

A STUDY OF ANKLE BRACHIAL INDEX IN YOUNG TYPE-2 DIABETES MELLITUS PATIENTS*Tanmay Ramesh Gandhi¹, Anil H. Inamdar²*¹Senior Resident, Department of General Medicine, Acharya Vinoba Bhave Rural Hospital, Datta Meghe Institute of Medical Sciences (DU), Sawangi (Meghe), Wardha, Maharashtra.²Professor, Department of General Medicine, Acharya Vinoba Bhave Rural Hospital, Datta Meghe Institute of Medical Sciences (DU), Sawangi (Meghe), Wardha, Maharashtra.

ABSTRACT

BACKGROUND

Diabetes mellitus is a major public health challenge of the twenty-first century. Long standing diabetes mellitus is associated with an increased prevalence of micro-vascular and macro-vascular diseases. Peripheral vascular disease is one of the most common and important complication of diabetes mellitus. The ABI is a very simple, non-invasive test that can be performed easily in the office by using a handheld Doppler device. The ABI is a very simple, non-invasive test that can be performed easily in the office by using a handheld Doppler device.

Aims and Objectives- 1) To study the ankle brachial index and prevalence of Peripheral Vascular Disease in young type 2 diabetes mellitus patients. 2) To compare the ankle brachial index in young type II diabetic subjects and non-diabetic subjects. 3. To correlate the findings of Ankle Brachial Index with age, sex, duration of diabetes, lipid profile and risk factors of PVD.

MATERIALS AND METHODS

Randomly selected 100 cases of Young (Age≤45 years) Type 2 Diabetes Mellitus and 100 non-diabetic young patients of the same age group were studied which were admitted to medical wards or were examined in OPD at Acharya Vinoba Bhave Rural Hospital, Sawangi, Meghe, Wardha between September 2014 to August 2016. It was a prospective type of case control study.

RESULTS

Abnormal ABI (≤ 0.9) was noticed in 13% subjects of case group and only in 4% subjects of the control group. The difference in mean ABI in cases and controls was statistically significant ($p < 0.05$). Normal ABI (1.0-1.3) was present in 54% cases and 85% controls. 33% cases and 12% controls had a borderline ABI (0.91-0.99).

CONCLUSION

Thus, it could be concluded that the subjects of case group had a higher probability for prevalence of PAD (13%) as compared to subjects of the control group with 4% prevalence. This in turn indicated that patients with type 2 diabetes mellitus are at a higher risk for developing PAD as compared to normal subjects.

KEYWORDS

Ankle Brachial Index, Type 2 Diabetes Mellitus.

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BACKGROUND

Diabetes mellitus is a major public health challenge of the twenty-first century. The explosive increase in the prevalence of diabetes seen in the last three decades poses huge clinical and economic burden in many countries.¹

It is estimated that by 2025 AD world will have 300 million diabetes patients. By 2025 AD India will have highest number of diabetes patients i.e. 57 million.²

India is one of the epicentres of the global diabetes mellitus pandemic. Rapid socioeconomic development and demographic changes, along with increased susceptibility for Indian individuals, have led to the explosive increase in the prevalence of diabetes mellitus in India over the past four decades. Type 2 diabetes mellitus in Asian Indian people is characterized by a young age of onset and occurrence at low levels of BMI. Available data also suggest that the susceptibility of Asian Indian people to the complications of diabetes mellitus differs from that of white populations.³

Risk factors for developing type 2 diabetes, peculiar to the Indian population are high familial aggregation, central obesity, insulin resistance and life style changes due to urbanization. In India nearly 75% of the Type 2 diabetics have first degree family history of diabetes indicating a strong familial aggregation.⁸ Comparison of Asian Indians, Europeans and other ethnic groups have shown that the former have higher insulin response than others, at fasting and in response to glucose.⁴

