The Study Of Ankle-Brachial Index As A Predictor Of Coronary Artery Disease – A Hospital Based Cross Sectional Study

J Inbanathan[1], H Darshan[2], D Sanjna[3], P Vinay[4], B V Naveen [5], Prithvi Amogh[6]

[1]*professor And Hod, Dept Of General Medicine Aims Bg Nagara, Mandya, Karnataka, India*
[2]*junior Resident Dept Of General Medicine Aims Bg Nagara, Mandya, Karnataka, India*
[3]*junior Resident Dept Of General Medicine Aims Bg Nagara, Mandya, Karnataka, India*
[4]*junior Resident Dept Of General Medicine Aims Bg Nagara, Mandya, Karnataka, India*
[5]*junior Resident Dept Of General Medicine Aims Bg Nagara, Mandya, Karnataka, India*
[6]*junior Resident Dept Of General Medicine Aims Bg Nagara, Mandya, Karnataka, India*

Abstract:

Background*: Ankle-brachial index is a non-invasive method to diagnose PAD (peripheral artery disease) and there is strong association between PAD with CAD (coronary artery disease).[10] the REACH trial suggests that 70% of patients with PAD have atherosclerotic disease in vascular beds such as coronary artery.[6] The present study aim to determine the relation between ankle-brachial index and CAD and to know whether ABI could be a useful tool in predicting CAD.*

Materials and Methods*: In this cross sectional study conducted in Adichunchanagiri institute of medical science B G Nagara Mandya, Karnataka over a period of 6 months. The studied subjects were 100 CAD patients of age >18 years confirmed by coronary artery angiography admitted in cardiac unit, characteristic of study subject were obtained by standard questionnaire. ABI was measured in all studied patients. ABI <0.9 was considered as PAD and ABI >0.9 was considered normal.[11] The presence of >50% stenosis of any coronary vessel on angiography was taken as positive for CAD. Data were analyzed.*

Results*: The study included a total of 100 CAD patients confirmed by coronary artery angiography. who were above the age group of 18 years among them 76(76%) were male and 24(24%) were female. Among them 46 were Diabetic ,24 were Hypertensives, 16 of them were both Diabetic and Hypertensive overall 67% of the patient were having ABI < 0.9. Wherein ABI <0.9 is seen in 76% of Diabetics, 72% of Hypertensives, 82% of Diabetic and Hypertensive patients and 21% of no comorbidity patients. There was a significant association of ABI<0.9 with CAD (P value=0.001) which suggests ABI index could be a useful tool in predicting CAD.*

Conclusion: *The present study indicated that ABI index could be a useful method in predicting CAD especially in resource low settings.*

Key Word*: Ankle-brachial index; Angiography; Coronary artery disease.*

I. Introduction

Atherosclerosis is the most common cause of cardiovascular disorders. In that PAD is associated with increased risk of obstructive CAD.[9] The above relationship is independent of other cardiovascular risk factors. Henceforth identifying PAD earlier is of high prognostic factor. Ankle-brachial index is a non-invasive method to diagnose PAD. The ankle-brachial index (ABI) calculated by dividing higher systolic blood pressure of each ankle artery by the higher systolic blood pressure of the upper limbs, is a simple method with high sensitivity and specificity in diagnosing PAD. Studies suggest that a low ABI (<0.9) may serve as a predictor of coronary artery disease (CAD), as both PAD and CAD share the similar underlying risk factor such as atherosclerosis. The aim of the current study is to determine the relation between ABI with coronary artery angiography confirmed CAD and to know whether ABI could be a useful tool in predicting CAD.

II. Material And Methods

This cross-sectional study was carried out on patients of Department of general Medicine cardiology unit at Adichunchanagiri institute of medical science B G Nagara Mandya Karnataka from May 2023 to October 2023. A total 100 adult subjects (both male and females) of aged >18 years.

Study Design: cross-sectional observational study.

Study Location: A tertiary care teaching hospital based study done in Department of General Medicine cardiology unit at Adichunchanagiri institute of medical science B G Nagara Mandya Karnataka.

Study Duration: May 2023 to October 2023.

Sample size: 100 patients.

