

Angiographic Findings in Comparison with of Ankle Arm Pressure Index Among Patients with Coronary Heart Disease Referred for Coronary Angiography

Ali Hussein Mttanish , Edmon Khammo Benjamin , Asaad Abdullah Abbas

ABSTRACT:

BACKGROUND:

Epidemiological studies had been demonstrated that subclinical cardiovascular disease in one vascular bed is associated with the presence of clinical disease in another bed; as well as subsequent cardiovascular and total mortalities. Degree of peripheral vascular disease (PVD) in the legs as measured non invasively are common in old adults without overt signs and symptoms of PVD. An ankle—arm index has been shown to be a strong predictor of total cardiovascular morbidity and mortality in those without prior history of clinical cardiovascular disease at the baseline examination.

PATIENTS AND METHODS:

A cross sectional study done in IBN AL NAFEES teaching hospital for cardiology and cardiac Surgery. from 1st of June 2015 to 30th of Feb. 2016, for different age groups and multiple different risk factors (smoking, D.M, hypertension, family history of Ischemic heart disease, previous Ischemic heart disease,, hyperlipidemia) have their ankle-arm index measured by Doppler study and reported as abnormal (<0.9) and normal (>0.9). Then their coronary angiographic findings were obtained and correlated to the level of Ankle Brachial Index.

RESULT:

Study showed that 18 patients with low ABI value have abnormal angiographic findings (100%) i.e. High specificity; while 28 patients with normal ABI value proved to have coronary artery disease by (39.1%) i.e. Low sensitivity; but on the other hand low ABI significant relation for both multiplicity and severity of coronary disease diagnosed by angiography (p value 0.0001) for both.

CONCLUSION:

Ankle-brachial index (ABI) index despite it is easy, quick and inexpensive bedside test for cardiovascular diseases it is of low sensitivity; but its high specificity.

KEYWORDS: ankle arm pressure index , coronary heart disease

INTRODUCTION:

The ankle-brachial index (ABI) is a very sensitive and specific method for the diagnosis of peripheral arterial disease (PAD) ⁽¹⁾. There is close relation between the presences of atherosclerotic peripheral vascular disease (P.V.D) and the presence of disease in the coronary circulation reflecting the diffuse nature of the atherosclerotic vascular disease ⁽²⁾. Fifty percent of peripheral vascular disease patients have significant coronary artery disease (3); many of whom are asymptomatic from the cardiac point; as they cannot exercise sufficiently to develop anginal symptom ^(2,3).

AIM OF THE STUDY:

In this study ABI index as a non invasive

physiological detection technique; based on the assessment of functional impairment of blood flow in the arterial bed was tested to evaluate the sensitivity and specificity of ABI as a screening tool in patients with coronary artery disease.

PATIENTS AND METHOD:

Design: cross sectional descriptive study.

Setting: IBN AL NAFEES teaching hospital for cardiology and cardiac Surgery.

Duration: from 1st of June 2015 to 30th of Feb. 2016.

PATIENTS:

Selected group of different ages and sex were randomly selected at catheterization unit. Those patients underwent coronary arteriography for suspected CAD. Each one of them had his history taken and examined thoroughly; in addition risk

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factors for coronary artery disease (DM hypertension; smoking , hyperlipidemia, family history of IHD, previous ischemic heart disease) were assessed Ankle-Brachial Index of those patients was measured at Doppler unit (while the patients lies on back , standard blood pressure cuffs are placed around his ankles and arms ,these cuffs will be inflated briefly above his normal systolic blood pressure ,once the cuffs deflated ,blood pressure measurements are taken using Doppler instrument. The arms and ankle systolic blood pressure measurements are recorded .then the ankles systolic pressures are divided by the highest arm pressures to establish an ABI for each leg). The highest of pressure on each side was divided by the highest of brachial pressure.

Exclusion Criteria:

1. Patients with valvular heart disease.
2. Patients with congenital heart disease.
3. Patients with previous CABG.
4. Patients with pervious angiographic study or percutaneous coronary intervention.
5. Patients sent for peripheral angiograph

Angiographic Assessment:

Coronary angiography was performed by judkins technique and coronary angiograms were visually analyzed by experienced cardiologist. The degree of luminal narrowing was given in percentage from the prestenotic diameter .artery considered to be normal (0%) , Non-significant 25—50%, significant non critical 51—70% significant critical 71-90% .subtotal obstruction 91-100% ; while left main stem (LMS) narrowing more than 50% according to maximum obstruction observed in any projections. -

Definition of clinical variables:

Many variables have been studied.