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Complications of Diabetes mellitus basically produces changes in the blood vessels and hence can affect almost every part of the body. Long standing diabetes mellitus is associated with an increased prevalence of micro-vascular and macro-vascular diseases. They include diabetic nephropathy, coronary heart disease (CHD), diabetic foot, peripheral vascular disease, diabetic neuropathy etc. Clustering of cardiovascular risk factors or syndrome X- namely central obesity, general obesity, hyperinsulinemia, dyslipidaemia, hypertension and glucose intolerance has been noted in urban Indians in various studies.⁵

Peripheral vascular disease is one of the most common and important complication of diabetes mellitus.⁶

Peripheral vascular disease has range of different clinical presentation from pain with walking (intermittent claudication) to gangrene. Diabetes accounts for about 50% of all non-traumatic amputations in India because of Diabetic foot. There is strong correlation between presence of peripheral vascular disease, Coronary artery disease and cerebrovascular accidents.⁷

The risk of developing PAD is much higher in patients with diabetes, and the disease is more severe and progresses more rapidly than in non-diabetic individuals.⁸

The presence of lower extremity ischaemia in the type 2 DM patients is often suggested by a combination of the clinical signs and symptoms plus the abnormal results on several non-invasive vascular tests like the transcutaneous oxygen measurement, the ABI and the absolute toe systolic pressure. Among them, the ABI has a proven role, both in the diagnosis of PAD and in the baseline assessment of the individuals who are at a risk of cardiovascular diseases.⁶

The ABI is a very simple, non-invasive test that can be performed easily in the office by using a handheld Doppler device. The Ankle-Brachial Index (ABI) is the ratio of the systolic pressure at the ankle to that in the arm. Generally, the higher systolic pressure in the dorsalis pedis and in the posterior tibial arteries serves as the numerator and the higher systolic pressure in the brachials serves as the denominator. A low ABI of 0.9 or <0.9 is a useful diagnostic tool for detecting PVD and it is also considered as a strong predictor of the cardiovascular morbidity and mortality.⁶

It is important to diagnose PAD in patients with diabetes to elicit symptoms, prevent disability and limb loss, and identify a patient at high risk of MI, stroke, and death. The diagnosis is made with a determination of the ABI. It is recommended that patients with diabetes who are >50 years of age have an ABI performed. An ABI is also useful in patients with other PAD risk factors and in those with symptoms.⁹

Since PVD is common in type 2 diabetes mellitus patients, this study was conducted to study its prevalence in young patients and risk factors which influence its occurrence.

Aim

The present study is carried out with the aim to study the ankle brachial index in young type 2 diabetes mellitus patients.

Objectives

1. To study the ankle brachial index and prevalence of Peripheral Vascular Disease in young type 2 diabetes mellitus patients.
2. To compare the ankle brachial index in young type II diabetic subjects and non-diabetic subjects.
3. To correlate the findings of Ankle Brachial Index with age, sex, duration of diabetes, lipid profile and risk factors of PVD.

MATERIALS AND METHODS

Study Design

Prospective Type of Case Control Study

Setting

This study was carried out at Acharya Vinoba Bhave Rural Hospital (AVBRH) a tertiary care hospital attached to JNMC, Wardha in Central India.

Study Period

2 years (September 2014 to August 2016)

Ethical Clearance

Ethical Clearance was taken from the ethical committee of Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha.

Cases

(100 cases and 100 controls) Randomly selected 100 cases of Young (Age ≤ 45 years) Type 2 Diabetes Mellitus and 100 non-diabetic young patients of the same age group were studied which were admitted to medical wards or were examined in OPD at Acharya Vinoba Bhave Rural Hospital, Sawangi Meghe, Wardha

Selection criteria of subjects under study

Inclusion Criteria

1. Cases of Diabetes Mellitus Type II on Insulin or oral hypoglycaemic agent therapy or on diet control with age ≤ 45 years.
2. Newly diagnosed cases of Type II diabetes mellitus.

