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Inter-Arm Blood Pressure Difference in Diabetes Mellitus and Its Preferential Association with Peripheral Artery Disease

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Aim: Inter-arm blood pressure difference (IAD) is known to be associated with a composite of cardiovascular disease (CVD) and with CVD risk factors. However, only limited information is available regarding the contribution of diabetes mellitus to IAD and the association of IAD with individual CVDs, such as coronary artery disease (CAD), stroke, and peripheral artery disease (PAD).

Methods: We addressed these issues in this cross-sectional study of 2580 participants who had simultaneous blood pressure measurements in both arms using an automated device.

Results: Compared with 1,264 nondiabetic subjects, 1316 patients with diabetes mellitus had a greater IAD (P=0.01) and a higher prevalence of IAD of ≥ 10 mmHg (8.4% vs. 5.4%, P=0.002). However, such difference was not significant after the adjustment for potential confounders. Among CAD, stroke, and PAD, only PAD was significantly associated with IAD in a model adjusted for the CVD risk factors. Age was found to modify the association between IAD and PAD, with the association being more prominent in the younger subgroup.

Conclusion: Thus, diabetes mellitus itself was not an independent factor associated with IAD. A larger IAD was preferentially associated with the presence of PAD, and this association was modified by age.

Key words: Inter-arm blood pressure difference, Blood pressure, Diabetes mellitus, Cardiovascular disease

Abbreviations: ABI, ankle–brachial pressure index; ACR, urine albumin to creatinine ratio; BP, blood pressure; CAD, coronary artery disease; CI, confidence interval; CKD, chronic kidney disease; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; HbA1c, glycated hemoglobin; HDL-C, high-density lipoprotein cholesterol; IAD, inter-arm blood pressure difference; IQR, interquartile range; JDS, Japan Diabetes Society; NGSP, National Glycohemoglobin Standardization Program; PAD, peripheral artery disease; TC, total cholesterol; TG, triglycerides

Introduction

Blood pressure (BP) measurements are essential in the diagnosis and management of hypertension. Since some patients have difference in BP between arms[1)], clinical practice guidelines[2, 3)] recommend to measure BP in both upper arms in the initial evaluation. A large inter-arm BP difference (IAD) suggests the presence of peripheral artery disease (PAD) in the upper limbs, such as the subclavian artery[4)].

Recently, IAD has gained much attention, because it has been shown to be an independent predictor of incident cardiovascular disease (CVD)[5)], death from CVD[6)], and all-cause mortality[7)]. Also, research on IAD has been promoted by the development of automated devices which allow us to simulta-

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neously measure BP at the four extremities as well as pulse wave velocity[8]. The presence of IAD is defined as the difference of systolic BP of 10 mmHg or greater[5, 9-12] in recent studies taken through simultaneous BP measurement using an automated device, whereas IAD of 20 mmHg or greater was taken in early studies through BP measurements using mercury BP gauge[13]. The prevalence of IAD varies between reports depending on the definitions of IAD, the methods for IAD determination, and the populations studied[14]. The known factors associated with IAD are similar to coronary risk factors, such as systolic BP, body mass index (BMI), abdominal circumference, and serum lipids[15].

Information is inconsistent regarding the role of diabetes mellitus as a potential factor of a greater IAD. Some studies[9-12] reported the associations of IAD with other clinical variables in patients with diabetes mellitus, but no comparison was done between those with and without diabetes mellitus. Clark *et al.*[16] performed a comparison of IAD between groups with and without diabetes mellitus, reporting a significantly greater IAD in diabetes patients. However, their result was not adjusted for potential confounders. Kimura *et al.*[11] performed a multivariable-adjusted analysis and found no significant contribution of diabetes mellitus to IAD in the Japanese general population. Thus, it is unclear whether or not diabetes mellitus is an independent factor associated with IAD.

In addition, information is limited regarding the association of IAD with individual CVD, namely, coronary artery disease (CAD), stroke, and PAD. The majority of previous cohort studies[16-22] used cardiovascular mortality as the outcome variable. Tomiyama *et al.*[5] reported the association of IAD with incident CAD, stroke, and the composite of the two, but not with PAD. In a cross-sectional study by Clark *et al.*[16], IAD was associated with the presence of PAD, although they did not report the association of IAD with CAD or stroke.

