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Research Article

Diastolic Blood Pressure Related to ABI Values Use for Peripheral Arterial Disease Screening in Women Over 50 Years Old

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ABSTRACT
Expectations of healthy living are greater in women than men at the age of 60 years. In life after a healthy life expectancy, often women begin to get sick. The prevalence of peripheral arterial disease (PAD) in women increases with age, so more women than men have PAD after age 40 years. PAD is often undiagnosed in women, because many do not show clinical symptoms that can lead to ongoing disease and increase the risk of unexpected events and mortality. Ankle Brachial Index (ABI) tests predict death and adverse cardiovascular events regardless of traditional cardiovascular risk factors, and can be used to diagnose PAD. The study was conducted with a cross-sectional method on 146 women in District X, South Jakarta, conducted in February to July 2020. Data collection included demographic characteristics data, physical examination including weight, height, manual blood pressure and ABI (Ankle Brachial Index) examination. In this study it was found that the age of the respondents varied from 50 to 70 years. The mean systolic blood pressure was 145.20 + 25.204 mmHg and the mean diastolic blood pressure was 85.99 + 12.121 mmHg. The average value of the right ABI (1,024 + 0,108), the left ABI (1,027 + 0,112). Pearson correlation test results obtained diastolic blood pressure has a significant relationship with the value of the left ABI ($p = 0.047$ and $r = -0.164$). Based on that, we can conclude that increased diastolic blood pressure is significantly associated with lower ABI values.

Keywords: Diastolic blood pressure, ABI, PAD

INTRODUCTION

Women live longer than men. Health life expectancy is greater in women than men at birth (64.8 versus 62.0 years) and at age 60 (21.9 versus 19 years). However, the number of years lost due to life in experiencing illness from birth is also greater in women than men (9.5 compared to 7.8 years). In life after a healthy life expectancy, often women begin to get sick [1]. The prevalence of peripheral arterial disease (PAD) in women increases with age, so more women than men have PAD after age 40 years. This situation creates a global burden so the American Heart Association (AHA) reminds doctors to pay special attention to this disease [2]. PAD is often undiagnosed in women, because many do not show clinical symptoms that can lead to ongoing disease and increase the risk of unexpected events and mortality [2]. Although most consider that mean blood pressure as a consequence of adverse cardiovascular disease associated with hypertension, the role of increased blood pressure variability has also been reported in various observational studies and clinical trials [3]. Ankle Brachial Index (ABI) is systolic pressure at the ankle divided by systolic pressure in the arm and has good specificity and sensitivity to diagnose PAD [4]. Additionally, ABI has been shown to predict death and adverse cardiovascular events regardless of traditional cardiovascular risk factors [4]. We therefore want to know the prevalence of PAD in women over 50 years old who do not display any symptoms of the disease and want to know whether there is a relationship between blood pressure and the value of the Ankle Brachial Index (ABI).

METHODOLOGY

Observational research with cross sectional design carried out on the population of a district

in South Jakarta. The respondents were chosen by random sampling cluster. Inclusion criteria were women aged 50 - 75 years and willing to take part in the study. Exclusion criteria are dementia, amputation of the foot above or below the knee. In this study, in addition to taking data on the demographic characteristics of respondents, physical examination included weight, height and blood pressure checks using Omron 7130 brand digital Tensimeter, an upper arm blood pressure monitor, in oscillometry mode, for clinical use and self-measurement, was validated, in a general population, according to the European Society of Hypertension International Protocol revision 2010.(5) Electronic blood pressure devices are used to measure and display arterial BP by automated and semi-automated inflation and deflation of a cuff applied to an extremity. The cuff is usually positioned on the upper arm for even compression of the brachial artery, which is the standard location for BP measurement (6) ABI checks using the Auto-testing tool with Smartdop XT testing of the Hadeco brand. This device allows automated simultaneous BP measurements of both arms or one arm and one leg, and thereby the calculation of ABI. The ABI results are displayed on the device screen. ABI values are classified <0.9 as an indication of PAD, values 0.9 -1.00 = borderline and values 1 - 1.4 as normal [7]. All study measurements were performed under standardized conditions in a quiet examination room with 10-min rest in the supine position before the introductory familiarization measurement.

