Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr ICV 2018= 82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Evaluation of ankle brachial index in peripheral vascular disease in type 2 diabetes mellitus patients

[1]Dr Bhautikkumar Bhanabhai Patel, [2]Dr Lal Babu Prasad

[1,2]Assistant Professor, Department of General Medicine, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

ABSTRACT:

Background: Diabetes, and its complications, have become an epidemic that has become an important and challenging health problem. The present study was conducted to evaluate ankle brachial index (ABI) in peripheral vascular disease (PVD) in type 2 diabetes mellitus patients. **Materials & Methods:** 68 type II diabetes patients with peripheral vascular disease of both genders were included. Ankle brachial index (ABI) was calculated for each leg. **Results:** Out of 68 patients, males were 40 and females were 28. The mean ABI <0.5 was seen in 20, 0.5- 0.9 in 16 and 0.9- 1.3 in 32 patients. The difference was significant (P< 0.05). **Conclusion:** Most of the patients had ABI between 0.9-1.3 in DM patients with PVD.

Key words: Ankle brachial index, Diabetes, Peripheral vascular disease

Received: 12-10-2019 Accepted: 22-10-2019

Corresponding author: Dr. Lal Babu Prasad, Assistant Professor, Department of General Medicine, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

This article may be cited as: Patel BB, Prasad LB. Evaluation of ankle brachial index in peripheral vascular disease in type 2 diabetes mellitus patients. J Adv Med Dent Scie Res 2019;7(12): 272-274.

INTRODUCTION

Diabetes, and its complications, have become an epidemic that has become an important and challenging health problem. By 2025, India will have the highest number of diabetes patients (57 million) out of the world total (300 million).[1] One of the complications of uncontrolled diabetes mellitus is peripheral vascular disease (PVD). It is also one of the main causes of amputation of lower limb3 that occurs 12 times more often in diabetics than those without it.[2] PVD is also a risk factor of foot infection. Both PVD and infections are among the major contributors of leg amputations, if a diabetic foot ulcer is present.[3]

Despite the fact that risk factors related to PAD in patients with DM are still not well established, it is well known that the ankle-brachial index (ABI) is the procedure of choice for the diagnosis of this pathology, since it is non-invasive, low cost, easy to perform and precedes PAD symptoms.[4] The American College of Cardiology/ American Heart Association (AHA) has recommended screening asymptomatic patients with diabetes older than 50 years or who are younger than 50 years with additional risk factors for cardiovascular disease for PAD.[5] Incongruously, American Diabetes Association (ADA) recommended, in 2018, that ABI test should only be performed in type 2 diabetes mellitus (T2DM) patients with symptoms or signs of PAD.[6] ABI is a reproducible and reasonably accurate, non- invasive measure for the detection of PVD and the determination of disease severity.[7] The present study was conducted to evaluate ankle brachial index (ABI) in peripheral vascular disease (PVD) in type 2 diabetes mellitus patients.

MATERIALS & METHODS

The present study comprised of 68 type II diabetes patients with peripheral vascular disease of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. A detailed history and thorough general physical examinations were performed. Height, weight, BMI and ABI were recorded. Biochemical examination comprised of CBC, fasting and post-prandial blood glucose estimation, urine examination, glycosylated haemoglobin, fasting lipid profile, blood urea and serum creatinine estimation, liver function tests were also done. Colour doppler ultrasound (CDU), ophthalmic examination, ECG, CT scan for cerebrovascular profile and coronary angiography for cardiovascular profile, sphygmomanometric

measurement of ankle and brachial artery pressure, doppler examination to auscultate and record blood flow from dorsalis pedis and posterior tibial and brachial arteries and Treadmill testing to assess functional limitations objectively (decline of ABI immediately after exercise provides further support of diagnosis of PVD) was done. Ankle brachial index (ABI) was calculated for each leg. Results thus obtained were subjected to statistical analysis P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 68		
Gender	**Males**	**Females**
Number	40	28

