Hypertension phenotypes in rural part of East Indonesia: the TENSI pilot study

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Abstract

Background: Though extensively studied in other Asian countries, office and home blood pressure (BP)-based hypertension determination and phenotypes in rural population are still scarcely investigated in Indonesia. We aim to elaborate this in an East Indonesia rural area, by implementing two available BP thresholds.

Material and methods: The Ternate Sehat Indonesia (TENSI) pilot study obtained demographic, anthropometric, biochemistry, office and home BP data from 146 residents aged ≥ 18 years old living in Ternate Island from July–August 2022. Hypertension and its phenotypes were defined in accordance with the 2019 Indonesian Society of Hypertension (InaSH) and the 2017 American College of Cardiology/American Heart Association (ACC/AHA) BP guidelines. Office and home BP differences were analyzed within each participant's characteristics.

Results: Mean mm Hg ± SD office and home (i) systolic BP were 121.8 ± 17.9 and 117.8 ± 14.8 mm Hg ($p < 0.001$), (ii) diastolic BP were 77.9 ± 12.1 and 74.7 ± 8.9 mm Hg ($p < 0.001$). Hypertension was evident in 26% (InaSH) and 34.2% (ACC/AHA) participants. Moreover, 17.4% (InaSH) and 24.8% (ACC/AHA) of those self-reported to not having hypertension were found to be hypertensives. The proportion of sustained, white-coat, and masked hypertension were 7.5%, 9.6%, 8.9% (InaSH), and 8.2%, 21.2%, 4.8% (ACC/AHA). Compared to office BP, home BP significantly differed throughout more characteristics.

Conclusions: Our study has ascertained the actual hypertension status and phenotypes within a rural East Indonesia environment. The revelation of stronger home BP ability to detect BP differences may promote its application within the population in the future.

Key words: blood pressure; office; home; hypertension; phenotypes

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Introduction

Hypertension is a commonly known major risk factor for cardiovascular disease, a dreadful scourge responsible for many preventable mortality and morbidity worldwide [1]. Almost a third of global adult residents are hypertensives [2]. Despite advancement in blood pressure (BP) monitoring technology and ubiquitous distribution of antihypertensives, low and middle income Asian countries continue to exhibit worrisome prospect of increased prevalence of hypertension [3]. Indonesia, a developing, low-to-middle income country in South East Asia, is one populous nation that contributes greatly to the global burden of hypertension due to low treatment rate (less than 25%

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and 20% for women and men, respectively) as well as low control rate (5%) [4, 5]. With the latest national hypertension prevalence being 34.1% in 2018, early detection and management is of utmost importance for epidemic control, particularly in rural area, where hypertension is more prevalent than in its urban counterpart [6, 7]. Since discovered to have stronger mortality predictive value than office BP (OBP) in the Ohasama study [8], home blood pressure (HBP) measurement has been widely applied and included in the guidelines for hypertension management in major Asian countries [9–12]. Furthermore, the identification of important hypertension phenotypes, e.g., masked (normal OBP with elevated HBP), white-coat- (elevated OBP with normal HBP), and sustained hypertension (elevated OBP and HBP), all increase the risk of cardiovascular event and/or death, have been made possible with HBP measurement [13–16]. Unfortunately, albeit the existence of a generous body of literature on HBP measurement and hypertension phenotypes among urban and rural Asian population [17–19], analogous effort on rural Indonesian population is scarce [12–20]. We aim to investigate the measured hypertension status through OBP and HBP measurement, implementing the currently used 2019 Indonesian Society of Hypertension threshold (InaSH) and the 2017 American College of Cardiology/American Heart Association (ACC/AHA) BP threshold [21, 22, 25], and to examine the presence and attributes of masked, white-coat, and sustained hypertension among residents living in a remote island in North Maluku, Indonesia.

Material and methods

Study design

The Ternate Sehat Indonesia (TENSI, or Healthy Ternate Indonesia) is a pilot public health effort focusing on the identification of risk factors for elevated BP in Ternate, an island populated by 205,870 inhabitants in North Maluku, East Indonesia [23]. Kalumata Primary Health Care Center, the health care facility with the largest area coverage (36.3%), was selected as the initial site. Invitation to study participation was broadcasted through local radio station and public posters one month prior to commencement. Willing participants were counseled on research protocol. Residents aged ≥ 18 years old, not pregnant, and able to provide written consents were included in the study. The study was conducted in accordance with the Declaration of Helsinki Ethical Principles and Good Clinical Practices. Finally, the Institutional Review Board of Khairun University, Ternate, approved the study protocol.