RESULT

The study was attended by 146 female respondents aged between 50 to 70 years, there were 77 people aged less than 60 years and 69 people aged over or equal to 60 years, with a mean ± SD of 59.29 ± 5.77 years. The mean body weight ± SD is 57.83 ± 10.69 kg. Mean ± SD height is 151.33 ± 5.56 cm. The mean systolic blood pressure is 145.20 + 25.204 mmHg and the average diastolic blood pressure is 85.99 + 12.121 mmHg.

Blood pressure based on the age of the respondent can be seen in Figure 1.

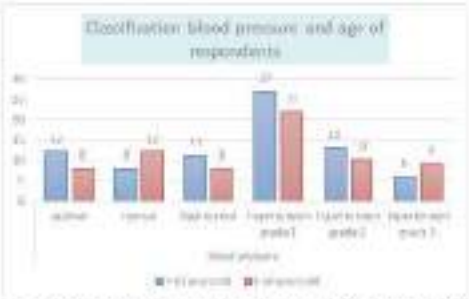

Fig.1: Classification of blood pressure based on the age of the respondent.

The results of blood pressure measurements on respondents are classified according to the Joint National Committee / JNC VIII [8]. From figure 1 we can see that only 40 respondents namely 20 respondents aged <60 years and 20 people ≥ 60 years who have optimal blood pressure (systolic <120 mmHg / diastolic <80 mmHg) or normal blood pressure (systolic 120 -129 mmHg and or diastolic 80-84 mmHg). The rest are 19 respondents (11 people <60 years, 9 people aged ≥ 60 years) with high normal blood pressure (systolic 130 -139 mmHg and or diastolic 84-89 mmHg), first degree hypertension (systolic 140-159 mmHg and or diastolic 90 -99 mmHg) as many as 49 people (27 people aged <60 years and 22 people ≥ 60 years), hypertension grade 2 (systolic 160 - 179 mmHg and or diastolic 100 -109 mmHg) as many as 23 people (13 people aged <60 years) and 10 people aged ≥ 60 years) and 15 people (6 people aged <60 years and 9 people ≥ 60 years) with degree 3 hypertension (systolic blood pressure ≥ 180 mmHg and or diastolic ≥ 110 mmHg).

The results of the ABI examination found that the value of right ABI X ± SD 1.03 ± 0.105 with a minimum value of 0.77 and a maximum value of 1.37. Left ABI value X ± SD = 1.03 ± 0.107 with a minimum value of 0.70 and a maximum value of 1.31.

Fig.2: Result of ABI examination from respondents.

From Figure 2 above it can be seen that the ABI value <0.9 was found in 16 respondents (10.9%) from the examination results on the right foot and 13 people (8.8%) on the examination on the left leg. 35 people on the right ABI and 36 people on the left ABI with borderline values (0.9-1). 98 people on the right ABI and 94 people on the left ABI with normal ABI values (1-1.4).

Furthermore, to determine the relationship between age, weight, height, blood pressure and ABI values, the Pearson statistical test was performed, the results of which can be seen in Table 1 below.

Table 1: Reliability Statistics

Risk Factor	Mean+SD	Right ABI		Left ABI	
		r	P	R	p
Age	59.29 + 5.77	0,024	0,778	-0,030	0,717
Weight	57,83± 10,69	-0,77	0,353	-0,115	0,166
Height	151,33 ± 5,56	-0,038	0,648	-0,025	0,765
Systolic blood pressure	145,20 + 25,204	-0,142	0,086	-0,159	0,055
Diastolic blood pressure	85.99 + 12,121	-0,084	0,314	-0,164	0,047*

*Pearson correlation test

In table 1 it can be seen that there is a relationship between diastolic pressure and left ABI value (p = 0.047 and r = -0.164), which means that the higher the diastolic blood pressure, the lower the ABI value.