The aims of this study were (1) to evaluate the independent association of diabetes mellitus with IAD using multivariable models and (2) to examine the associations of IAD with CAD, stroke, and PAD, separately.

Methods

Study Design and Population

This was a cross-sectional study using our database including 3,277 consecutive participants of vascular health examinations at the vascular laboratory at Osaka City University Hospital and the Health Promotion Center in Osaka City, Japan, from July 2000 through April 2009. As presented in **Fig. 1**, we excluded subjects from the current analysis if there was lack of relevant information, such as BP (systolic and diastolic) for both arms, ankle–brachial pressure index (ABI), age, sex, smoking status, BMI, fasting plasma glucose, glycated hemoglobin (HbA1c), total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), estimated glomerular filtration rate (eGFR), urine albumin to creatinine ratio (ACR), medications for diabetes mellitus, hypertension, dyslipidemia, and medical history of CAD, stroke, and PAD.

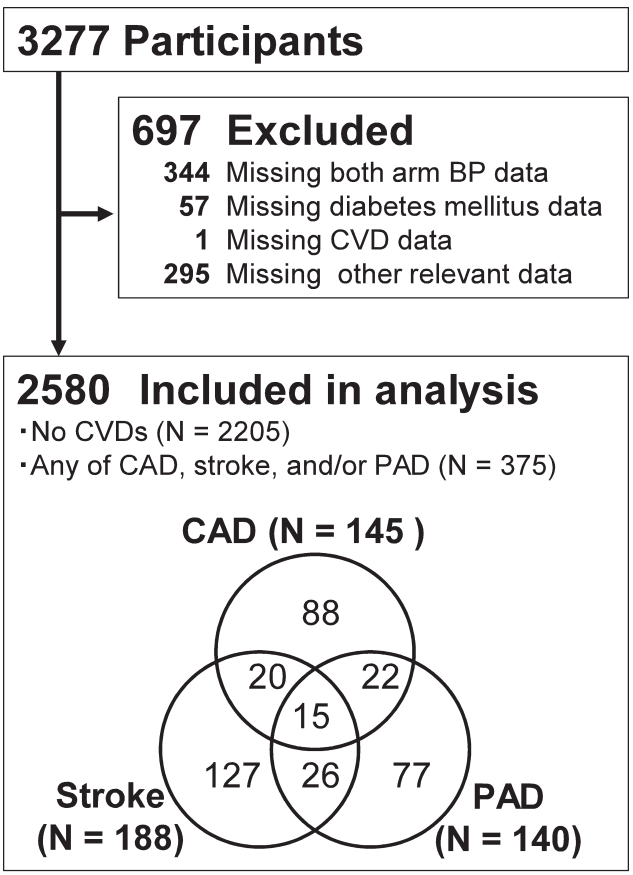

Fig. 1. Selection of study population

Abbreviations: BP, blood pressure; CVD, cardiovascular disease; CAD, coronary artery disease; PAD, peripheral artery disease.

This study was conducted in accordance with the principles of the Declaration of Helsinki and the Ethical Guidelines for Clinical Studies by the Ministry of Health, Labor and Welfare, Japan (the original 2003 version, which was modified in 2004 and 2006). This study protocol was reviewed and approved by the ethics committee at the Osaka City University Graduate School of Medicine (Approval No. 4122). All participants provided written informed consent for the use of their data for research purposes.

Measurement of BP, IAD, and ABI

We simultaneously measured the BP in four extremities, excluding amputated legs (9 right and 7 left legs), in the supine position after at least 5 min bed rest using an oscillometric apparatus (model BP-203RPE, Colin, Komaki City, Japan), as previously described[23-26]. We defined IAD as absolute difference of systolic BPs measured in the right and left arms. ABI was calculated as the ratio of ankle systolic BP to brachial systolic BP (a higher value) for both legs, and the lower ABI value was used in the subsequent analysis.