Office-based data collection

Information on age, sex, length of education, self-reported history of hypertension and diabetes, smoking status, waist circumference (WC), waist-to-hip ratio (WHR), body mass index (BMI), and fasting plasma glucose (FPG) were obtained as apprised by standardized WHO STEPwise Approach to Chronic Disease Risk Factor Surveillance (STEPS) Instrument [24]. Local languages were used in communicating with non-Indonesian speaking indigenous people. Age was categorized as young adult (< 44 years old) and middle-aged to elderly (≥ 44 years old). Hypertension and diabetes history were based on the participants' personal recall of previous diagnoses and/or current medication status. Smoking was dichotomized as current and never/past smokers. OBP was measured in conformity with the 2019 InaSH consensus, using the Indonesian Ministry of Health-approved oscillometric BP device (Sinocare BA-801; AKL 20051124995; Sinocare Healthcare Indonesia) [25]. The final OBP value was the average of two measurements. WC was measured at the level between the lower ribs and the iliac crest. WHR was defined as WC divided by hip circumference, measured by the largest part of the gluteal area. BMI, calculated as body weight in kilogram divided by height in meter squared, was categorized as overweight/obese (≥ 23) and normal/underweight (< 23), in line with the WHO BMI cut-off point for Asian population [26].

Home-based data collection

Using identical device, participants were instructed to self-measure their HBP in accordance with the 2019 InaSH consensus [25]. Two morning BP (1-minute interval between readings) were measured in sitting position after 2 minutes of rest, within 1 hour after waking up, after urination, prior to dosing and breakfast, while two evening BP (1-minute interval between readings) were measured before retiring, in sitting position after 2 minutes of rest, for four days. All values were recorded in a provided diary, and the averages of these were taken as the final HBP value. Daily morning-and-evening reminders were made by the research investigators in regular time unique to each participant's schedule

to ensure BP measurement compliance. FPG serum (mg/dL) was measured once after an 8-hours no calorie intake overnight, using the Indonesian Ministry of Health-approved glucometer device (Sinocare Safe-Accu 2; AKL 20101027017; Sinocare Healthcare Indonesia).

Hypertension and its phenotypes definition

Most BP guidelines established in Asian countries, e.g., Japan, Korea, and China, define adult hypertension as (i) office systolic BP (SBP) ≥ 140 mm Hg and/or diastolic BP (DBP) ≥ 90 mm Hg, or (ii) home SBP ≥ 135 mm Hg and/or DBP ≥ 85 mm Hg [10–12, 21]. Subsequent to the introduction of the 2017 ACC/AHA guideline, the following cut-off values were introduced: office/home SBP ≥ 130 mm Hg and/or DBP ≥ 80 mm Hg [9, 22]. Whilst Indonesia adopted the former threshold as its national BP guideline, the authors decided to define hypertension in this study according to both thresholds since no Indonesian clinical trials were included in their development.

Vis-à-vis with the aforementioned scientific differences, (i) white-coat hypertension is defined as office SBP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg, with home SBP < 135 mm Hg and DBP < 85 mm Hg (InaSH), or office SBP ≥ 130 mm Hg and/or DBP ≥ 80 mm Hg, with home SBP < 130 mm Hg and DBP < 80 mm Hg (ACC/AHA), (ii) masked hypertension is defined as office SBP <140 mm Hg and DBP <90 mm Hg, with home SBP ≥ 135 mm Hg and/or DBP ≥ 85 mm Hg (InaSH), or office SBP < 130 mm Hg and DBP < 80 mm Hg, with home SBP ≥ 130 mm Hg and/or DBP ≥ 80 mm Hg (ACC/AHA) (iii) sustained hypertension is defined as office SBP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg, with home SBP ≥ 135 mm Hg and/or DBP ≥ 85 mm Hg (InaSH), or office SBP ≥ 130 mm Hg and/or DBP ≥ 80 mm Hg, with home SBP ≥ 130 mm Hg and/or DBP ≥ 80 mm Hg (ACC/AHA) [22, 25].