DISCUSSION

Of the 146 respondents found that respondents aged less than 60 years old were found 59,75% had hypertension degrees 1 to 3. In respondents aged 60 years and over, respondents with hypertension were 59.43%. This is the same as that reported by Riskesdas (Riset Kesehatan Dasar) Ministry of Health Republic of Indonesia 2018, hypertension occurs in the age group of 31-44 years (31.6%), age 45-54 years (45.3%), and age 55-64 years (55.2%) (9). According to the US National Health and Nutrition Examination Survey (NHANES), 70% of adults ≥65 years have hypertension.[10]

A study that collected data over a 30-years period have demonstrated the increasing prevalence of hypertension with age. Hypertension is an important risk factor for cardiovascular morbidity and mortality, particularly in the elderly. It is a significant and often asymptomatic chronic disease, which requires optimal control and persistent adherence to prescribed medication to reduce the risks of cardiovascular, cerebrovascular and renal disease (11). The effect of high blood pressure varied by cardiovascular disease end point, from strongly positive to no effect. A 20 mm Hg rise in systolic blood pressure showed substantially stronger associations with stable angina (HR 1·41 [95% CI 1·36–1·46]), subarachnoid haemorrhage (1·43 [1·25–1·63]), and intracerebral haemorrhage (1·44 [1·32–1·58]) than with total cardiovascular disease (1·26 [1·25–1·28]). (12)

A cross-sectional study (n = 3842) to determine hypertension prevalence and investigate determinants of blood pressure control in hypertensive adults, the diagnosis of hypertension via home visits (active detection) and routine clinical examinations at the Tegal Alur II Community Health Center (passive detection) in 2017, found that the prevalence of hypertension in adults in Tegal Alur was 16.8% (n = 646), and the rate of uncontrolled hypertension was 89% (n = 572).(13) Research by taking data electronic

health records from 1997 to 2010 in the CALIBER (Cardiovascular research using Linked Bespoke studies and Electronic health Records) programme to assemble a cohort of 1,25 million patients, 30 years of age or older and initially free from cardiovascular disease, a fifth of whom received blood pressure-lowering treatments. They selected patients from 225 primary care practices registered between January, 1997, and March, 2010. Patients were classified as having hypertension if their baseline blood pressure was 140/90 mm Hg or higher, or they had a recorded diagnosis of hypertension, or they received repeat prescriptions (at least two monthly packs) for blood pressure-lowering drugs (including thiazide diuretics, β blockers, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, or calcium channel blockers). During 5,2 years median follow-up, they recorded 83 098 initial cardiovascular disease presentations. In each age group, the lowest risk for cardiovascular disease was in people with systolic blood pressure of 90–114 mm Hg and diastolic blood pressure of 60–74 mm Hg, with no evidence of a J-shaped increased risk at lower blood pressures (12). Many studies of hypertensive older patients suggest a "J-shaped" curve with elevated cardiovascular risk associated with low systolic and diastolic blood pressure.

For most adults ≥65 years old, a more aggressive systolic blood pressure target <130 mmHg is recommended. (14) Prior to the 2017 guideline update, the 2015 ACC/AHA (American College of Cardiology/American Heart Association) blood pressure recommendations for coronary artery disease patients >80 years old encouraged avoiding a systolic blood pressure <130 mmHg and/or diastolic blood pressure <65 mmHg (15).

Peripheral arterial disease (PAD) is the third most common manifestation of cardiovascular disease (CVD), following coronary artery disease (CAD) and stroke. (2) Peripheral artery disease is a progressive disorder characterized by stenosis and/or occlusion of large and medium-sized arteries, other than those that supply the heart (coronary artery disease) or the brain (cerebrovascular disease). (16) It preferred term for partial or complete obstruction of ≥1 peripheral arteries, refers to atherosclerotic occlusive disease of the lower extremities (17).