Exclusion Criteria

1. Type I diabetes mellitus patients
2. Patients with cellulitis in lower limbs
3. Patients with bilateral gross oedema of lower limbs
4. Patients with pre-existing gangrene of lower limb/limbs of Peripheral Vascular Disease.
5. Patients with pre-existing Buerger's Disease or Thromboangiitis obliterans
6. Patients not consenting for the study.

Informed Consent

A written informed consent as per the proforma (Annexure II) was obtained from all participants of the study after explaining the nature of procedure.

Those participants who were not willing for the procedure were excluded from the study.

Study Protocol

A total of 100 patients of diabetes mellitus with fasting blood glucose more than 126 mg/ Or post meal blood glucose level more than 200 mg/dl were selected as cases using purposive sampling techniques.

A detailed history in the form of age, gender, occupation, previous chronic diseases, use of any medications was taken according to the proforma attached in Annexure I.

Also history with regard to duration of type II diabetes mellitus, doses of drugs including oral hypoglycaemic agents and insulin received was taken.

A detailed past history was obtained to find out evidence of any risk factors like hypertension and smoking. Patients with recent history of smoking (24 hours prior to the examination) were excluded from the study as according to a study by Yataco et al., the ABI on the smoking day is lower than on the non-smoking day owing to a lower ankle systolic blood pressure. Brachial systolic blood pressures, heart rate, and calf blood flow are not altered by smoking.¹⁰

A detailed general physical examination and systemic examination was carried out in all subjects.

100 subjects were selected as controls with no previous history of diabetes mellitus, hypertension or peripheral vascular disease.

Anthropometric Measurements

Anthropometric features including weight, height, waist circumference (WC), hip circumference (HC) were measured by standard method to calculate the Body Mass Index (BMI) and waist hip ratio.

After physical examination, biochemistry measurements including Fasting blood sugar (FBS), Post meal blood sugar (PMBS), Fasting Lipid Profile and Urine Albumin were done in all subjects.

Specific Investigations:

Ankle Brachial Index (ABI) Measurement

The ankle brachial index measurement was done in all subjects after they were stabilized in wards or outpatient department. The measurement was done using ALOKA PROSOUND; Model – PROSOUND ALPHA 7; Serial No. - 20259721; Probe No. 4 machine (without printer).

Methodology of Measurement of ABI

Measurement of Ankle Brachial Index.¹¹

Patients should be lying flat with the head and heels fully supported i.e. not hanging over the end of the examination table. The patient was kept at rest for 5 -10 minutes in a room with comfortable temperature (19^o-22^oC/66^oF-72^oF)

The patient was not to smoke at least 24 hours before the ABI measurement. The cuff was chosen adequately according to the limb size of the subject. The width contour was at least 40% of the limb circumference.

The arm should be supported at heart level. Position the cuff with tubing away from the probe as this may interfere with the probe positioning.

Step 1

The brachial systolic pressure was measured in both arms.

The patient was allowed to rest for 5-10 minutes in the supine position.

The BP cuff was placed on patient's upper arm with the lower edge approximately 1 inch above the Antecubital fossa.

The brachial pulse was palpated after which conductivity gel was applied over the brachial artery. The tip of the probe was placed into the gel at a 45-60-degree angle until clear arterial pulse sounds are heard.

The cuff was inflated to the point that pulse sounds disappear, then we increased the pressure by 20 mm Hg above that point.

Slowly the cuff was deflated at a rate of 2 mm Hg per sec and the point where arterial pulse sound returns was recorded.

The procedure was repeated in the other arm.

The higher of the two brachial systolic pressure readings was used to calculate the ABI.

There should be a difference of less than 10 mm Hg between each brachial BP.

Step 2

Measurement of the posterior tibial and dorsalis pedis systolic pressures in both legs:

The BP cuff was placed on the patient's leg approximately 2 inches above the ankle's medial malleolus.

The posterior tibial (PT) pulse was located and the Doppler probe was positioned accordingly, and the systolic pressure was measured.