Statistical analyses

Continuous variables were presented as mean ± standard deviation or median (interquartile range), and categorical variables as n (proportion) as suitable. Group differences in mean or median were tested using Student's t- or Mann-Whitney U-test (2 groups) and one way-analysis of variance or Kruskal-Wallis tests (> 2 groups), and in proportions using X^2 or Fisher's Exact test. Post hoc analysis between groups was performed by Tukey or Bonferroni tests, as appropriate. All analyses were carried out using SPSS Version 25 software (IBM SPSS). A two-tailed p-value of < 0.05 is accounted as statistically significant.

Results

From July to August 2022, a total of 165 participants were registered. After excluding those who were pregnant (n = 9) and presented inadequate home BP data (n = 10), 146 participants (88.5%) were finally included into the study.

Basic characteristics of the study subjects

Table 1 presents the basic characteristics of the study subjects and measured hypertension status by self-reported hypertension history. Compared to patients without known hypertension, those with self-reported hypertension history were significantly older, more of male dominance, less educated, more diabetic, exhibited larger WC, bigger WHR, displayed higher FPG and more elevated office and home SBP and DBP. Simultaneous OBP and HBP measurement revealed 68% and 80% participants in the hypertension history group, and 17.4% and 24.8% in the non-hypertension history group, to be actually hypertensive, as per the InaSH and ACC/AHA guidelines, respectively.

Office and home SBP and DBP differences within groups of variables

Table 2 shows the office and home SBP differences in each variable. Compared to their counterparts, office SBPs were significantly more elevated in those aged ≥ 44 years old, with self-reported hypertension history, BMI ≥ 23 and FPG > 100 mg/dL. These are further augmented by home SBPs, which apart from having the aforementioned findings, were also significantly higher in male, less educated, and with self-proclaimed diabetes history. Similar pattern were observed in DBP, with lesser statistical significance of difference displayed by the sex group in home DBP (Tab. 3).

Proportion and characteristics of each hypertension phenotypes

The proportion of normal office SBPs were 87.7% (InaSH) and 72.6% (ACC/AHA), while that of normal home BPs were 89.7% (InaSH) and 87% (ACC/AHA). Figure 1 demonstrates the SBP-based distribution of sustained, white-coat and masked hypertension of study subjects as follows: 6.2%, 6.2%, 4.1% (InaSH) and 8.2%, 19.2%, 4.8% (ACC/AHA). When considering both SBP and DBP, these proportions, as in order previously stated, change into 7.5%, 9.6%, 8.9% (InaSH), and 8.2%, 21.2%, 4.8% (ACC/AHA).

The characteristic differences across hypertension phenotypes based on the InaSH guideline are pre-

Table 1. Basic characteristics and actual hypertension prevalence of the study population by hypertension history (n = 146)

Variables	All (n = 146)	HT history (n = 25)	No HT history (n = 121)	p
Demographics				
Age (years)	34.9 ± 15.9	51.2 ± 14.6	31.5 ± 14	< 0.001
Female, n (%)	106 (72.6)	14 (56)	92 (76)	0.04
Education (years)	12.1 ± 3	10.9 ± 3.6	12.3 ± 2.8	0.03
Risk factors				
Smoking, n (%)	27 (18.5)	4 (16)	23 (19)	0.99
Diabetes, n (%)	17 (11.6)	7 (28)	10 (8.3)	0.01
Anthropometric indices				
Waist circumference [cm]	85.2 ± 13	93.7 ± 12.8	83.4 ± 12.4	< 0.001
Waist-to-hip ratio	0.9 ± 0.1	0.9 ± 0.1	0.8 ± 0.1	0.01
Body mass index	25.4 ± 5.4	27 ± 4.8	25 ± 5.4	0.09
FPG [mg/dL]	102.2 ± 43.3	119.7 ± 53.4	98.8 ± 40.5	0.04
Systolic blood pressure [mm Hg]				
Office	121.8 ± 17.9	141 ± 22.4	117.8 ± 13.9	< 0.001
Home	117.8 ± 14.8	135.1 ± 15.8	114.2 ± 11.8	< 0.001
Diastolic blood pressure [mm Hg]				
Office	77.9 ± 12.1	90.8 ± 15.2	75.2 ± 9.6	0.001
Home	74.7 ± 8.9	82.6 ± 11.8	73 ± 7.3	< 0.001
Actual HT prevalence, n (%)				
InaSH, n (%)	38 (26)	17 (68)	21 (17.4)	< 0.001
ACC/AHA, n (%)	50 (34.2)	20 (80)	30 (24.8)	< 0.001

