

ORIGINAL PAPER

Target blood pressure and control status in Asia

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Abstract

It is widely accepted that hypertension constitutes a significant cardiovascular risk factor and that treating high blood pressure (BP) effectively reduces cardiovascular risk. An important issue in Asia is not just the high prevalence of hypertension, particularly in some countries, but also the low level of awareness and treatment rates in many

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regions. The 2017 update of the American College of Cardiology/American Heart Association hypertension guidelines raised the question about which BP threshold should be used to diagnose and treat hypertension. Although there is a theoretical rationale for a stricter BP criterion in Asia given the ethnic-specific features of hypertension in the region, the majority of countries in Asia have retained a diagnostic BP threshold of $\geq 140/90$ mm Hg. Although lowering thresholds might make theoretical sense, this would increase the prevalence of hypertension and also markedly reduce BP control rates. In addition, there are currently no data from robust randomized clinical trials of the benefits of the lower targets in preventing cardiovascular disease and reducing cardiovascular risk, particularly in high-risk patients and especially for Asian populations. There is also no defined home BP treatment target level for an office BP treatment target of 130/80 mm Hg. However, in this regard, in the interim, lifestyle modifications, including reducing body weight and salt intake, should form an important part of hypertension management strategies in Asia, while studies on treating at lower BP threshold level in Asians and getting to lower BP targets will be helpful to inform and optimize the management of hypertension in the region.

1 | BACKGROUND

Elevated blood pressure (BP) has been irrefutably shown to be associated with cardiovascular mortality and morbidity. Furthermore, there is definitive evidence to show that treatment of elevated BP is highly effective. The big challenge now is to identify and define the BP threshold at which clinically relevant hypertension should be diagnosed and BP targets during treatment.

For the past quarter of a century, the diagnosis of hypertension in adults has been based on systolic BP (SBP) ≥ 140 mm Hg and/or diastolic BP (DBP) ≥ 90 mm Hg. These thresholds were chosen arbitrarily and have been in use since 1993 when the new classification of hypertension was introduced by the Fifth Joint National Committee on the Detection, Evaluation and Treatment of High Blood Pressure (JNC5).¹ This report changed the way hypertension was diagnosed, moving from a diagnosis based on DBP in earlier JNC reports, to one based on both SBP and DBP.^{1,2}

The JNC committee was recently replaced by a team of several medical societies led by the American College of Cardiology (ACC) and the American Heart Association (AHA). In November 2017, these organizations introduced another change in the threshold for diagnosing hypertension and the treatment target, reducing it by 10 mm Hg to a BP of $\geq 130/80$ mm Hg.³ This new lower BP threshold has caused a lot of ongoing debate, not only in the United States but also throughout the world.⁴⁻⁶

2 | RECOMMENDED DIAGNOSTIC BP THRESHOLD AND TARGET BP IN ASIA

After the publication of the ACC/AHA guidelines, many countries reviewed and updated their own national guidelines. The European

guidelines,⁷ released in August 2018, retained a diagnostic BP threshold of $\geq 140/90$ mm Hg, as did almost all countries/regions in Asia. Thus, although BP thresholds for the diagnosis of hypertension are relatively consistent across Asia (Table 1), some countries/regions recommend a lower threshold for defining BP control ($< 130/80$ mm Hg), consistent with the European and US guidelines.^{3,7} In contrast to the US guidelines, which recommend the same BP target for all patients with hypertension, regardless of comorbidities, many Asian countries/regions recommend different target BP depending on the comorbidity and risk profile. In addition, there is variation between countries/regions in the target recommendations for patients with the same comorbidity (Table 1).