Definitions of CVDs

Pre-existing CVDs were based on clinical history of each subject as previously described[23, 24]. CAD was diagnosed if the subject had a past history of myocardial infarction, percutaneous coronary intervention, and/or coronary artery bypass grafting. We excluded those complaining of equivocal symptoms without objective findings supporting myocardial ischemia. Stroke was diagnosed if the subject had a past history of symptomatic cerebral infarction and/or cerebral hemorrhage, which had been confirmed by computed tomography and/or magnetic resonance imaging. We excluded those with transient ischemic attack and those complaining of equivocal head and neck symptoms without objective findings supporting stroke. PAD was diagnosed if the subject had a history of percutaneous interventions, bypass grafting, and/or amputation due to limb ischemia. In this study, we didn't consider patients with ABI of less than 0.9 to have PAD if he or she had no treatment history as mentioned above. We took this definition of PAD because we intended to diagnose CAD, stroke, and PAD with comparably stringent criteria and because some patients with PAD history had ABI of 0.9 or higher after successful intervention.

Definition of Diabetes Mellitus

Diabetes mellitus was diagnosed if the subject had fasting plasma glucose of 126 mg/dL or higher, and/or HbA1c of 6.5% or higher, and/or the subject received anti-diabetic medication. The above laboratory values were taken according to the criteria by the Japan Diabetes Society (JDS)[27]. Because our database was created before April 1, 2012, when the JDS changed the standard HbA1c values from HbA1c (JDS) to HbA1c by the National Glycohemoglobin Standardization Program (NGSP), we report here HbA1c (NGSP) values converted using the officially certified conversion equation[28] as follows:

$$\text{HbA1c (NGSP) [\%]} = 1.02 \times \text{HbA1c (JDS)} + 0.25.$$

Definitions of Other Major CVD Risk Factors

We considered hypertension, dyslipidemia, smoking, obesity, and chronic kidney disease (CKD) as other major CVD risk factors. Hypertension was defined if the subject had BP of 140/90 mmHg or higher according to the criteria by the Japanese Society of Hypertension[3], and/or if the subjects were treated with medications for hypertension. Dyslipidemia was diagnosed if the subject had low-density lipoprotein cholesterol (calculated using the Friedewald formula) of 140 mg/dL or higher, TG of 150 mg/dL or higher, and/or HDL-C lower than 40 mg/dL according to the criteria by the Japan Atherosclerosis Society[29], and/or if the subject received lipid-lowering medication. Smoking denotes current smokers. CKD was diagnosed if the subject had albuminuria (ACR higher than 30 mg/g creatinine) and/or reduced eGFR less than 60 mL/min/1.73 m^2, which was calculated using the equation for the Japanese[30]. As an index of obesity, BMI was used as a continuous variable.

Statistical Analysis

We first examined the distribution of IAD in the total subjects via a histogram and calculated the prevalence of IAD of 10 mmHg or higher. Then, we summarized the clinical characteristics of the participants as medians and interquartile ranges (IQRs) for continuous variables, or as numbers (percentages) for categorical variables. We also compared the values of IAD and the prevalence of IAD ≥ 10 mmHg between the groups with and without diabetes mellitus. Mann–Whitney *U*-test and χ^2 test were used for comparison between groups with a higher (≥ 10 mmHg) and a lower (< 10 mmHg) IAD. In the total participants, factors associated with IAD ≥ 10 mmHg were assessed by unadjusted and multivariable logistic regression models adjusted for age, sex, diabetes mellitus, hypertension, dyslipidemia, smoking, CKD, and BMI. Odds ratios (95% confidence intervals) and *P* values were reported. The association of IAD with each of the CVDs was evaluated by multivariable logistic regression models adjusted for age, sex, diabetes mellitus, hypertension, dyslipidemia, smoking, CKD, and BMI. For this purpose, we handled IAD as a continuous variable. To better fit the model, we entered IAD into the models after adding 1 (because some participants had zero value) and log transformation, namely as $\text{Log}_{10}(1 + \text{IAD})$. In preliminary analysis, we found that age exhibited a significant effect modification on the association between IAD and the presence of PAD. Therefore, all models included the interaction term of age x $\text{Log}_{10}(1 + \text{IAD})$. Adjusted odds ratios (95% confidence intervals) and *P* values were