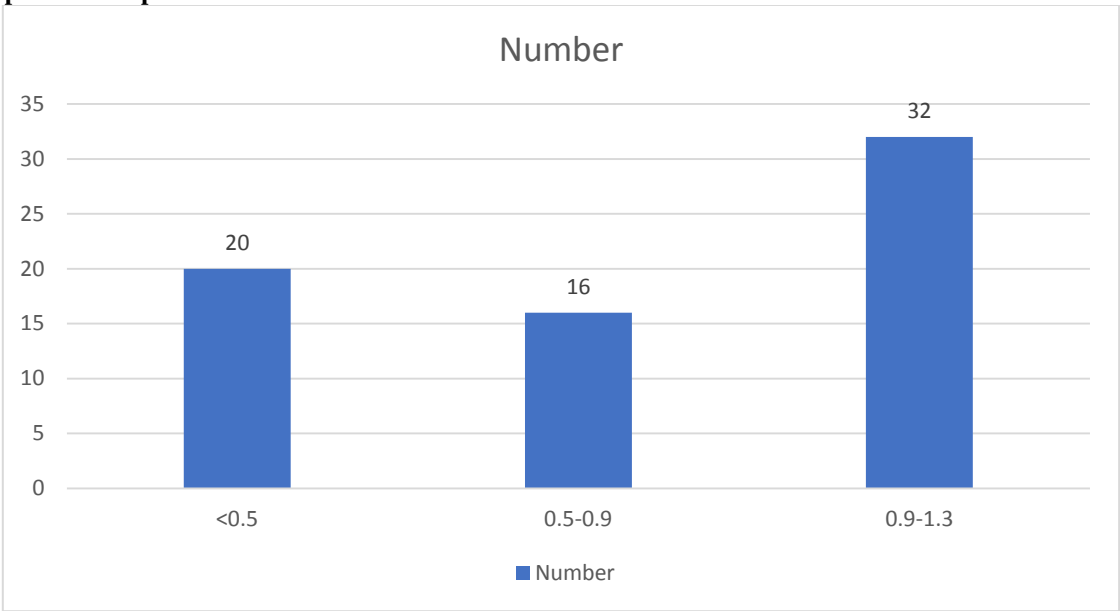
Table I shows that out of 68 patients, males were 40 and females were 28.

Table II ABI in patients with PVD

ABI	Number	P value
<0.5	20	0.05
0.5-0.9	16	
0.9-1.3	32	

Table II, graph I shows that mean ABI <0.5 was seen in 20, 0.5- 0.9 in 16 and 0.9- 1.3 in 32 patients. The difference was significant (P< 0.05).

Graph I ABI in patients with PVD



DISCUSSION

Atherosclerotic cardiovascular diseases are the main cause of mortality in individuals with diabetes mellitus (DM) and are responsible for most of the public health costs related to this disease.[8,9] In addition, peripheral arterial disease (PAD) in patients with DM is an important risk factor for lower limb amputation, being associated with other vascular events (stroke and myocardial infarction) and increasing the probability of cardiovascular diseases up to one-third in patients with diabetes at a more advanced stage.[10] Diagnosis of PVD among diabetic patients has its limitation due to diminished clinical manifestations of the disease and diagnostic methods.[11] A high level of specificity (83.3 - 99.0%) and accuracy (72.1 - 89.2%) of the method in detecting ≥ 50% stenosis has been reported for an ankle brachial index (ABI) ≤ 0.90.[12] The present study was conducted to evaluate ankle brachial index (ABI) in peripheral vascular disease (PVD) in type 2 diabetes mellitus patients.

In present study, we found that out of 68 patients, males were 40 and females were 28. Singh et al[13] correlated ankle brachial index (ABI) with peripheral vascular disease (PVD) in type 2 diabetes mellitus in 100 patients in the age group of 30 to 80 years. The mean age was 60.04 ± 5.03 years, mean body mass index was 27.10 ± 2.67 kg/m2 and mean duration of diabetes was 7.75 ± 1.50 years. Among the 68 diagnosed cases of PVD on CDU, 70.6% cases were detected to have PVD by the ABI method (true positive) whereas 20 (29.4%) cases remained undiagnosed when ABI alone was used for the diagnosis (false negative). Conversely, among 51

diagnosed cases of PVD by ABI method 5.9% cases were found to be normal on CDU (false positive). The ABI method was found to have specificity of 88.5% but the sensitivity was only 70.6%.

We found that mean ABI <0.5 was seen in 20, 0.5-0.9 in 16 and 0.9- 1.3 in 32 patients. Felicio et al[14] in their study a total of 711 subjects were divided into groups: group 1, 600 type 2 diabetes mellitus patients, symptomatic or not for peripheral arterial disease; group 2, 61 type 2 diabetes mellitus patients newly diagnosed and drug naïve; and group 3, 50 subjects without diabetes. Ankle-brachial index, medical records and physical examination were performed in all patients, accessing cardiovascular risk factors. Analysing group 1 asymptomatic patient to peripheral arterial disease, we found abnormal ankle-brachial index in 49% (77/156) ⩾50years and 42% (16/38) <50years (p=not significant). Considering drug-naïve patients, a peripheral arterial disease prevalence of 39% (24/61) was found; among these, 48% (13/27) were <50years and 32% (11/34) were ⩾50years (p=not significant). A forward stepwise regression model was developed, with type 2 diabetes mellitus duration (r2=0.12) and sedentary lifestyle (r2=0.14) found as independent variable predictors of severity of peripheral arterial disease, related to ankle-brachial index.