FPG — fasting plasma glucose; HT — hypertension; InaSH — the 2019 Indonesian Society of Hypertension guidelines; ACC/AHA — the 2017 American College of Cardiology/American Heart Association guidelines. Values are expressed as mean ± standard deviation (SD) unless otherwise stated

sented in Table 4. As opposed to the normotensive, the sustained and masked hypertension groups were significantly older, more of male dominance, less educated, more diabetic, larger WC, WHR, BMI and FPG. Quasi-analogous pattern was identified within hypertension phenotypes based on the ACC/AHA threshold (Tab. 5).

Discussion

The TENSI study was a pilot effort to determine the measured hypertension status and phenotypes, based on two available BP guidelines, in Ternate Island through the application of OBP and HBP measurements. Interestingly, among participants who self-reported to not having any hypertension history, 17.4% (InaSH) and 24.8% (ACC/AHA) were actually hypertensives. These "concealed" hypertensives were further found to be evident in each phenotype: 64.3%, 76.9%, 18.2% (InaSH) and 77.4%, 57.1%, 16.7% (ACC/AHA) within the white-coat, masked, and sustained hypertension groups, respectively. This discrepancy between self-reported and measured hypertension status, as elaborated by Sohn and Gonçalves et al., could be explained by disparities in regional, socioeconomic, religious, and cultural perspectives [27, 28], warranting a more rigorous BP monitoring, health education, and evaluation of related risk factors in general population.

In each study variables, OBP and, to a stronger degree, HBP value were significantly higher in participants who were middle aged-to elderly, male, less educated, with self-reported hypertension and diabetes history, higher WC, BMI, WHR, and FPG. Synchronous results were presented by these preceding studies: Kawabe et al., Wang et al., and Cacciolati et al. previously confirmed the higher prevalence of masked hypertension in older and male subjects in Japan, US, and France, respectively [29–31]. Educational factor, e.g., years of schooling and academic degrees attained, were proven by Liu et al. and Sun et al. to be inversely associated with BP [32, 33], most likely related to personal awareness and healthy lifestyle [34]. Diabetes and insulin resistance, through means of recently uncovered mech-

Table 2. Office and home systolic blood pressure (SBP) differences within each characteristics

Variables	Group	Office SBP [mm Hg]		Home SBP [mm Hg]	
		Mean ± SD	p	Mean ± SD	p
Sex	Female	120.4 ± 17.3	0.13	115.7 ± 14.3	0.01
	Male	125.5 ± 19		123.3 ± 14.7	
Age	<44	117.7 ± 13.7	< 0.001	113.5 ± 11.2	< 0.001
	≥44	131.1 ± 22.4		127.3 ± 17.4	
Education years	≤12	122.9 ± 19	0.2	119.8 ± 15.6	0.001
	>12	118.7 ± 14.3		112.3 ± 10.6	
Smoking status	Yes	122.1 ± 14	0.9	120.9 ± 13.6	0.20
	No	121.7 ± 18.7		117 ± 15	
HT history	Yes	141 ± 22.4	< 0.001	135.1 ± 15.8	< 0.001
	No	117.8 ± 13.9		114.2 ± 11.8	
DM history	Yes	126.7 ± 20.3	0.2	124.9 ± 15.5	0.03
	No	121.2 ± 17.5		116.8 ± 14.5	
Waist circumference	< 85	115.1 ± 13	< 0.001	111.2 ± 10.2	< 0.001
	≥85	128 ± 19.5		123.8 ± 15.9	
Body mass index	< 23	114 ± 10.9	< 0.001	110.7 ± 10.1	<0.001
	≥ 23	126.1± 19.5		121.7 ± 15.6	
Waist-to-hip ratio	< 0.9	118.1 ± 14.9	0.01	112.7 ± 10.4	< 0.001
	≥ 0.9	126.3 ± 20.1		123.9 ± 17	
FPG	≤ 100	120 ± 15.2	0.03	115.8 ± 13.3	0.02
	> 100	127.5 ± 22.5		123.2 ± 16.9	

HT — hypertension; DM — diabetes; FPG — fasting plasma glucose

anisms involving renin-angiotensin-aldosterone system, sympathetic nervous system, cellular processes and gut microbiota, increase the risk of developing hypertension [35]. Asayama et al. found a direct relationship between WC and BMI with incidence of masked and white-coat hypertension [36]. Ahn et al., Kuwabara et al, and Lv et al. discovered a strong independent association of higher FPG with incidence of hypertension [37–39]. In comparison with OBP, as ascertained by Horikawa et al. and Kadowaki et al., HBP exhibited better ability to detect SBP and DBP differences within groups of variables, further emphasizes its role in BP monitoring [40, 41].