3 | BP CONTROL STATUS IN ASIA

An important issue in Asia is not just the high prevalence of hypertension, particularly in some countries/regions, but also the low level of awareness and treatment rates in many regions, as previously reported (Table 2).⁸ A study done by the HOPE Asia Network was the first to investigate current home BP control status in eleven different Asian countries/regions using standardized home BP measurements taken with the same validated home BP monitoring device with data memory.⁹ The results showed that BP control based on office BP of $< 140/90$ mm Hg and a home BP of $< 135/85$ mm Hg can be achieved by a relatively high proportion of specialist centers in Asia.¹⁰ However, there was extremely wide variation between control rates achieved in different regions, from 70% in Taiwan to only 5.5% in Pakistan. Furthermore, the effect of lowering diagnostic and therapeutic thresholds to levels recommended in the 2017 ACC/AHA guidelines differed by country/region (Tables 3 and 4).

TABLE 1 Current recommendations for diagnostic and target blood pressure thresholds in Asian countries

	Diagnostic threshold (mm Hg)	BP control target (mm Hg)		CKD	CAD	CVA	Elderly	Control rate (%)
		General	DM					
Malaysia (2018) ²⁸	≥140/90	<140/90	<130/80	<140/90 if proteinuria <1 g/24 h <130/80 if >1 g/24 h <130/80 if eGFR >20 mL/min	<130/80	<140/90 for 2° pr <130/80 for 2° pr of lacunar stroke	65-80 y: SBP <140 (<130 if fit) >80 y: SBP <150	26.3
China (2018) ²⁹	≥140/90	<140/90 <130/80 if tolerated					65-79 y: <150/90 (<140/90 if tolerated) ≥80 y: <150/90	16.8
India (2013) ³⁰	≥140/90	<140/90	<140/80	<140/80		<135/85	55-79 y: <140/80 ≥80 y: 140-145	20.2
Singapore (2018) ³¹	≥140/90	<140/90	<140/80	<130/80			<80 y: <140/90 >80 y: <150/90	69.1
Indonesia (2019) ³²	≥140/90	≤130/70-79 if tolerated (not <120)	≤130/70-79	<140/70-79 (130 if tolerated)	≤130/70-79 if tolerated (not <120)	≤130 if tolerated (not <120)	65-79 y: 130-139/70-79 if tolerated >80 y 130-139/70-79 if tolerated	NA
Japan (2019) ³³	≥140/90	<130/80	<130/80	<130/80 if proteinuria +ve ^a (age <75 y) <140/90 if proteinuria -ve (age >75 y)	Not mentioned	<130/80 (age <75 y) <140/90 (age >75 y)		36.9
Korea (2018) ³⁴	≥140/90	<140/90 <130/80 can be considered if risk >15%	<140/85 <130/80 (pts with CVD)	<140/90 if albuminuria -ve <130/80 if albuminuria +ve	<130/80 can be considered if age >50 y	<130/80 can be considered if age >50 y	<140/90	69.3
Pakistan (2018) ³⁵	≥140/90	1° <140/90 2° <130/80					65-79 y: <140/90 >80 y: <150/90 <140/90	5.5 ²⁸ 20%
Philippines (2013) ³⁶	≥140/90	<140/90						
Taiwan (2015) ³⁷	≥140/90	OBP: <140/90 UAOBP: <140/90 (1° pr)	OBP: <130/80 UAOBP: <130/80 (2° pr)	OBP: <140/90 (or <130/80 if proteinuria +ve) UAOBP: <120/NA (2° pr)	OBP: <130/80 UAOBP: <140/90 (2° pr)	OBP: <140/90 UAOBP: <140/90 (2° pr)	<75 y: <120/NA ≥75 y: <140/90	70.1% ²⁹
Thailand (2015) ³⁸	≥140/90	18-65 y: 120-130/70-79 >65 y: 130-139/70-79	18-65 y: 120-130/70-79 >65 y: 130-139/70-79	18-65 y: 120-130/70-79 >65 y: 130-139/70-79	18-65 y: 120-130/70-79 >65 y: 130-139/70-79	18-65 y: 120-130/70-79 >65 y: 130-139/70-79	>65 y: 130-139/70-79	29.7 ³⁰
Vietnam (2018) ³⁹	≥140/90	<140/90 <130/80 can be considered						36.3 (62.3 from MMM17)

Abbreviations: +ve, positive; -ve, negative; 1°, primary; 2°, secondary; BP, blood pressure; CAD, coronary artery disease; CKD, chronic kidney disease; DM, diabetes mellitus; eGFR, estimated glomerular filtration rate; h, hours; MMM17, May Measurement Month 2017; NA, not applicable; OBP, office blood pressure; pr, prevention; UAOPB, unattended out-of-office blood pressure; y, years.