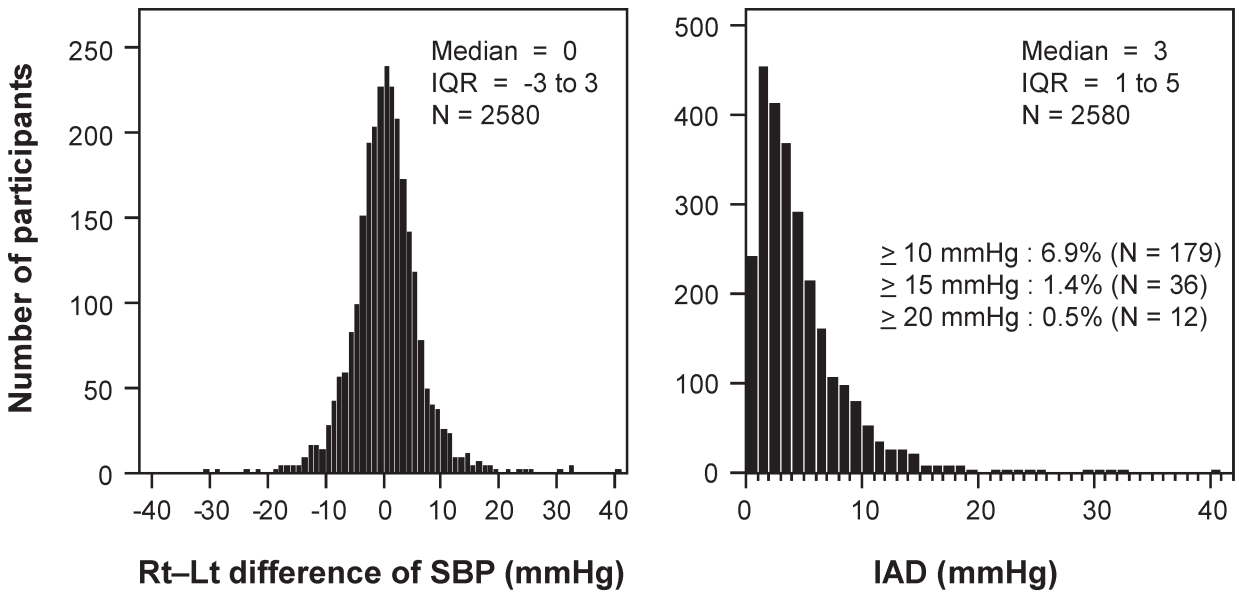

Fig. 2. Distributions of the right–left difference of systolic blood pressure and IAD in the total population
Abbreviations: IAD, inter-arm blood pressure difference; IQR, interquartile range.

reported.

All these statistical analyses were conducted with Windows PCs using the JMP 12 software (SAS Institute Japan, Tokyo) and R version 3.3.1 (R Foundation for Statistical Computing, Vienna, Austria) with EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan), which is a graphical user interface for R[31].

Results

Fig. 1 presents the selection of the study population. From the 3277 total participants, we excluded 344 subjects according to the pre-specified exclusion criteria. Finally, 2580 subjects were included in this study.

Fig. 2 gives the distributions of the difference of systolic BP (right minus left) and the absolute value, namely, IAD, in the study population. The right–left difference of systolic BP showed a normal distribution with a median of 0 mmHg. The median (IQR) of IAD was 3 (1–5), and the prevalence of IAD ≥ 10 mmHg was 6.9% (N=179).

Table 1 summarizes the clinical characteristics of the subjects by IAD. The two groups differed in diabetes mellitus, BMI, and hypertension, but not in age, sex, and smoking status. With regard to the prevalence of CVDs, PAD was significantly more prevalent in the group with IAD ≥ 10 mmHg than in the counterpart, but the prevalence of CAD or stroke was not different by IAD. In participants with IAD ≥ 10 mmHg (N=179), 93 had lower SBP in the left arm, whereas 86 had lower SBP in the right arm. Between these groups, there was no significant difference in the prevalence of patients with CAD (6.5% vs. 8.1%, P=0.66), stroke (6.5% vs. 7.0%, P=0.89), PAD (11.8% vs. 5.8%, P=0.16), or any CVD (18.3% vs. 17.4%, P=0.88) by χ^2 test.