It is estimated that >200 million people have PAD worldwide, with a spectrum of symptoms from none to severe. Relatively uncommon among younger people, the prevalence of PAD rises with age and affects a substantial proportion of the elderly population (>20% in >80-year-old individuals). (16)

PAD remains underdiagnosed and under treated in women. (2,17) Women with PAD experience more atypical symptoms and poorer overall health status, it is associated with reduced functional capacity and increased risk for cardiovascular morbidity and mortality. Not with standing its widespread prevalence, its associations with mortality and morbidity, and the reduced quality of life. (18) In a scientific statement on Women and PAD from the AHA in 2012, Hirsch et al. noted the increased prevalence of PAD in adults ≥ 40 years of age, and highlighted the need for raising clinical awareness, focused treatment plans, and expanding research on PAD in women. (19)

PAD affects the lower extremities more commonly than the upper extremity vessels. It has been long recognized that an insufficient blood supply to the legs could cause pain and dysfunction in the same way that coronary artery disease could lead to angina, and may lead to an recurrent fatigue, cramping sensation, or pain that is known as claudicatio intermittens and is characterized as leg pain associated with walking and relieved by rest, is generally indicative of exercise-induced ischemic leg pain, primarily in the calf, which is the most recognized symptomatic subset of lower extremity PAD. (16)

Systematic review and analysis study by Song et al., a comprehensive literature search for 118 articles studies reporting on the prevalence of peripheral artery disease in the general population that were published between Jan 1, 2011, and April 30, 2019, in PubMed, MEDLINE, Embase, the Global Health database, CINAHL, the Global Health Library, the Allied and Complementary Medicine Database, and ProQuest Dissertations and Theses Global, Global Peripheral Artery Disease Study of 2013 and the China Peripheral Artery Disease Study as sources. Peripheral artery disease had to be defined as an ankle-brachial index lower than or equal to 0,90. They found that the prevalence of peripheral artery disease increased consistently with age. The global prevalence of peripheral artery disease in people aged 25 years and older was 5,56%, 3,79–8,55%, and the prevalence estimate was higher in high-income countries than that in low-income and middle-income countries (7,37%, 4,35–13,66, vs 5·09%, 3,64–7,24). Globally, a total of 236,62 million people aged 25 years and older were living with peripheral artery disease in 2015, among whom 72,91% were in low-income and middle-income countries (20).

The diagnosis of lower-extremity PAD is established by the resting ankle-brachial index (ABI), calculated as the ratio of systolic blood pressure in the ankle and the higher of the two brachial artery pressures (16). In this study we used the Auto-testing tool Smartdop X7 testing of the Hadeco brand to measurement ABI. Automated calculation of the ABI with the oscillometric device prevents calculation errors by the observer and saves time. Another advantage of the automated simultaneous oscillometric ABI measurement is that it is free of the random BP variation that occurs with sequential Doppler ABI measurement. Moreover, the automated method is free of interobserver variability and observer bias, which are additional problems characteristic of Doppler ABI measurement (21). The ankle-brachial index can be used to screen for and diagnose PAD in the primary care setting.(22) Ankle-brachial index the ratio of the ankle blood pressure to the highest brachial systolic pressure, is an inexpensive and efficient method to diagnose PAD in the primary care setting. (23) The ABI has been shown to be accurate in studies that have used it, with the specificity and accuracy of ABI less than or equal to 0.9 for the diagnosis of PAD as high as 83% to 99% and 72% to 89%, respectively, in a meta-analysis of 8 studies. (24) Another study said that ABI has highly sensitive (90%) and specific (98%) (23).

The American Diabetes Association recommends ABI screening in all patients with diabetes who are older than 50 years, if results are normal, screening should be repeated every five years. Patients with diabetes who are younger than 50 years should be screened if they have risk factors (e.g., smoking, hypertension, hyperlipidemia, duration of diabetes more than 10 years). (25) ABI can be assessed with or without segmental pressures and waveforms; leg segmental pressure measurements can be used to establish a diagnosis when anatomical localization is required to design a therapeutic plan (17).