Regarding hypertension phenotypes in Indonesia, Turana et al. in the AsiaBP@Home study article reported the following prevalence of white-coat, masked, and sustained hypertension groups: 13%, 9%, 54% (InaSH) and 16%, 3%, 71% (ACC/AHA) [12]. The authors were aware that this prevalence incompatibility might be mainly caused by discrepancies in the study subjects characteristics, where ours consisted of residents in a rural archipelagic area, with peculiar anthropometric, sociocultural, and lifestyle compared to urban people.

Over the last ten years, a number of internationally published hypertension studies on rural Indonesia population were conducted [20, 37–39]. Hussain et al reported a hypertension prevalence of 46.4% among 4,881 rural populations aged ≥ 40 years old recruited from 99 villages in seven East Indonesia provinces [20]. Rahmawati et al. identified a direct relationship between hypertension knowledge and medication adherence in 384 hypertensives participants aged ≥ 45 years old originated from eight villages in Yogyakarta, West Indonesia [42]. Astutik et al. described a hypertension prevalence of 27.8% among 54 women aged ≥ 45 years old living in a rural East Java village, West Indonesia [43]. Widyaningsih et al. reported on missed opportunities in hypertension risk factors screening from 31,554 rural residents aged ≥ 15 years old residing in North Sumatra, East Java, and Central Java provinces, West Indonesia [44]. Our study offered an additional novel perspective on measured hypertension status and its phenotypes in rural Indonesia through the utilization of self-HBP measurement by study participants.

Table 3. Office and home diastolic blood pressure (DBP) differences within each characteristics

Variables	Group	Office DBP [mm Hg]		Home DBP [mm Hg]	
		Mean ± SD	p	Mean ± SD	p
Sex	Female	77.3 ± 11.5	0.37	73.9 ± 7.8	0.08
	Male	79.4 ± 14		76.8 ± 11.2	
Age	< 44	75.9 ± 10.5	0.009	72.9 ± 7.1	0.003
	≥ 44	82.3 ± 14.6		78.6 ± 11.1	
Education years	≤ 12	78.7 ± 12.6	0.15	76 ± 9.2	0.002
	> 12	75.5 ± 11		71 ± 7.1	
Smoking status	Yes	78.9 ± 12.2	0.64	78.7 ± 12	0.06
	No	77.6 ± 12.3		73.8 ± 7.9	
HT history	Yes	90.8 ± 15.2	< 0.001	82.6 ± 11.8	< 0.001
	No	75.2 ± 9.6		73 ± 7.3	
DM history	Yes	81.1 ± 13	0.25	81 ± 10.9	0.002
	No	77.4 ± 12.1		73.8 ± 8.3	
Waist circumference	< 85	74.4 ± 9.5	0.001	72 ± 7	< 0.001
	≥ 85	81 ± 13.5		77.2 ± 9.8	
Body mass index	< 23	73.3 ± 8.6	< 0.001	70.9 ± 6.9	< 0.001
	≥ 23	80.4 ± 13.2		76.7 ± 9.3	
Waist-to-hip ratio	< 0.9	76.2 ± 10.7	0.08	72.8 ± 7.6	0.004
	≥ 0.9	79.8 ± 13.7		77 ± 9.9	
FPG	≤ 100	76.5 ± 10.8	0.009	73.1 ± 8.4	< 0.001
	> 100	82.7 ± 15.3		79.1 ± 8.3	