Sample size calculation: The sample size was estimated on the basis of prevalence of CAD patients in the region.

Subjects & selection method: The study subjects were patients who are >18 years came with symptoms of CAD admitted in Adhichunchanagiri medical college cardiology unit and had undergone coronary artery angiography, confirming CAD. ABI index is measured in all patients. ABI <0.9 was considered as PAD and ABI >0.9 was considered normal.[11] The presence of >50% stenosis of any coronary vessel on angiography was taken as positive for CAD. Data were analyzed. (10)
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Inclusion criteria:
1.   Either sex
2.   Aged ≥ 18 years,
3.   Newly detected CAD confirmed by coronary artery angiography.

Exclusion criteria:
1.   Patients with deformity in upper or lower limbs
2.   Patients with Dyslipidemia on treatment
3.   Patients with substance abuse
4.   Patients with history of PAD on medications
5.   Patients with DVT history
6.   Patients with past CAD history
7.   Pregnant.

Procedure methodology
         After written informed consent was obtained, a well-designed questionnaire was used to collect the data from the Coronary artery angiography confirmed CAD patients admitted in cardiology unit. The questionnaire included characteristics such as age, gender, Diabetes, Hypertension, lifestyle habits like smoking, alcohol or any substance abuse. The considered risk factors were described as follows,
         Hypertension: Systolic blood pressure >140mmhg and /or diastolic blood pressure >90mmhg and/or receiving antihypertensive treatment.
         Diabetes mellitus: Positive findings from any two of the following: symptoms of Diabetes mellitus plus casual plasma glucose concentration >200mg/dl or fasting blood glucose >126mg/dl or 2-hour blood glucose 200mg/dl and /or use of glucose lowering drugs.
         All these patients had undergone ABI measurement. The ankle brachial index (ABI), calculated by dividing the higher systolic blood pressure of the ankle artery by the higher systolic blood pressure of the upper limbs using appropriate cuffs size.
         ABI <0.9 was considered as PAD and ABI >0.9 was considered normal. The presence of >50% stenosis of any coronary vessel on angiography was taken as positive for CAD.
All data compiled and analyzed using appropriate software.

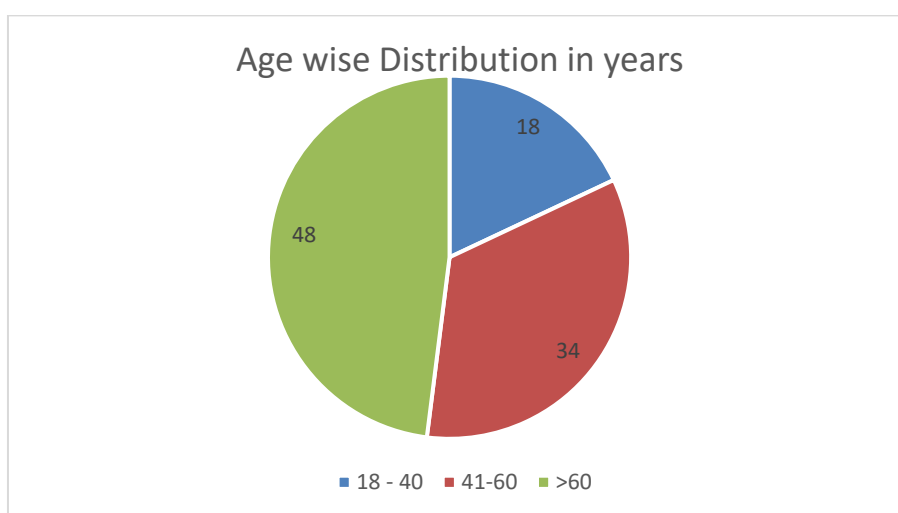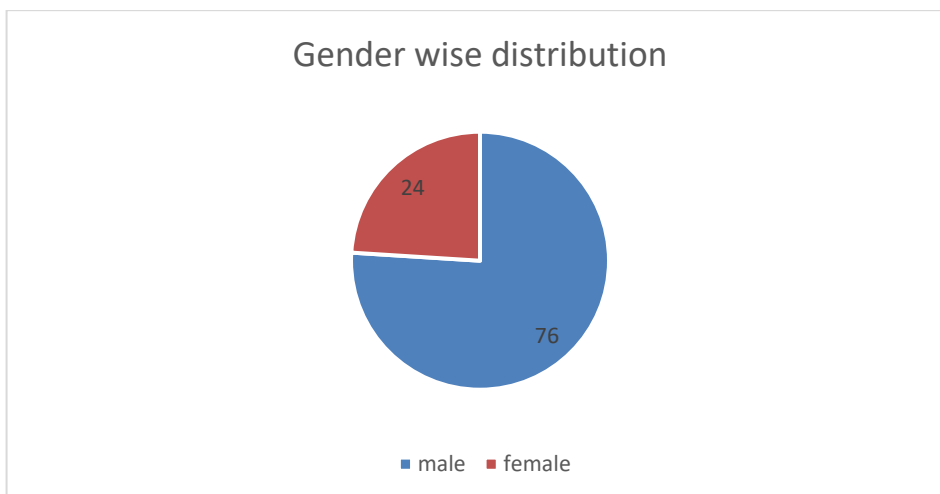Distribution of subjects based on Gender
Male: 76 (76%)
Female: 24(24%)