The USPSTF (The US Preventive Services Task Force) recommendation ABI applies to adults who do not have any symptoms or diagnosis of PAD, CVD, or kidney disease. The potential benefit of using the ABI to screen for PAD is finding and treating the condition earlier to prevent pain, possible leg amputation, and potentially other types of CVD events (heart attacks, strokes, death). Although there is evidence that the ABI is a useful test to diagnose PAD in people with symptoms, there is currently no evidence that it benefits those without symptoms (by finding those who will develop symptoms later and thus benefit from treatment) (26).

Potential harms from ABI testing itself are small; however, it may lead to further diagnostic testing, which may have more side effects. (26) Compared to other diagnostic methods, ABI is superior because it is s a simple, noninvasive test, which could be routinely determined in all patients. Resting ABI results should be reported as: abnormal (≤0.90), borderline (0.91–0.99), normal (1.00–1.40), or non-compressible (>1.40 (20) An abnormal ankle-brachial index- below 0.9- is a powerful independent marker of cardiovascular risk. (27)

In this study it was found that the value of ABI <0.9 in the right foot was 10.9% and the left leg was 8.8%. ABI value <0.9 is an indication of PAD. Almost all patients in this study had no complaints regarding the PAD. PAD has increasing prevalence in females, compared to men, women with PAD >50% present are more asymptomatic or have atypical symptoms. Women with PAD have increased quality of life impairment, increased risk of depression and increased cardiovascular mortality.(28) In addition, mortality due to PAD has increased for the last 2 decades. (29) PAD is also a major risk factor for lower-extremity amputation, especially in patients with diabetes. Moreover, even for the asymptomatic patient, PAD is a marker for systemic vascular disease involving coronary, cerebral, and renal vessels, leading to an elevated risk of events, such as myocardial infarction (MI), stroke, and death (28).

A prospective observational survey evaluated 1148 respondents' men and women of age between 60 and 79 years from Kerala, South India. was aimed at studying the prevalence of PAD and risk factors, found that mean ABI was significantly lower in women [0.95 (0.17) vs 0.99 (0.21); p = < 0.001] in men.

However, height-adjusted mean ABI among men and women showed no significant difference (0.98 vs.0.95, 95% CI (-0.005,0.06), p = 0.092). There was a steady increase in the prevalence of the disease with age, prevalence in the 60- 64 years and 75 to 79 years groups was 21.13% and 38.19% (30).

A cross-sectional study, including 115 patients aged 40 years and older attending an outpatient service at General Hospital in South Angola. The evaluation included a basic questionnaire for lifestyle and medical history and ankle-brachial index (ABI) measurement using hand-held Doppler. PAD was defined as an ABI ≤0.9 in either lower limb. Of 115 patients, 62.60% were women with a median age of 52.5 (range of 40 to 91) years. The prevalence of PAD was 42.6% (31). But another cross-sectional study analysis of

1568 subjects (mean age 6.5 years, 43% males), from the population were selected randomly from the electronic health records of all patients with health care coverage from two districts in the north metropolitan area of Madrid (Spain), namely, Fuencarral-El Pardo and Tetuán, which include three and seven primary health care centers, showed the existence of a low prevalence of peripheral artery disease in a population aged 45–74 years, and PAD prevalence was 3.81% (95% CI, 2.97–4.87) for all participants. In men, PAD prevalence was significantly higher than in women [5.17% (95% CI, 3.74–7.11) vs. 2.78% (95% CI, 1.89–4.07); p = 0.014] [32].

In this study using no significant relationship was found between age and ABI values. This is different from the research conducted by Marumo on 113 men and 53 women with type 2 diabetes mellitus, found that there is a correlation between age and ABI in women but not in men, so it can be said that there are gender-related differences between age and ABI. The relationship of age and ABI reflects the progression of the atherosclerosis process in the legs which increases with age in women [33]. Study in South Angola found the main risk factor for PAD was age (≥60 years) (31).

In this study analysis with the Pearson correlation test found an association between diastolic pressure and the value of the left ankle ABI (p = 0.047 and r = -0.164), it means that the higher the diastolic blood pressure, the lower the ABI value. Other studies also found the same thing: high risk groups including patients with high systolic and diastolic blood pressure variability, this group had 1.679-fold (95% CI: 1,141-2,472, P = 0.009) increased risk of PAD compared to patients in the low risk group [33].