HT — hypertension; DM — diabetes; FPG — fasting plasma glucose

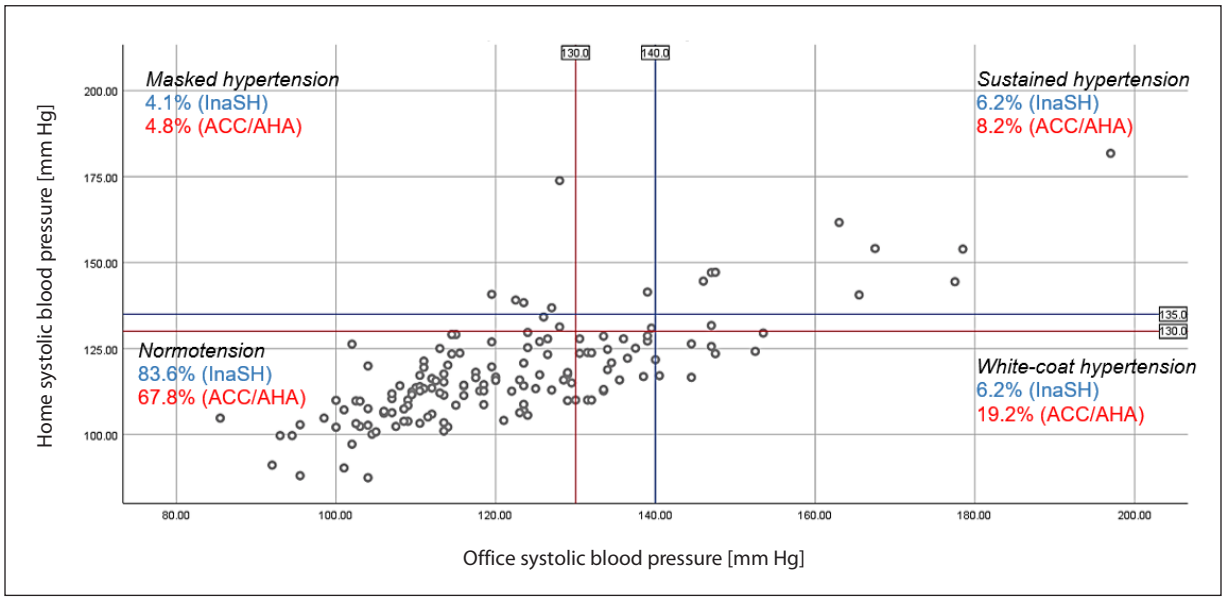

Figure 1. The distribution of hypertension phenotypes status based on office and home systolic blood pressure, categorized according to 2019 Indonesian Society of Hypertension (InASH) and American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA) guidelines

Table 4. Characteristic differences across hypertension subgroups based on the InaSH guideline

Variables	Normotension (n = 108)	White-coat HT (n = 14)	Masked HT (n = 13)	Sustained HT (n = 11)	p
Demographics					
Age (years)	30.1 ± 13.3	42.6 ± 14.8*	49.6 ± 12.8*	54.5 ± 15.5*	< 0.001
Female, n (%)	82 (78.4)	12 (85.7)	7 (53.8)*	5 (45.5)*	0.05
Education (years)	12.6 ± 2.7	11.5 ± 3	±	10.3 ± 14.3*	0.001
Risk factors					
Smoking, n (%)	16 (14.8)	3 (21.4)	6 (46.2)*	2 (18.2)	0.05
Self-reported HT, n (%)	8 (7.4)	5 (35.7)*,†	3 (23.1)*,**	9 (81.8)*,**,†	< 0.001
Self-reported DM, n (%)	10 (9.3)	0 (0)*	4 (30.8)*	3 (27.3)*	0.02
Anthropometric indices					
WC (cm)	82.5 ± 12	89.3 ± 11.7	92.5 ± 15.2*	97.3 ± 11.5*	< 0.001
WHR	0.8 ± 0.1	0.8 ± 0.1**,†	0.9 ± 0.1*,**	1 ± 0.1*,**	< 0.001
BMI	24.4 ± 5.2	26.8 ± 4.2	28.6 ± 4.9*	29.6 ± 5.4*	0.001
FPG >100 mg/dL	17 (17)	4 (28.6)*	8 (66.7)*,**	6 (58)*,**,†	< 0.001
Systolic blood pressure [mm Hg]					
Office	114.9 ± 11.5	140 ± 11*,†	126.4 ± 6.2*,**	160.5 ± 18.9*,**,†	< 0.001
Home	112.1 ± 9.2	121.8 ± 6.2*	134.1± ± 13.6*,**	149.3 ± 14.2*,**	< 0.001
Diastolic blood pressure [mm Hg]					
Office	73.3 ± 8.2	90.8 ± 7.4*,†	80.8 ± 4.7**	103.3 ± 12.4*,**,†	< 0.001
Home	71.5 ±± 6	77.9 ± 5.5*	83.3 ± 5.8	91.1 ± 13.4*,**,†	< 0.001