Distribution of subjects based on age
18 – 40 years – 18 (18%)
41 – 60 years – 34(34%)
>60 years – 48(48%)

Gender wise distribution

Age wise Distribution in years

III. Result

Risk factor distribution among study group:

Among 100 patients 46 were Diabetes, 24 were Hypertension, 16 had both Diabetes and Hypertension, 14 patients with no comorbidities.
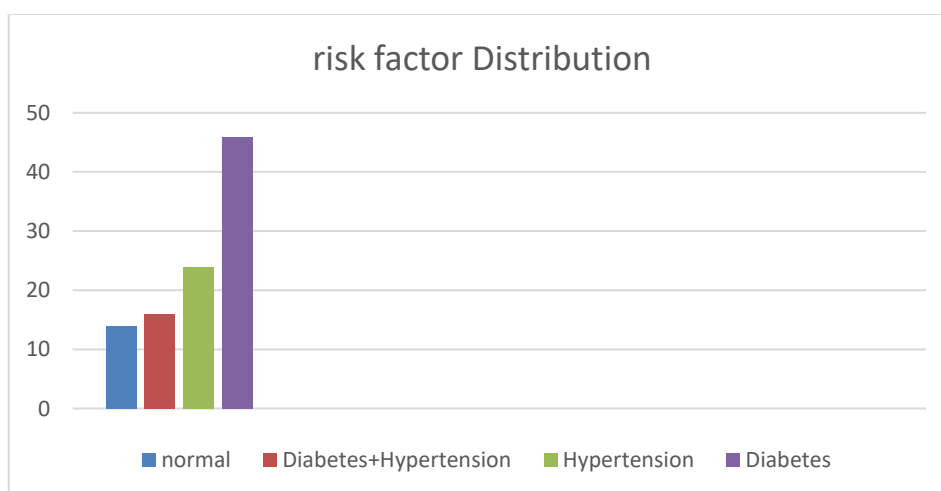
risk factor Distribution

Table 1
The relation of ABI in CAD patients:
Among 100 patients 67 of them had ABI <0.9 suggesting statistical significance with CAD.

ABI	CAD	P value
<0.9	67	
>0.9	33	0.001
Total	100	

Table 2
The relation of ABI in Diabetes patients:

Diabetic status	ABI >0.9	ABI <0.9	Total
Non-Diabetic	22	32	54
Diabetic	11	35	46
Total	33	67	100

In the study population 46% were Diabetic among them 76% had ABI <0.9.

Table 3
The relation of ABI in Hypertension patients:

Hypertension status	ABI >0.9	ABI <0.9	Total
Positive	7	17	24
Negative	26	50	76
Total	33	67	100

In the study population 24% were Hypertensive among them 72% had ABI <0.9.