1-different age groups

2-gender: male and female

3-hypertension: only those who have longstanding hypertension and under treatment

4-diabetes: only those on treatment either insulin or oral hypoglycemic

5-hyperlipideamia: cholesterol>240mg; LDL >100mg; triglyceride>250mg. (12)

6-smoking: was considered to be present if the patient currently smokes more than 10 cigarettes per day

7-family history: considered to be risk factors if patient have first degree relative with defined cardiac event (IHD coronary angioplasty; coronary by bass grafiing; or sudden cardiac death) in male less than 55 years or female less than 65 years.

8-history of previous IHD: documented previous attacks with objective ECG or biochemical evidence.

Statistical Analysis:

All data were analyzed using the statistical package for social Science. (SPSS) 20 version for windows program on the computer. Data were given as mean+ standard deviation (S.D)). Chi -square test was used to compare deference between frequencies.

Student t-test was used to compare mean values between groups.

Pearson's correlation test was used for assessment of correlation. '

ANOVA test was used to find out the significant differences of more than 2 groups of continuous variables. Statistical significance was accepted as p value< 0.05.

RESULT:

In our study we can see that PVD is age related disease since the mean age of patients with low ABI < 0.9 was 60±9.7 year and most of them male 0.77% .

Table (1) shows dirdibusion of studied group according to gender. Females are more frequently have normal Ankle Arm Index than male 10 (71.4%) and 32 (69.6%) prospectively

Table 1:Distribution of studied group according to their gender and Ankle Arm Index.

		Ankle Arm Index		P value
		Abnormal	Normal	
		No.(%)	No(%)	
Gender of Patients	Female	4 (28.6)	10 (71.4)	0.000212
	Male	14 (30.4)	32 (69.6)	

ANGIOGRAPHIC FINDINGS CORONARY HEART DISEASE

Studying of Effect of Different medical History variables on ABI shown in table (2) hypertension (55%), diabetes (61.2%) , and family history of ischemic heart disease (63.7%) in which they were

of no statistical significance. While previous history of ischemic heart disease proved to be of statistical significant as shown below:

Table 2: Distribution of studied group according to risk factors and ankle arm index

Variables	Ankle Arm Index		P Value
	Abnormal < 0.9 No (%)	Normal 0.9- 1.2 No (%)	
Hypertension	14 (35)	26 (65)	0.232
Diabetes Mellitus	11 (37.9)	18 (62.1)	0.223
Smoking	13 (39.4)	20 (60.6)	0.079
Hyperlipidemia	10 (38.5)	16 (61.5)	0.211
Family History of IHD	8 (38.1)	13 (61.9)	0.315
History of IHD	17 (37)	29 (63)	0.033

In this study we can see strong inverse association between the number of coronary arteries which proved to have stenosis and their severity with the INDEX. The more lower the INDEX there is high

risk of coronary artery stenosis. Three coronary arteries stenosis found in patients with low INDEX (62.9%) as shown in table (3 and 4) this association proved to be of statistical significant

Table 3: Comparison between number of coronary vessels affected and ankle arm index

		Ankle Arm Index		P Value
		Abnormal No. %	Normal No %	
Number of affected Vessels	0	0	14 (100)	0.0001
	Single	1 (6.3)	15 (93.8)	
	Two	4 (30.8)	9 (69.2)	
	Triple	13 (62.9)	4 (27.1)	

Table 4: Comparison between severity of coronary lesion and ankle arm index.

		Ankle Arm Index		P Value
		Abnormal No. %	Normal No %	
Degree of Lesion (according to ACC Guide Line (Korne etat 2003))	No Lesion	0	14 (100)	0.0001
	Mild <50% stenosis	1 (6.7)	15 (93.3)	
	Moderate 50- 70% stenosis	2 (25)	6 (75)	
	Sever >70% stenosis	15 (65.2)	8 (34.8)	

Table (5) : study Ankle arm index as screening test Sensitivity of the test is 39% while it is Specificity for coronary artery disease. We can see that is 100%

Table 5 : Sensitivity and Specificity of Ankle Arm Index for Coronary artery disease