Fig. 3 compares the IAD values between those with and without diabetes mellitus. IAD was significantly higher in patients with diabetes than those without diabetes [3 (1–6) vs. 3 (1–5), P=0.01]. The proportion of subjects with IAD ≥ 10 mmHg was also higher in patients with diabetes mellitus (8.4% vs. 5.4%, P=0.002).

Factors associated with IAD ≥ 10 mmHg were examined by logistic regression analysis (**Table 2**). In univariate analysis, diabetes mellitus was significantly associated with the widening of IAD. However, the association was not significant in the multivariable analysis. On the other hand, BMI and hypertension exhibited a significant association with IAD ≥ 10 mmHg in the multivariable analysis. Similar results were shown when other IAD cut-off levels were used.

Fig. 4 indicates odds ratios of the associations of IAD with CAD, stroke, and PAD in the total subjects calculated by multivariable logistic regression analysis adjusted for age, sex, smoking status, diabetes mellitus, hypertension, dyslipidemia, CKD, BMI, and the interaction term of age x $Log_{10}(1+IAD)$. Among the three types of CVD, only PAD was significantly and independently associated with IAD.

Table1. Clinical characteristics of the subjects

	IAD ≥ 10 mmHg	IAD < 10 mmHg	*P* value
Number of subjects	179	2,401	–
Age (year)	62 (55–67)	61 (53–67)	0.10
Male Sex [*N*, (%)]	80 (44.69)	1,178 (49.06)	0.26
Smoker [*N*, (%)]	81 (45.25)	1,076 (44.81)	0.91
Diabetes mellitus [*N*, (%)]	111 (62.01)	1205 (50.19)	<0.01
Hypertension [*N*, (%)]	114 (63.69)	1,002 (41.73)	<0.01
Dyslipidemia [*N*, (%)]	135 (75.42)	1,679 (69.93)	0.12
Chronic kidney disease [*N*, (%)]	74 (41.34)	883 (36.78)	0.22
Body mass index (kg/m^2)	24.3 (22.3–27.6)	23.3 (21.3–25.7)	<0.01
Fasting plasma glucose (mg/dL)	121 (99–149)	107 (95–131)	<0.01
HbA1c (%)	7.0 (5.8–8.4)	6.3 (5.5–8.0)	<0.01
Systolic BP, right (mmHg)	134 (122–148)	126 (114–138)	<0.01
Systolic BP, left (mmHg)	135 (120–147)	126 (115–139)	<0.01
Diastolic BP, right (mmHg)	78 (71–85)	76 (70–83)	0.02
Diastolic BP, left (mmHg)	78 (71–85)	76 (69–82)	0.02
Total cholesterol (mg/dL)	206 (184–233)	204 (179–229)	0.12
Triglycerides (mg/dL)	117 (84–160)	107 (78–150)	0.11
HDL–C (mg/dL)	52 (44–63)	53 (43–65)	0.62
eGFR (mL/min/1.73 m^2)	74.0 (62.8–91.7)	75.3 (61.8–88.7)	0.55
UACR (mg/gCr)	12.7 (7.3–40.7)	9.7 (5.4–27.4)	<0.01
ABI	1.05 (0.99–1.11)	1.11 (1.06–1.16)	<0.01
Medication use			
Anti–hypertensives [*N*, (%)]	56 (31.28)	579 (24.1)	0.03
Anti–diabetics [*N*, (%)]	67 (37.43)	829 (34.53)	0.43
Lipid–lowering medications [*N*, (%)]	59 (32.96)	790 (32.90)	0.99
CAD [*N*, (%)]	13 (7.26)	132 (5.50)	0.32
Stroke [*N*, (%)]	12 (6.70)	176 (7.33)	0.76
PAD [*N*, (%)]	16 (8.94)	124 (5.16)	0.03
Any of CAD, stroke, and/or PAD [*N*, (%)]	32 (17.88)	343 (14.29)	0.19

The table gives medians (IQRs) and *P* values by Mann-Whitney *U*-test for continuous variables, and numbers (percentages) and *P* values by χ^2 test for categorical variables.
Abbreviations: IAD, inter-arm blood pressure difference; HbA1c, glycated hemoglobin; BP, blood pressure; HDL-C, high-density lipoprotein cholesterol; eGFR, estimated glomerular filtration rate; ACR, urine albumin to creatinine ratio; ABI, ankle brachial pressure index; CAD, coronary artery disease; PAD, peripheral arterial disease.

