ejpmr, 2021,8(9), 592-596

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

EVALUATION OF ANKLE BRACHIAL PRESSURE INDEX IN DRIVERS WITH UNCOMPLICATED DIABETES

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Article Received on 14/07/2021 **Article Revised on 04/08/2021** **Article Accepted on 24/08/2021**

ABSTRACT

Introduction: Diabetes mellitus (DM) is an endocrine disorder in which increased blood glucose levels either due to deficiency of insulin or its resistance which is the leading causes of mortality and morbidity. Peripheral arterial disease (PAD) and diabetes mellitus are highly correlated. Ankle brachial index (ABI) is a simple test used to detect PAD. It is the ratio of Ankle systolic blood pressures to arm systolic blood pressure. Heavy vehicle drivers may suffer from pain at back, legs, arms and hands caused by uncomfortable seating for long times. It may predispose to stasis of blood and lead to occlusion of vessels of lower limbs. The primary aim of this study was to determine the ABI in heavy vehicle drivers with diabetes and without type 2 diabetes mellitus. **Methodology:** This cross-sectional study was conducted in ACSR Medical college Nellore from March 2019 to September 2019. All the subjects were recruited from RTC depot, Nellore, Andhra Pradesh with in a age group of 40-60 years. Ankle brachial pressure index derived from systolic BPs measured in the arms and legs after 10 minutes of rest in a supine position with arms and legs straight and at rest. Arm BPs were measured using a sphygmomanometer and a stethoscope whereas and leg BPs were measured with a phygmomanometer and an 8 MHz Doppler to detect pulses. Left ABI was calculated in a similar way. The lower ratio of either side was considered the participant's overall ABI. **Results:** P VALUE IS 0.553, greater than 0.05, so the association is not statistically significant. **Conclusion:** There is no statistically significant variation of ABI Index values between diabetic and non-diabetic heavy vehicle drivers.

KEYWORDS: Ankle brachial pressure index, PAD.

INTRODUCTION

Diabetes mellitus (DM) is an endocrine disorder in which high blood glucose either due to deficiency of insulin or its resistance which is the leading causes of mortality and morbidity. According to International Diabetic Federation, the current Diabetic capital of world, our India will be having 101.2 million Diabetic patients by 2030. In these patients peripheral arterial disease is one of the high risk condition. Ankle brachial pressure index is an available and straight forward reproducible method for detection of PAD, for improving risk satisfaction in the population.[1]

Peripheral arterial disease (PAD) and diabetes mellitus are highly correlated. Diabetes is considered as one of the strongest risk factors, and the presence of symptomatic PAD in diabetic patients is an indicator of poor outcomes. The most common clinical manifestation of PAD is claudication that worsens upon walking. In advanced stages, the PAD may manifest with resting limb pain and critical ischemia. In diabetes, the PAD is more common with increasing age, the existence of diabetic peripheral neuropathy, and a longer duration of diabetes mellitus.[2] [3] [4]

Ankle brachial index (ABI) is a simple test used to detect PAD in clinical settings introduced in the late 1960s Apart of being a diagnostic tool, ABI values reflect also the severity of PAD making it a widely used marker for the presence and progression of PAD in major CV studies.[5]

It is the ratio of systolic blood pressures at the ankle to systolic blood pressure in the arm. Usually the systolic blood pressure at the ankle is higher compared to the arm. A normal value for ABI assessment within the general population is considered to be 1.00–1.40 with values 0.91–0.99 classed as 'borderline', while those below 0.91 represent likely PAD.[6]

Due to the high risk of concurrent cardiovascular disease, and lower limb complications associated with PAD, and the rapid progression of atherosclerosis in diabetes, accurate and reliable diagnostic testing tools are

necessary for early diagnosis and treatment. Early detection of PAD allows for intervention and management of coexisting cardiovascular diseases, including lifestyle modification, medication and prevention and management of lower limb complications such as foot ulceration and amputation.[7]

Peripheral vascular disease (PVD) is strongly associated with type 2 diabetes. PVD assessment and diagnosis are often neglected in many health care systems. The purpose of this study was to evaluate the occurrence of PVD in a primary care setting using ABPI in patients with type 2 diabetes. The use of ABPI should be considered as an essential tool for early detection and treatment of PVD in type 2 diabetics.[8]

Diabetes mellitus and its complications like peripheral neuropathy does not spare any professionals including doctors, teachers, and road transport drivers etc. Road transport drivers are among the professional groups whose activities have a strong impact on public safety.[9] In view of the nature of their professional activity, which involves exposure to stress, a sitting working mode, and a shift and night work, the drivers are at a higher risk for developing diabetic complications. This can increase the risk for road traffic accidents due to loss of sensation and proprioception of the feet while driving public vehicles as a result of peripheral neuropathy. Therefore purpose of the present case study is to emphasise the need for early screening for diabetes and its complications among public transport professionals.[10], [11]