^aProteinuria defined as urinary protein ≥15 g per gram of creatinine.

TABLE 2 Prevalence, awareness, treatment, and control of hypertension by country/region in Asia (reproduced with permission from Chia et al⁸)

Country ^{source}	Prevalence, %	Awareness, %	Treated, %	Controlled, %
China ⁴⁰	25.2	46.5	41.1	13.8
Hong Kong ⁴¹	31.6	46.2	69.7	25.8
India ⁴²		25.1 (rural)	24.9 (rural)	10.7 (rural)
		41.9 (urban)	37.6 (urban)	20.2 (urban)
Indonesia ⁴³	26.5	35.8	NR	NR
Japan ³³		60.0 (M)	52.8 (M)	31.7 (M)
		45.0 (F)	52.8 (F)	42.0 (F)
Korea ³⁴		32.9 (M)	51.7 (M)	36.9 (M)
		23.7 (F)	71.3 (F)	49.4 (F)
Malaysia ^{44,45}	30.3	43.2	81.2	26.3
Pakistan ³⁵	50.3	29.6	18	5.5
Philippines ³⁶	28.0	67.8	75	27
Singapore ³¹	23.5	73.7	NR	69.1
Taiwan ^a	20.8	72.1	89.4	70.2
Thailand ^b	24.7	55.3	49.2	60.4

Abbreviations: F, female; M, male; NR, not reported.

^aNational Health and Nutrition Examination Survey, 2013-2016, unpublished data.

^bNational Health Examination Survey, 2014-2015, unpublished data.

4 | IMPLICATIONS

Adopting a lower BP threshold will mean a higher prevalence of hypertension and even worse control rates of hypertension in much of Asia. While the debate on the threshold and treatment target is still ongoing, several Asia-specific hypertension features have to be considered. Some of these features can be summarized as follows. Stroke is a more common complication of hypertension than coronary artery disease in many Asian countries/regions.¹¹ The association between higher SBP and cardiovascular events is steeper in Asians vs Westerners.¹² Asians are likely to develop high BP even in the presence of mild obesity.¹³ Many countries/regions in Asia have a high population intake of salt and show increased salt sensitivity.^{14,15} There are also common hypertension phenotypes in Asia, characterized by morning BP surge, nocturnal hypertension and greater BP variability.¹⁶⁻²¹

Based on all these differences between Asians and Caucasians, is there any merit in recommending and adopting the lower BP threshold for diagnosis and treatment target in Asia? Although the cardiovascular risk profile of Asian patients with hypertension means that it makes theoretical sense to lower diagnostic and therapeutic BP thresholds, there are currently no data from robust randomized clinical trials for the benefits of the lower targets in preventing cardiovascular disease (CVD) and reducing cardiovascular risk, particularly in high-risk patients and especially not in Asian populations.⁵ This was the rationale cited by a number of Asian countries for leaving current guidelines unchanged for the time being. There is also concern about lowering the clinic BP treatment target down to 130/80 mm Hg because there is no evidence regarding the equivalent home BP, which could result in some well-controlled patients being undertreated.