Since the effect modification by age was significant in the association between IAD and PAD, we performed an additional analysis stratified by the median age of 62 years. As presented in **Table 3**, the association of IAD with PAD was more prominent in the younger subgroup than in the older subgroup, whereas the association of age with PAD was similar in the younger and older subgroups. In contrast, the presence of diabetes mellitus did not modify the association between IAD and PAD: the interaction term of diabetes mellitus x $Log_{10}(1+IAD)$ was not significant ($P=0.92$).

Discussion

This study was conducted to examine the contribution of diabetes mellitus to IAD and the associations of IAD with CAD, stroke, and PAD, separately. We found that patients with diabetes mellitus had higher IAD levels and a higher prevalence of IAD ≥ 10 mmHg than those without diabetes mellitus, although diabetes mellitus itself was not an independent factor associated with IAD. A larger IAD was preferentially associated with the presence of PAD independent of the major CVD risk factors, and this association was modified by age.

The prevalence of IAD ≥ 10 mmHg in patients with diabetes mellitus (8.4%) was similar to the previous report (8.6%) by Clark *et al.*[16]. Also, our finding that IAD was greater in patients with diabetes mellitus than those without diabetes mellitus is consistent with the report by Clark *et al.*[16]. However, as shown in our

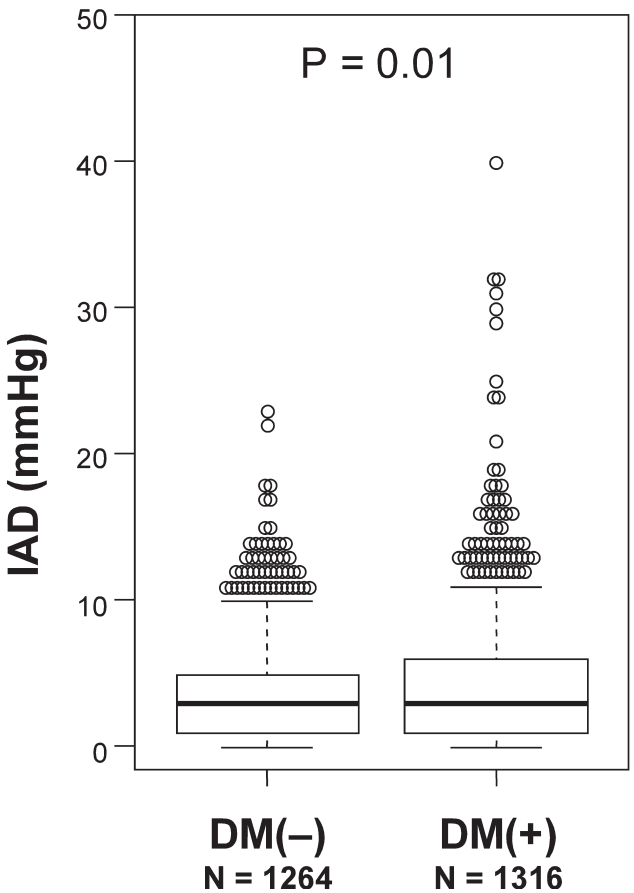

Fig. 3. Comparison of IAD between groups with and without diabetes mellitus

The box-and-whisker plots indicate 5th, 25th, 50th, 75th, and 95th percentile levels for each group. *P* value by Mann–Whitney *U*-test.
Abbreviations: IAD, inter-arm blood pressure difference; DM, diabetes mellitus.

study, the association between IAD and diabetes mellitus was no longer significant after the adjustment for the major CVD risk factors. In such multivariable analysis, the presence of hypertension and a higher BMI were significantly associated with IAD ≥ 10 mmHg, suggesting that the apparent association between diabetes mellitus and IAD in the unadjusted analysis was confounded by the higher prevalence of hypertension (57.4% vs. 28.6%, $P<0.001$) and the higher BMI [23.9 (22.0–26.7) vs. 22.8 (20.7–24.9), $P<0.001$] in the group with diabetes mellitus. These adjusted results are consistent with the previous report by Kimura *et al.*[11] in the Japanese general population in which multivariable adjustment was done. The apparent discrepancy between the result by Clark *et al.* and the results by us and Kimura *et al.* may be due to statistical methods and/or difference in ethnicity.