Studies found that the percentage of subjects with hypertension and systolic blood pressure were slightly higher in women but did not significantly increase compared to men. ABI is significantly lower in women but the prevalence of PAD (ABI <0.9) although slightly higher in women but the increase is not significant when compared to men [34]. Another study found no sex difference in the prevalence of PAD, which was consistent with findings from previous studies [35]

Data cohort study from the ALLHAT trial (Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial) recruited patients ≥55 years of age with baseline hypertension (SBP>140 mm Hg or DBP>90 mm Hg) and at least 1 other coronary artery disease risk factor (i.e., history of myocardial infarction or stroke, history of coronary artery bypass grafting/angioplasty, diabetes mellitus, high-density lipoprotein <35 mg/dL, left ventricular hypertrophy, or current cigarette smoking). The target systolic blood pressure was set at <140/90 mm Hg for all participants during the trial. 33 357 patients attended the study with an average age of 67.4 years, 53.1% men, 59.7% white race, the median baseline blood pressure was 146/84 mm Hg. Participants were followed for a median of 4.3 (interquartile range, 3.6–5.3) years, during which time 1489 (4.5%) had a lower extremity PAD event, and 4148 (12.4%) died. Systolic blood pressure <120 mm Hg was associated with a 26% (CI, 5%–52%; P=0.015) higher hazard and systolic blood pressure ≥160 mm Hg was associated with a 21% (CI, 0%–48%; P=0.050) higher hazard for a PAD event, in comparison with systolic blood pressure 120 to 129 mm Hg. In contrast, lower, but not higher, diastolic blood pressure was associated with a higher hazard of PAD events: for DBP <60 mm Hg (hazard ratio, 1.72; CI, 1.38–2.16) (36).

Study the prevalence of LEAD (Lower Extremity Peripheral Artery Disease) among hypertensive patients attending the hypertension clinic, consultant out-patient department, University of Benin Teaching Hospital, Benin City, 153 hypertensive patients aged 36-92 years were consecutively enrolled in the study. LEAD was defined as an ankle-brachial index (ABI) <0.9 in either leg using the hand-held Doppler ultrasound scan. 41.8% of the patients had ABI <0.9 in either leg. Among patients with LEAD majority were asymptomatic with a ratio of 1:8 for symptomatic versus asymptomatic disease (37).

Study by Rapsomaniki et al. found that compared with systolic blood pressure, diastolic blood pressure showed substantially weaker associations with stable angina, peripheral arterial disease, and myocardial infarction and with total cardiovascular disease. They report associations for 20/10 mm Hg changes in systolic/diastolic blood pressure throughout their analysis, but they note that the equivalence of these increments with respect to cardiovascular disease risks varied with age (overall, a 20 mm Hg change in systolic blood pressure was equivalent in risk to roughly 11 mm Hg increments in diastolic blood pressure). Systolic and diastolic blood pressure showed heterogeneous associations with different cardiovascular outcomes. They also found that peripheral arterial disease had an inverse association with mean arterial pressure (HR 0·90 [95% CI 0·86–0·94]) (10).

Study by Powell TM examined the relationship between reported hypertension and incident confirmed symptomatic PAD (n = 178) in 39,260 female health professionals aged ≥ 45 years without known vascular disease at baseline. Median follow-up was 13.3 years. Women were grouped according to presence of reported isolated diastolic (IDH), isolated systolic (ISH), or combined systolic-diastolic hypertension (SDH) using cut-points of 90 and 140 mmHg for diastolic and systolic blood pressure, respectively. There was a 43% increased adjusted risk per 10 mmHg of reported systolic blood pressure (95% CI 27-62%) and a gradient in risk according to systolic blood pressure category (< 120, 120-139, 140-159, and ≥ 160 mmHg); hazard ratios were 1.0, 2.3, 4.3, and 6.6 (p-trend < 0.001), respectively. Reported diastolic blood pressure, while individually predictive in models excluding systolic blood pressure, was not predictive after adjustment for systolic blood pressure. (38)