HT — hypertension; DM — diabetes mellitus; WC — waist circumference; WHR — waist-to-hip ratio; BMI — body mass index; FPG — fasting plasma glucose; p < 0.05 compared with *normotension, **white coat HT and †masked HT. Values are expressed as mean ± standard deviation (SD) unless otherwise stated

Study limitations

Several issues were identified that would potentially compromise the result interpretation. The study concentrated on rural residents of Ternate Island, who bore distinct features compared to those living in other areas in Indonesia and overseas. Having small number of participants, the authors believe that incorporating more health care center and residents would improve representativeness. The recruitment of participants via media advertisements inevitably introduced selection bias, an issue which needs to be addressed by random selection in future studies. Regarding BP device, though officially licensed by the National Health Ministry, Sinocare BA-801 has not yet been validated for international use [45]. This is largely due to limited funding, precluding procurement of internationally approved BP device and reducing data collection period.

Conclusion

This study presented the actual hypertension status of Ternate Island's rural residents, determined by OBP and HBP measurement. By implementing two currently existing BP thresholds, the existence of "concealed" hypertensives and the prevalence of hypertension phenotypes were described. Limited budget, manpower, and sociocultural challenges are but few obstacles in the effort to prevent the increase of hypertension in rural area. Nonetheless, proceeding from this study, the authors aim to build joint actions with stakeholders and fellow researchers in hypertension for a more comprehensive study in the future.

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Conflict of interest

All authors declare no conflict of interest.

Table 5. Characteristics differences across hypertension phenotypes based on the American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA) guidelines

Variables	Normotension (n = 96)	White-coat HT (n = 31)	Masked HT (n = 7)	Sustained HT (n = 12)	p
Demographics					
Age (years)	29.6 ± 12.3	37 ± 14.1*,†	61.7 ± 13.7*,#	55.4 ± 14*,#	< 0.001
Female, n (%)	73 (76)	24 (77.4)	4 (57.1)*,#	5 (41.7)*,#	0.05
Education (years)	12.3 ± 2.7	12.6 ± 3.2	10.1 ± 2.3*	10.2 ± 4.1*	0.03
Risk factors					
Smoking, n (%)	15 (15.6)	7 (22.6)	2 (28.6)	3 (25)	0.5
Self-reported HT, n (%)	5 (5.2)	7 (22.6)*,†	3 (42.9)*,#	10 (83.3)*,#,†	< 0.001
Self-reported DM, n (%)	8 (8.3)	4 (12.9)	2 (28.6)	3 (25)	0.09
Anthropometric indices					
WC [cm]	81.7 ± 12.4	89.2 ± 11.2*	94.3 ± 11*	97.4 ± 11*	< 0.001
WHR	0.88 ± 0.08	0.88 ± 0.06†	0.96 ± 0.05*,#	0.96 ± 0.06*,#	< 0.001
BMI	24.2 ± 5.4	27.2 ± 4.8*	27.3 ± 3.3	29.1 ± 4.7*	0.002
FPG >100 mg/dL	17 (22.9)	9 (31)*	4 (42.9)*	5 (54.5)*	0.03
Systolic blood pressure [mm Hg]					
Office	112.1 ± 9.4	136.1 ± 7.9	124.9 ± 3.2	159.6 ± 18.2*,#,†	< 0.001
Home	111.3 ± 9	120.6 ± 6.2	142 ± 14.4*,#	148.3 ± 13.8*,#	< 0.001
Diastolic blood pressure [mm Hg]					
Office	72.5 ± 7.9	85.9 ± 8.3*,†	74.8 ± 5.9#,†	101.4 ± 13.4*,#,†	< 0.001
Home	71.9 ± 6.9	76.8 ± 6.4*	76.4 ± 5.3	90.3 ± 13.1*,#,†	< 0.001

HT — hypertension; DM — diabetes mellitus; WC — waist circumference; WHR — waist-to-hip ratio; BMI — body mass index; FPG — fasting plasma glucose; p < 0.05 compared with *normotension, #white coat HT and †masked HT. Values are expressed as mean ±_standard deviation (SD) unless otherwise stated

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