	Abnormal Coronary Art. No(%)	Normal Coronary Art.No(%)	Total No(%)
Abnormal Index	18 (39.13)	0 (0)	18(30)
Normal Index	28(60.87)	14(100)	42(70)
Total	46(100)	14(100)	60(100)

Sensitivity =39% Specificity= 100% +ve predictive value=100% - ve predictive value=33%

DISCUSSION:

Ankle-brachial index (ABI) is useful clinical test for detecting significant peripheral vascular disease^(5, 6); ABI detectable PVD has been shown to correlate with higher prevalence of coronary artery disease (CAD) consolidating the believes that atherosclerosis is a systemic disease in which involvement of one vascular bed means the presence of the disease in another one⁽⁶⁾;this was clearly evident in our study in that all patients with low ABI index <0.9 have abnormal coronary angiographic results (100%) which is consistent with other studies performed by many colleagues . which entailed that low ABI level is associated with high risk for other manifestation of cardiovascular disease such as myocardial infarction and Stroke⁽⁷⁾. Adjustment of low ABI indices for ages of patient studied showed that it mainly prevalent in old age group patients with mean age 60.94 (table 2); It is clear that patients age is a negative influential risk factor for atherosclerotic disease progression. For this reason it was used as a rough indicator for coronary plaque burden when assessing subclinical atherosclerosis⁽²⁾, it is without dispute that PAD and CAD accumulate progressively with aging⁽⁶⁾;in this study old 'age appeared to be a significant influential risk factor for atherosclerosis (p value 0.001) consistent with above studies; and whereas the incidence of cardiovascular disease rises throughout adult life in both sexes it is clearly evident that there is male predominance in the affected population; as results showed female gender comprises 22% out of the total number of low ABI patients against 78% of male gender (table 1) ,

It is probable that atherosclerotic risk factors are more prevalent in the male population in addition to the negative influence effect of the gender type itself , in relation to the presence of single or multiple atherosclerotic risk factors namely (hypertension, diabetes , smoking ,hyperlipidemia, family history of ischemic heart disease 1 ,(tables 3

, 4 ,5 , 6, 7) respectively and their implication in the genesis of low ABI levels non of these appear to be independently significant which could be due to small sample size ;but probably if all or some of these factors are combined in single patient surely it will potentiate each other and once this is the story ABI would be expected to be a better predictor for cardiovascular morbidity and mortality than any one risk factor alone⁽⁷⁾.

There is a strong relationship between the presence of previous history of cardio vascular morbidities and low ABI indices ;as the study showed 94% of 1 low index patients gave positive history while 6% were negative ;this came agreed with the studies which revealed that patients with low ABI more likely to give a history of ischemic heart disease and to have a higher chances to sustain acute coronary events ;probably duo to more diffuse endothelial dysfunction and/or more sever shear effect within culprit arteries with huge plaque burden⁽⁸⁾ in consistent with the believes that atherosclerotic disease is a diffuse one ; low ABI indices which indicate this is further consolidated by angiographic data which in low ABI patients revealed the presence of multiple coronary lesions in multiple vessels (table 9); p value 0.0001 It is also showed that in low ABI index patients coronary lesions tend to be in the severe category according to angiographic interpretation standards (table 10);but none of the coronary arteries appear to be selectively affected i.e. no one of the coronary artery tree is immune against atherosclerotic changes ; Last abeles (Peorson,2002) which test the sensitivity and the specificity of ABI as a screening tests for coronary artery disease showed that ,despite the Strong link between low index and the presence of diffuse atherosclerotic 'Changes :it is of low sensitivity (39%) ;but highly specific (100%) and this is consistent with other studies performed on ABI for the same purposes ;one of them showed the sensitivity of a low ABI was 16.5%; and the

specificity was 92.7% ⁽⁹⁾ in another study a low ABI has 30% sensitivity and 91% specificity ⁽¹⁰⁾, Currently known sensitivity and specificity data regarding ABI measurement mostly originate from the United States, and ethnicity-based variations in ABI are largely unknown. Moreover, the worldwide frequency of PAD as detected by ABI varies markedly across countries and regions, suggesting that the diagnostic accuracy of ABI measurement may also differ.

CONCLUSION:

Ankle-brachial index (ABI) index despite it is easy, quick and inexpensive bed side test for cardiovascular diseases it is of low sensitivity ;but its high specificity make it an important test for those with multiple risk factors for atherosclerotic changes to delinte patients at high risk who should have additional monitoring or who might get benefit from preventive steps .

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