Heavy vehicle drivers are more prone to high risk factors like hypertension, peripheral arterial disease, high cholesterol i.e obesity etc. They may suffer from back, legs, arms and hands pains, caused by uncomfortable seating for long times and vehicle vibrations. It may predispose to stasis of blood and lead to occlusive disorders of vessels of lower limbs.[12]

The primary aim of this study was to determine the ABI in heavy vehicle drivers with diabetes and without type 2 diabetes mellitus.

AIMS AND OBJECTIVES

1. To assess ankle brachial index in type 2 diabetes
2. To find out if there is any variation in ABI when compared to non diabetics.
3. The aim of the study was to assess ABPI index in diabetic and non-diabetic population and to compare severity and outcome between both groups of individuals.

METHODOLOGY

This cross-sectional study was conducted in ACSR Medical college Nellore from March 2019 to September 2019. All the subjects were recruited from RTC depot, Nellore, Andhra Pradesh with in a age group of 40-60 years. The studygroup consists of 30 healthy nondiabetics and 30 uncomplicated type2 diabetics.

An informed consent and Institutional Ethical Committee clearance was obtained.

STUDY TOOL

1) ANKLE BRACHIAL PRESSURE INDEX (13)
2) RANDOM BLOOD SUGAR
3) An appropriately sized blood pressure cuff for the upper and lower extremities with a working sphygmomanometer
4) A Doppler device for detecting flow
5) Ultrasound transmission gel
6) An examination table

INCLUSION CRITERIA

1) Drivers with an experience of more than five years, who are working around 12 hours per day of age group 40-60 years.
2) Community-dwelling, generally asymptomatic adults (may include populations with atypical symptoms or minor symptom not recognized as PAD).

EXCLUSION CRITERIA

The contraindications to brachial and/or ankle pressure measurement including history of deep vein thrombosis, lymphoedema of the arms or legs, history of mastectomy or current leg ulceration preventing placement of a blood pressure cuff around the lower leg, and inability lie in a supine position for 40min.[14]

PROCEDURE

Ankle brachial pressure index derived from systolic BPs measured in the arms and legs after 10 minutes of rest in a supine position with arms and legs straight and at rest. Manual cuffs were used for all BP measurements and arm circumference was determined during screening to select the appropriate cuff size consistent with JNC7 recommendations.[15] Arm Blood pressure were measured using a sphygmomanometer and a stethoscope where as and ankle BPs were measured with a sphygmomanometer and an 8 MHz Doppler to detect pulses. One measurement was made at each of the six sites in the following order: left arm, left ankle (dorsalis pedis, posterior tibialis), right arm, and right ankle. Right ankle brachial pressure index is calculated as the ratio of the higher right ankle pressures (dorsalis pedis or posterior tibialis) divided by the higher brachial pressure (right or left side) or, in the case where right and left brachial pressures differed by >10 mmHg, the average of the right and left brachial pressures. Left ABI was calculated in a similar way. The lower ratio of either side was considered the participant's overall ABI.[16], [17]

Right ankle brachial pressure index = higher of the right ankle pressure/higher arm pressure

Left ankle brachial pressure index = higher of the left ankle pressure/higher of Arm pressure

INTERPRETATIONS

The interpretation can be done as below provided that there are no other significant conditions affecting the arteries of the leg, the following ankle brachial pressure

index ratios can be used to predict the severity of peripheral arterial disease.

ANKLE BRACHIAL PRESSURE INDEX	INTERPRETATION	ACTION
Above 1.2	abnormal vessel hardening from peripheral arterial disease	Refer routinely
1.0-1.2	Normal range	None
0.90-0.99	Acceptable	None
0.80-0.89	Some arterial disease	Manage risk factors
0.50-0.79	Moderate arterial disease	Routine specialist referral
Under 0.50	Severe arterial disease	Urgent specialist referral

Elderly and diabetic individuals have calcification in their arteries that prevent occlusion of flow by pressure cuff. This will cause an abnormally high reading. Typically reading greater than 1.50 is considered as abnormal. Such patients must be referred to further vascular evaluation.