The association of IAD with CVD was reported by some cohort studies, although information is limited regarding the association of IAD with individual CVD, namely, CAD, stroke, and PAD. Some cohort studies and a meta-analysis employed all-cause mortality[6] or cardiovascular mortality[7, 16-22] as the clinical outcome variable. As far as we know, no previous study showed a significant association between IAD and CAD. Regarding stroke, a recent large cohort study by Tomiyama *et al.*[5], including 13,317 participants without history of any CVD at baseline, IAD ≥ 15 mmHg predicted the incident stroke during the mean follow-up period of 7.4 years. Although we failed to reveal the association of IAD with stroke, it might be due to survival bias of the cross-sectional design of this study. With regard to PAD, Tomiyama *et al.*[5] also found a significant cross-sectional association between IAD and a low ABI, confirming the observation by Kimura *et al.*[11], suggesting the association of IAD with lower limb PAD. In a cross-sectional study of 727 patients with diabetes mellitus and 285

Table 2. Factors associated with IAD of 10 mmHg or greater

Exposure variables	Unadjusted analysis		Adjusted analysis	
	Odds ratio (95%CI)	*P*	Odds ratio (95%CI)	*P*
Age (per 1 year)	1.01 (1.00–1.03)	0.05	1.00 (0.99–1.02)	0.63
Sex (male vs. female)	0.84 (0.62–1.14)	0.26	0.68 (0.46–1.00)	0.05
Smoking status (smoker vs. non-smoker)	1.02 (0.75–1.38)	0.91	1.1 (0.79–1.70)	0.45
Diabetes mellitus (presence vs. absence)	1.62 (1.19–2.21)	<0.01	1.27 (0.90–1.78)	0.18
Hypertension (presence vs. absence)	2.45 (1.79–3.36)	<0.01	2.10 (1.48–2.99)	<0.01
Dyslipidemia (presence vs. absence)	1.32 (0.93–1.88)	0.11	1.04 (0.73–1.50)	0.81
Chronic kidney disease (presence vs. absence)	1.21 (0.90–1.65)	0.23	0.99 (0.72–1.37)	0.97
Body mass index (per 1 kg/m^2)	1.07 (1.04–1.11)	<0.01	1.05 (1.01–1.09)	<0.01

The adjusted analysis was done with mulitivariable logistic regression analysis which included the eight listed variables.
Abbreviations: IAD, inter-arm blood pressure difference; CI, confidence intervals.