Study Emdin et al. to identify a cohort of 4.2 million people in the United Kingdom, linked electronic health records from 1990 to 2013 included all those aged between 30 and 90 years with no history of cardiovascular disease (with the exception of peripheral arterial disease) and a blood pressure measurement taken at a research standard practice (a practice meeting certain research quality standards) between 1990 and 2013. They found a 20 mm Hg higher than usual systolic blood pressure was associated with a 63% higher risk of peripheral arterial disease (hazard ratio 1.63, 95% confidence interval 1.59 to 1.66). The strength of the association declined with increasing age and body mass index (P<0.001 for interaction) but was not modified by sex or smoking status. Peripheral arterial disease was associated with an increased risk of 11 different vascular events, including ischaemic heart disease (1.68, 1.58 to 1.79), heart failure (1.63, 1.52 to 1.75), aortic aneurysm (2.10, 1.79 to 2.45), and chronic kidney disease (1.31, 1.25 to 1.38), but not haemorrhagic stroke. The most common initial vascular event among those with peripheral arterial disease was chronic kidney disease (24.4% of initial events), followed by ischaemic heart disease (18.5% of initial events), heart failure (14.7%), and atrial fibrillation (13.2%). (39)

Peripheral artery disease (PAD) is often accompanied by heart failure with preserved ejection fraction (HFpEF). Left ventricular (LV) diastolic dysfunction is related to HFpEF. Study by Yanaka K from One thousand one hundred twenty-one patients (male 56%, mean age 68 ± 13 years) with available preserved LV systolic function assessed by echocardiography (ejection fraction ≥50%) were enrolled from a single-center database between January 2013 and May 2015. PAD was defined as ankle brachial index <0.9. Diagnosis of LV diastolic dysfunction was based on the American Society of Echocardiography and European Association of Cardiovascular Imaging guidelines. (40) The prevalence of LV diastolic dysfunction was higher in patients with PAD than patients without PAD (40,41)

Study by Lu et al. during a median follow-up of 25.4 years, 466 incident PAD occurred (271 cases in 9858 participants without anti-hypertensive medications). In participants without anti-hypertensive medications, they observed significant hazard ratios of PAD in elevated blood pressure (1.80 [1.28–2.51]) and stage 2 hypertension (2.40 [1.72–3.34]), but not in stage 1 hypertension. They analyzing systolic and diastolic blood pressure separately, higher systolic blood pressure categories showed significant associations with incident PAD in a graded fashion whereas, for diastolic blood pressure, only ≥90 mmHg did. Systolic blood pressure, including the category of 130–139 mmHg, showed stronger associations with incident PAD than did diastolic blood pressure. Consequently, elevated blood pressure conferred similar or even greater risk of PAD than stage 1 hypertension, with implications on how to interpret new blood pressure categories in terms of leg vascular health (42).

Cross-sectional study by Liang YJ included 1499 participants (age ≥60 years, 59.0% women) of the Confucius Hometown Aging Project in Shandong, China. From June 2010–July 2011, data were collected through interviews, clinical examinations, and laboratory tests. In this population-based study of Chinese older people, they found that the prevalence was 5.7% for PAD. The cardiovascular risk factor profile for PAD is characterized by hypertension, diabetes, and an increased LDL-C/HDL-C ratio. (43)

Hypertension not only is associated with the development and progression of PAD but also confers an additional risk of cardiovascular morbidity and mortality, starting with a systolic blood pressure as low as 110 mmHg. (39) All patients with cardiovascular disease (including patients with PAD) should be treated for hypertension with the intent to reduce the number of fatal and nonfatal cardiovascular events (44).

