Hasford J, Mimran A, Simons WR. A population-based European cohort study of persistence in newly diagnosed hypertensive patients. J Hum Hypertens 2002; 16: 569-75.
35. Lawes CM, Rodgers A, Bennett DA, Parag V, Suh I, Ueshima H, et al. Blood pressure and cardiovascular disease in the Asia Pacific region. J Hypertens 2003; 21: 707-16.
36. Law MR, Frost CD, Wald NJ. By how much does dietary salt reduction lower blood pressure? III—Analysis of data from trials of salt reduction. BMJ 1991; 302: 819-24.
37. Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. DASH-Sodium Collaborative Research Group. N Engl J Med 2001; 344: 3-10.

การตรวจสอบการควบคุมความดันโลหิตสูงในเวชปฏิบัติในประเทศไทย (HABIT)

พีระ บูรณะกิจเจริญ

ได้ทำการสำรวจแบบภาคตัดขวางเพื่อตรวจสอบการควบคุมความดันโลหิต, ปัจจัยเสี่ยง, ภาวะที่เป็นร่วมด้วย และการทำลายอวัยวะในผู้ป่วยไทยที่เป็นความดันโลหิตสูง ทำระหว่างเดือนกุมภาพันธ์ถึงเมษายน พ.ศ. 2550 ได้จำนวนผู้ป่วยนอกที่เป็นฃวามดันโลหิตสูงและได้รับการรักษาเกินกว่า 6 เดือน 1,914 ราย (ชาย: หญิง = 4: 3; อายุเฉลี่ย 61.9 ± 11.7 ปี) สามารถประเมินการควบคุมความดันโลหิตได้ในผู้ป่วย 1,807 ราย (ความดันโลหิตเฉลี่ย 140.45 ± 19.99/77.84 ± 12.51 มม. ปรอท) พบความดันโลหิตควบคุมได้ถึงเป้าหมาย (< 140 มม. ปรอท) ร้อยละ 51 หากประเมินความดันโลหิตเป้าหมายในผู้ป่วยเบาหวานที่ < 130/80 มม. ปรอท จะสามารถควบคุมความดันโลหิตได้ถึงเป้าหมายร้อยละ 44 ปัจจัยเสี่ยงและภาวะที่เป็นร่วมด้วยที่พบบ่อยคือ ภาวะโคเลสเตอรอลสูงในเลือด (ร้อยละ 66) โรคอ้วนลงพุง (ร้อยละ 36) โรคเบาหวาน (ร้อยละ 32) พบการรักษาด้วยยาลดความดันโลหิตชนิดเดียวร้อยละ 26, ยา 2 ชนิด ร้อยละ 44 และยาตั้งแต่ 3 ชนิดขึ้นไปร้อยละ 29 มีการใช้ยาต้านแคลเซียม ร้อยละ 49, ยาขับปัสสาวะร้อยละ 45, ยาต้านเบต้ารีเซพเตอร์ร้อยละ 44 และยาต้านเอ็นไซม์แองจิโอเทนซิน คอนเวอร์เตอร์ ร้อยละ 38, 3 ใน 4 ของแพทย์ทราบระดับความดันโลหิตเป้าหมายของผู้ป่วยตามข้อแนะนำ ในการรักษาความดันโลหิตสูงล่าสุด โดยสรุป สามารถลดความดันโลหิตได้ถึงเป้าหมายในปี พ.ศ. 2550 ดีกว่าในปี พ.ศ. 2546 (ร้อยละ 51 ต่อร้อยละ 44) ปัจจัยเสี่ยงที่พบบ่อยที่สุดที่ต้องมีการรณรงค์เป็นอันดับแรกๆ คือ ภาวะโคเลสเตอรอลสูงในเลือดและโรคอ้วนลงพุง