Joosten et al[15] analysed the association between smoking, hypertension, hypercholesterolaemia and T2DM as PAD predictors in men, have concluded that patients who did not present one or more of these risk factors had 77% lower risk of developing this disease. Weragoda et al[16] pointed not only DM, hypertension, dyslipidaemia and smoking as principal risk factors for PAD but also its lack of awareness, which leads to delayed diagnosis, low compliance and unfavourable outcomes. Therefore, measuring ABI as early as possible in all T2DM patients becomes more imperative.

CONCLUSION

Authors found that most of the patients had ABI between 0.9-1.3 in DM patients with PVD.

REFERENCES

1. Pistrosch F, Natali A and Hanefeld M. Is hyperglycemia a cardiovascular risk factor? Diabetes Care 2011; 34: S128–S131.
2. Norgren L, Hiatt WR, Dormandy JA, et al. Inter-society consensus for the management of peripheral arterial disease (TASC II). J Vasc Surg 2007; 45: S5–S67.
3. Aderval Aragão J, Prado Reis F, Ribeiro Borges Neto R, et al. Prevalence of peripheral occlusive arterial disease in patients with chronic renal failure. J Vasc Bras 2009; 8: 301–306.
4. Rooke TW, Hirsch AT, Misra S, et al. 2011 ACCF/AHA focused update of the guideline for the management of patients with peripheral artery disease (Updating the 2005 Guideline). Vasc Med 2011; 16: 452–476.
5. Haskell WL, Lee IM, Pate RR, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc 2007; 39: 8: 1423–1434.
6. Gerhard-Herman MD, Gornik HL, Barrett C, et al. 2016 AHA/ACC guideline on the management of patients with lower extremity peripheral artery disease: executive summary: a report of the American College of Cardiology/ American Heart Association Task Force on Clinical Practice Guidelines. Circulation 2017; 135: e686–e725.
7. Imai E, Horio M, Nitta K, et al. Modification of the Modification of Diet in Renal Disease (MDRD) study equation for Japan. Am J Kidney Dis 2007; 50: 927–937.
8. Parmenter BJ, Raymond J, Dinnen P, et al. High-intensity progressive resistance training improves flat-ground walking in older adults with symptomatic peripheral arterial disease. J Am Geriatr Soc 2013; 61: 1964–1970.
9. Askew CD, Parmenter B, Leicht AS, et al. Exercise & Sports Science Australia (ESSA) position statement on exercise prescription for patients with peripheral arterial disease and intermittent claudication. J Sci Med Sport 2014; 17: 623–629.
10. Strandness Jr DE, Bell JW. Peripheral vascular disease: Diagnosis and objective evaluation using a mercury strain gauge. Ann Surg 1965; 161 (Suppl 4): 4. 1
11. Premalatha G, Shanthirani S, Deepa R et al. Prevalence and risk factors of peripheral vascular disease in a selected South Indian population: the Chennai Urban Population Study. Diabetes Care 2000; 23 (9): 1295-300.
12. Pecoraro RE, Reiber GE, Burgess EM. Pathways to diabetic limb amputation: basis for prevention. Diabetes Care 1990; 13 (5): 513-21.
13. Singh T, Manaswi Chaubey, Chaturvedi PK. Correlation of Ankle Brachial Index with Peripheral Vascular Disease in Type 2 Diabetes Mellitus. JIACM 2018; 19(1): 13-16.
14. Felício JS, Koury CC, Abdallah Zahalan N, de Souza Resende F, Nascimento de Lemos M, Jardim da Motta Corrêa Pinto R, Jorge Kzan de Souza Neto N, Imbelloni Farias de Franco I, Neres Iunes de Oliveira MC, Leite de Alcântara A, Contente Braga de Souza AC. Ankle-brachial index and peripheral arterial disease: An evaluation including a type 2 diabetes mellitus drug-naïve patients cohort. Diabetes and Vascular Disease Research. 2018 Jul;16(4):344-50.
15. Joosten MM, Pai JK, Bertoia ML, et al. Associations between conventional cardiovascular risk factors and risk of peripheral artery disease in men. JAMA 2012; 308(16): 1660.
16. Weragoda J, Seneviratne R, Weerasinghe MC, et al. Risk factors of peripheral arterial disease: a case control study in Sri Lanka. BMC Res Notes 2016; 9(1): 508.