RESULTS: Statistical Analysis Statistical analysis was performed using Microsoft Excel 2010 data analysis tool pack

		ABPI NORMAL		ABPI REFERRAL		ABPI RISK		ABPI SEVERE	
		Yes	No	Yes	No	Yes	No	Yes	No
Diabetes	No	3	27	26	4	0	30	0	30
	Yes	6	24	23	7	1	29	0	30
Chi-Square Tests	P VALUE- 0.236		P VALUE- 0.253		P VALUE- 0.500		P-value cannot be calculated		

DIABETES * ABPI Cross tabulation					
		ABPI			Total
		NORMAL	REFER	RISK	
DIABETES	NO	3	26	1	30
	YES	6	23	1	30
Total		9	49	2	60

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.184[a]	2	**0.553**
Likelihood Ratio	1.203	2	0.548
Linear-by-Linear Association	0.869	1	0.351
N of Valid Cases	60		

P VALUE IS 0.553, greater than 0.05, so the association is not statistically significant.

DISCUSSION

The present ABPI study shows that the ABI index doesn't show significant variation between diabetic and non- diabetic high vehicle drivergroups. This may be because their occupation itself is a risk factor for the peripheral arterial disease. In addition to their occupation, diabetes possess a major risk of peripheral arterial disease.

In my present study it is consistent that assessment of ABPI in drivers with uncomplicated diabetes had approximately equal risk of PAD with non- diabetics.

Peripheral arterial disease is characterized by a gradual reduction in blood flow to one or more limbs secondary to atherosclerosis.[18]

The Prevalence of peripheral arterial disease is~2-6% for men and women younger than 50 yrs of age, increasing to greater than 7% in those older than 70 yrs of age.[19],[20]

In patients with peripheral arterial diseases, diabetic patients have worse arterial disease and a poorer outcome than non diabetic patients. Peripheral arterial disease is also an important risk factor for lower extremity amputation in diabetic patients with chronic foot ulcers.

Strandness et al. reported that diabetic patients had more infrapopliteal disease, whereas King et al. found greater involvement of the profunda femoris in diabetic patients.[21]

Coronary heart disease accounts for half of the total mortality, whereas vascular disease in general accounts for almost two thirds of the total mortality. [N] Renal

artery stenosis has also been demonstrated in greater than 40% of the patients with peripheral arterial disease.[22]

Few studies have compared the severity and mortality of peripheral arterial disease among diabetic versus Nondiabetic patients.[26] A recent study in the U.K. showed that the cost of revascularization procedures was more in diabetic patients than in Nondiabetic patients with peripheral arterial disease.[25]

In my study it is observed that heavy vehicle drivers do have physical inactivity, smoking, drinking, insomnia high blood pressure, BMI etc…similar to a previous survey by NIOSH on Truck drivers, who are more likely to smoke and have other high-risk factors — like hypertension, high cholesterol and obesity, physical inactivity and sleep duration.

Previous epidemiological studies have demonstrated poor survival in patients with peripheral arterial disease compared with the general population[16] and a higher incidence of peripheral arterial disease and poorer prognosis in diabetic patients compared with Nondiabetic patients.[23,24]

Not only can simple, noninvasive testing methods greatly increase the accuracy of clinical diagnosis for the presence of arterial disease, but also the baseline data obtained can serve as objective indexes to follow the natural history of the disease.

Furthermore there is no convincing previous evidence that ABPI with uncomplicated diabetes have more risk compared to non- diabetics. Therefore more studies need to be done to know whether there is a significant variation of ABI index in diabetic and non-diabetic heavy vehicle drivers.

CONCLUSION

The present study concludes that

1. The ankle brachial index measurement has a lot of importance in the early detection of peripheral arterial disease.
2. There is no statistically significant variation of ABI Index values between diabetic and non-diabetic heavy vehicle drivers.

SUMMARY

This test is non invasive and in expensive and and therefore Ankle brachial index measurement has a lot of importance in the clinical practice. But it is often limited by incorrectly performed procedure in general practices due to lack of time and inadequate training have been identified as factors associated with it.

Therefore before assessing ankle brachial pressure index as a screening tool for detection of peripheral vascular disease and other diseases like cardiovascular disease, there is a need for training program to be conducted to medical students and also to be included in academic curriculum with standardised methodology in order to diagnose and prevent detect peripheral arterial disease.

LIMITATIONS

The limitations of the present study are that,

- This is not a randomized controlled trial. Therefore there is a possibility of selection bias which could be alleviated with proper randomization in a large scale trial.
- Blinding was not possible.
- The further studies need to be made by increasing the study population to know the significance of the ankle brachial index by adopting different appropriate methods.

ACKNOWLEDGEMENT

We thank the staff of Department of Physiology ACSR Government medical college Nellore, Andhra Pradesh, for helping us in all the possible way.

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