Singapore clinicians became uncertain about what was the correct thing to do after release of the 2017 ACC/AHA guidelines,³ both about the diagnostic threshold ($\geq 140/90$ or $\geq 130/80$ mm Hg) and about whether to lower BP to $<140/90$ or $<130/80$ mm Hg for specific patient groups. Many clinicians were concerned about lowering BP to $<130/80$ mm Hg, especially in elderly patients with low DBP. In Japan, the results of a survey of Nikkei Online physician members in August 2018 showed that 58% thought the treatment target for adults without complications should remain at $<140/90$ mm Hg while 32% thought that it should be changed to $<130/80$ mm Hg.²²

Overall, Asian experts from the HOPE Asia Network refer to the step-by-step approach to BP lowering and targets recommended by an Asian consensus²³ as the current best approach in the region. The three-step approach is to lower morning home SBP to 145 mm Hg (first step) then to 130 mm Hg (second step) and to 125 mm Hg (third step). This is consistent with Asian data from the Japan Morning Surge-Home Blood Pressure (J-HOP) and Home blood pressure measurement with Olmesartan Naive patients to Establish Standard Target blood pressure (HONEST) studies indicating that morning home BP should be controlled to at least <145 mm Hg to reduce the risk of cardiovascular events²⁴⁻²⁷ and that achieving a SBP <125 mm Hg should reduce the CVD event rate even further.

5 | CONCLUSIONS

Hypertension awareness and control is poor in most Asian countries/regions, even when defined using the higher BP threshold of $\geq 140/90$ mm Hg. While treating BP at lower levels and getting to lower targets may be beneficial to many Asian patients, who are at higher cardiovascular risk compared with Caucasians, there is still

TABLE 3 Hypertension diagnosis and control rates using conventional and strict (ACC/AHA 2017) thresholds (data from the AsiaBP@Home study)

Rate (% patients)	Well-controlled		Sustained (uncontrolled)		White coat (uncontrolled)		Masked (uncontrolled)	
	<140/90 mm Hg	<130/80 mm Hg	<140/90 mm Hg	<130/80 mm Hg	<140/90 mm Hg	<130/80 mm Hg	<140/90 mm Hg	<130/80 mm Hg
China	35	19	29	50	24	22	12	9
India	52	36	13	37	28	25	7	2
Indonesia	23	10	54	71	13	16	9	3
Japan	64	39	9	10	20	39	7	27
Korea	54	30	14	31	22	32	11	7
Malaysia	37	18	15	33	42	45	6	4
Pakistan	55	38	17	30	17	20	10	12
Philippines	62	37	13	27	18	31	8	6
Singapore	30	13	34	57	28	29	7	1
Taiwan	52	35	12	33	21	21	15	11
Thailand	61	28	10	26	17	37	12	9

Abbreviations: ACC, American College of Cardiology; AHA, American Heart Association.

TABLE 4 Proportion of patients with well-controlled clinic and morning systolic blood pressure using conventional and strict (ACC/AHA 2017) thresholds (data from the AsiaBP@Home study)

Control rate (% patients)	Conventional threshold		ACC/AHA 2017 threshold	
	Clinic SBP	Morning home SBP	Clinic SBP	Morning home SBP
China	47	59	28	41
India	59	79	38	62
Indonesia	32	36	13	26
Japan	71	84	49	66
Korea	65	75	37	62
Malaysia	43	79	22	63
Pakistan	65	72	49	58
Philippines	69	79	43	67
Singapore	37	59	14	42
Taiwan	67	73	46	56
Thailand	64	82	33	70

Abbreviations: ACC, American College of Cardiology; AHA, American Heart Association; SBP, systolic blood pressure.

a lot that can be done without the use of medication. Increasing awareness of elevated BP, reducing obesity, and salt intake is far more important than debating over whether BP should be lowered to <130/80 mm Hg when even getting to a BP of <140/90 mm Hg is currently only achieved in very few treated individuals. Once a BP of <140/90 mm Hg is achieved then fine tuning can be done to try and achieve the lower target of <130/80 mm Hg, if this is tolerated and done safely. In addition, strategies and targets should be based on the risk profile of each individual patient. Furthermore, studies on treating at lower BP threshold level in Asians and getting to lower BP targets will be very useful for informing and optimizing the management of hypertension in the region.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

YC Chia and Kazoumi K conceptualized the topic of this manuscript. YC Chia contributed the contents and wrote the entire manuscript. All other authors read, edited, and approved the manuscript.

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