Asymptomatic PAD is very prevalent in the hypertensive population under study. The use of ABI screening can improve the prediction of cardiovascular risk. Optimal blood pressure target values in PAD patients and cardiovascular

morbidity / mortality data will be evaluated after a 5-year prospective phase of the Ankle-Brachial Index Evaluation in the Hungarian Hypertension program. (45) Blood pressure treatment goals in patients with PAD need careful consideration given that lower blood pressures may exacerbate an already impaired oxygen delivery to limbs and exacerbate symptoms of PAD. The most recent American College of Cardiology/American Heart Association hypertension guidelines recommend lower blood pressure treatment targets for patients at high cardiovascular risk (goal <130/80 mm Hg). Given a lack of prospective evidence in support of higher versus lower treatment targets from large clinical trials, the guidelines recommend treating patients with PAD the same way as patients with established cardiovascular disease, and the treatment target has historically been <130/80 mm Hg (44).

The evidence for blood pressure treatment targets in patients with PAD is limited to small prospective studies and retrospective analyses of antihypertensive trials. A recent meta-analysis of small prospective studies indicated that antihypertensive treatment has not been associated with worsening symptoms and outcomes in PAD but may be associated with improved leg ischemia (46). A substudy of the SPRINT trial showed that although lower diastolic blood pressure was associated with worse cardiovascular outcomes, there was no sign that the advantage of the intensive systolic blood pressure lowering differed by baseline diastolic blood pressure (47)

From this research we didn't find any relation between body height and weight with ABI. The relationship between BMI, an index of generalized adiposity, and PAD reported in various studies is inconsistent. The study on 623 participants under case control showed that participants with PAD (ABI <0.9) who have body mass index ≥ 30 got two-fold risk to PAD [48]. Study among 3,250,350 individuals, the mean age was 63.1 ± 10.5 years and 65.5% were women. The mean BMI was 27.7 ± 5.8 kg/m^2. 27.8% of participants were obese (BMI ≥30 kg/m^2) - 27.6% females, 28.1% males. Overweight individuals [BMI 25-29.9 kg/m^2] exhibited the lowest prevalence of PAD. There was a J-shaped association of BMI with prevalent PAD. Increasing BMI is a robust independent risk factor for PAD only in women. [49]

Davies research on 478 general practitioners indicates that ABI measurements are very large at nursing assignments are mainly performed for wound management purposes rather than for cardiovascular risk assessment. This is only used in about three-quarters of respondents from general practice in Wales and those who use it do so periodically. ABI measurement is a procedure that is underutilized and is often done incorrectly in general practice surveys [50].

A study by Mansoor and colleagues was conducted using the National Health and Nutrition Examination Survey data set to determine the presence of gender-specific risk factors in women for PAD and to create a more comprehensive risk assessment instrument for women that could be used as part of routine clinical care. The data set included 150.6 million women. A weighted PAD diagnosis was reported in 20.6 million subjects (13.7%). Women who had PAD were older, less educated, and less physically active. Those with PAD also had a higher prevalence of traditional cardiovascular risk factors such as diabetes and hypertension, as well as a higher prevalence of history of coronary artery disease and stroke as compared with women without PAD. (51)

Early screening and modification of risk factors is key to reducing the prevalence of PAD and to prevent progression to ischemic limb disease. (51) The ACC/AHA guidelines recommend screening of asymptomatic individuals older than 65 years and in 50- to 64-year-old patients with diabetes and smoking history (52). Peripheral artery disease is much like hypertension and should be dubbed a "silent killer." It continues to be underdiagnosed, undermanaged, and undertreated in women. These require action and diligent detective work by all healthcare providers to raise awareness and improve screening and detection of this disease to improve the mortality and quality of life of women and to ensure aggressive treatment is provided. (53) PAD can be considered a general atherosclerotic predictor, which identifies patients at high risk for experiencing cardiovascular or cerebrovascular events and should be included in routine clinical practice [50].

CONCLUSION

In this study it was found that the prevalence of PAD based on ABI examination on the right ankle was 10.9% and on the left ankle was 8.8%. Diastolic blood pressure has a significant relationship with the value of left ABI (ρ = 0.047 and r = -0.164) which means the higher the diastolic pressure, the lower the ABI value. ABI examination is a non-invasive examination that can be used to detect the presence of asymptomatic or symptomatic PAD especially for patient with hypertension.

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