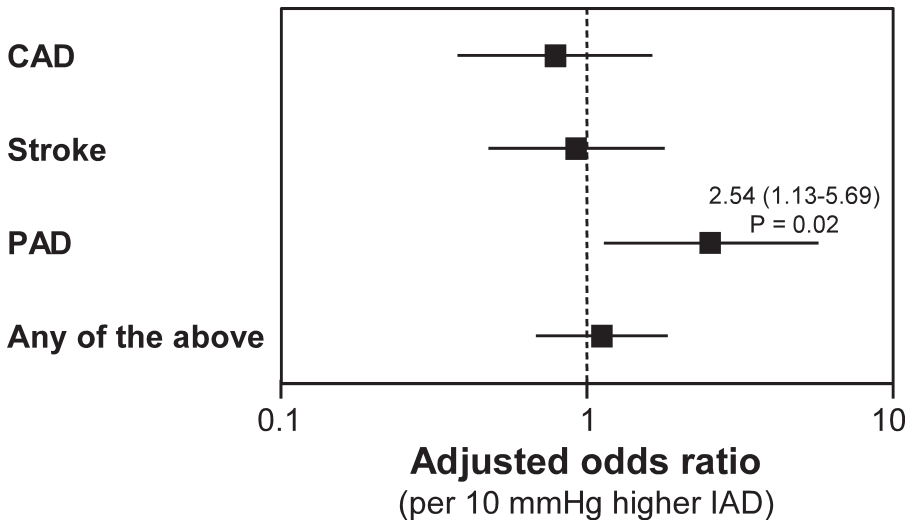

Fig. 4. IAD and odds to have CAD, stroke, and PAD

The graph indicates adjusted odds ratios (95% confidence intervals) by multivariable logistic regression analysis adjusted for age, sex, diabetes mellitus, hypertension, dyslipidemia, smoking status, chronic kidney disease, BMI, and the interaction term of age and Log_{10} (1 + IAD). Odds ratios were calculated per 1 log unit higher Log_{10} (1 + IAD), which are equivalent with per 10 mmHg higher IAD.
Abbreviations: IAD, inter-arm blood pressure difference; CAD, coronary artery disease; PAD, peripheral artery disease.

Table 3. Association of IAD with PAD in the total subjects and age subgroups

Exposure variables	Populations		
	Total subjects	Age < 62 years	Age ≥ 62 years
Log_{10} (1 + IAD) (per 1 log unit)	2.54 (1.13–5.69) *P* = 0.02	3.69 (1.08–12.55) *P* = 0.03	1.08 (0.56–2.09) *P* = 0.83
Age (per 1year)	1.07 (1.05–1.10) *P* < 0.01	1.07 (1.01–1.14) *P* = 0.02	1.08 (1.04–1.12) *P* < 0.01
Log_{10} (1 + IAD) x Age (interaction term)	—— *P* = 0.04	——	——

The table gives odds ratios (95% confidence intervals) by multivariable logistic regression analysis in the total subjects and the subgroups stratified by the median age.
Abbreviations: IAD, inter-arm blood pressure difference; PAD, peripheral arterial disease.

nondiabetic participants[16], IAD showed a significant association with the presence of PAD in a multivariable logistic model. Thus, our result is consistent with these studies and confirmed the close relationship between IAD and lower limb PAD.

We defined PAD not by the reduced ABI but by the presence of history of interventions for lower limb ischemia, including amputation. This is one of the strength of this study, because other studies from Japan rely on ABI alone for the diagnosis of PAD, not the presence of established PAD. In our study, 51 out of 140 patients with established PAD had ABI ≥ 0.9 who had undergone successful intervention. When we included participants with reduced ABI (< 0.9) in the PAD group, the number of participants with "PAD" was increased up to 185, but the result was not altered regarding the independent association of IAD with "PAD" thus defined.

Abnormal IAD has not been clearly defined. Previous studies used various cut-off levels of IAD, namely, 5, 10, 15 [5, 11], and 20 mmHg[13, 14], although Tomiyama *et al.*[5] reported that IAD ≥ 15 mmHg was predictive of future stroke. A previous study reported that as many as 23% of patients had IAD ≥ 20 mmHg

in a setting of general practice[13], but they performed BP measurements in both arms sequentially using mercury BP gauge. In our study, IAD ≥ 15 mmHg and IAD ≥ 20 mmHg was found in only 1.4% and 0.5% of the total participants by simultaneous and automated BP measurements in both arms. Therefore, we used 5, 10, and 12 mmHg cut-off levels in our study and confirmed essentially the same results regarding the relationship between IAD and PAD.

What are the implications of this study and the related previous studies? First, IAD can serve as a non-invasive marker in the screening of vascular disease, particularly PAD. In addition to ABI, IAD can be monitored easily even after leg amputation, bypass grafting, and percutaneous intervention of leg arteries. Second, IAD is useful in predicting risk for future stroke[5]. And third, as clinical practice guidelines[2, 3] recommend, measurement of BP in both arms is important for some patients in the diagnosis of hypertension. In this study, 179 out of 2,580 participants (6.9%) had IAD of 10 mmHg or greater, and the subgroup of diabetes patients showed a higher prevalence of IAD widening. Measurement of BP in both arms will help in identifying people with hypertension.

In conclusion, patients with diabetes mellitus had higher IAD levels and higher prevalence of IAD ≥ 10 mmHg than those without diabetes mellitus, but the presence of diabetes mellitus was not an independent factor associated with IAD. A larger IAD was preferentially associated with the presence of PAD independent of the major CVD risk factors.

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Conflicts of Interest

All authors declared no competing interests relevant to this study.

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