Table 4
The relation of ABI in patients having both Diabetes and Hypertension:

Diabetes and Hypertension	ABI >0.9	ABI<0.9	Total
Positive	3	13	16
Negative	30	54	84
Total	33	67	100
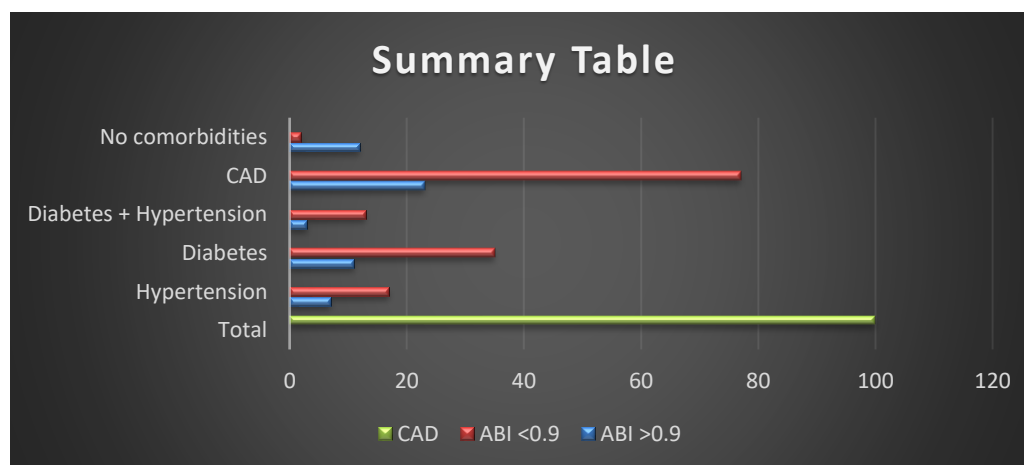
IV. Discussion

Atherosclerosis is a chronic inflammatory disease of large and medium sized vessels that causes Coronary artery disease, peripheral artery disease, strokes. There is a significant association between CAD and PAD nearly 63% were found to have PAD along with CAD.[10] ABI has been shown to be a noninvasive, sensitive, specific and cost effective method in diagnosing PAD.[9]

Diagnosing CAD requires health care resources and expertise cardiologist. In Developing nation like India especially in rural areas such facilities are not readily available. ABI is widely used as screening purpose of CAD by many physicians as it doesn't require expertise of a specialist. In the current study we were aiming to determine the relation between ankle-brachial index and CAD and to know whether ABI could be a useful tool in predicting CAD.

In the current study a total of 100 CAD patients admitted over a span of 6 months in cardiology unit of Adichunchanagiri institute of medical science B G Nagara Mandya Karnataka who had undergone angiography

were taken, >50% coronary vessel stenosis considered as CAD. In all the subjects ABI was calculated, ABI <0.9 was considered as PAD and >0.9 was considered as normal. Data collected and analyzed.

In 100 subjects 76% male and 24% female, overall 46% were Diabetic, 24% were Hypertensive, 16% were both Diabetic and Hypertensive. ABI was <0.9 in 76% of Diabetic, 72% of Hypertensive, 82% of both Diabetic and Hypertensive, 21% of no comorbidity patients. In 100 CAD patients 67% of the patient were having ABI <0.9 with P-value 0.001. Hence there was a significant association of ABI<0.9 in CAD patients. Hence ABI could be a useful method in predicting CAD.

In the studies like Papa ED at al. suggested ABI <0.9 was a strong predictive factor of cardiovascular events wherein 47% had multi-arterial coronary disease.[2]

De Oliveria DC et al. concluded that ABI <0.9 had a higher prevalence of stenosis of coronary vessel and an abnormal ABI was an independent predictor of lesions >50% stenosis in LAD.[3]

Doobay AV et al. study suggested that the sensitivity and specificity of low ABI (<0.9) to predict incidence of CAD is 16.5% and 92.7% respectively hence concluded that specificity is higher than sensitivity in predicting CAD by ABI.[5]

The present study concluded that ABI could be a useful method in predicting CAD patients in a resource low setting, leading to early intervention and prevention.

V. Conclusion

The present study concluded that ABI could be a useful method in predicting CAD patients in a resource low setting, leading to early intervention and prevention.

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