On the same leg, the dorsalis pedis (DP) pulse was located and the systolic pressure was measured.

The above procedure was repeated for the other leg.

The higher of the two-ankle systolic pressure was selected and used for calculation of the ABI.

Step 3

To calculate the ABI, each ankle systolic pressure was divided by the brachial systolic pressure.

Highest ankle pressure / Highest brachial pressure = Ankle Brachial Index (ABI)

Interpretation of ABI

At present, the Peripheral Vascular Laboratory uses the following parameters in classifying the severity of PAD by ABI (adapted from ACA/AHA practice guidelines 2005)¹²

- 1)>1.30 – Non-compressible (indicates significant medial wall calcification).
- 2)1.0 - 1.30 – Normal.
- 3)0.91 - 0.99 - Equivocal or Borderline PAD.
- 4)0.41 – 0.90 - Mild to moderate peripheral arterial disease.
- 5)0.00- 0.40 – Severe peripheral arterial disease.

An ABI <0.9 suggests significant narrowing of one or more blood vessels in the leg. The majority of patients with

claudication have ABI ranging from 0.3 to 0.9. Rest pain or severe occlusive diseases typically occurs with an ABI <0.5. ABIs <0.2 are associated with ischemic or gangrenous extremities.

Statistical Methods

The data was collected and stored in an electronic spreadsheet (Microsoft Excel 2016, Redmond, Washington, USA).

A descriptive statistical analysis was carried out in this study. The results on the continuous measurements were presented as mean $\pm$ SD and the results on the categorical measurements were presented in number (%).

Statistical analysis was done by using descriptive and inferential statistics using chi-square test, z-test, Student's t test (two tailed, independent), Pearson's correlation coefficient, multiple regression analysis and one-way ANOVA and software used in the analysis were SPSS 17.0 version, EPI-INFO and Graph Pad Prism 6.0 version and $p < 0.05$ is considered as level of significance.

Conclusions were drawn from the data collected after analysing the results statistically.

RESULTS

The present study entitled "A Study of Ankle Brachial Index in Young Type-2 Diabetes Mellitus Patients" was conducted in the Department of Medicine, Acharya Vinobha Bhave Rural Hospital, Jawaharlal Nehru College, Sawangi (Meghe), Wardha.

It was a prospective type of case control study with a total of 200 subjects of which 100 were included in study group i.e. young type 2 diabetes mellitus patients according to inclusion criteria and rest 100 were matching to study group except they were non-diabetic and included in control group.

Characteristics	Cases (n=100)	Control (n=100)	P Value
Age (in years)	37.75 $\pm$ 3.62	36.61 $\pm$ 4.58	0.053, NS
Gender (M: F)	60: 40	54: 46	0.39, NS
BMI(kg/m ²)	23.38 $\pm$ 3.31	22.46 $\pm$ 2.70	0.032, S
Waist –Hip Ratio	0.89 $\pm$ 0.10	0.88 $\pm$ 0.09	0.833, NS
FBS (mg/dl)	149.10 $\pm$ 35.72	99.58 $\pm$ 12.46	0.0001, S
PMBS (mg/dl)	201.08 $\pm$ 49.90	130.60 $\pm$ 16.67	0.0001, S
TC (mg/dl)	174.54 $\pm$ 40.10	166.94 $\pm$ 36.43	0.162, NS
TG (mg/dl)	132.78 $\pm$ 61.37	115.50 $\pm$ 40.14	0.019, S
HDL (mg/dl)	34.61 $\pm$ 4.71	35.76 $\pm$ 4.64	0.084, NS
LDL (mg/dl)	107.25 $\pm$ 34.55	97.82 $\pm$ 27.72	0.035, S
VLDL (mg/dl)	25.27 $\pm$ 12.12	22.96 $\pm$ 8.76	0.124, NS
SBP (mmHg)	130.34 $\pm$ 15.37	121.10 $\pm$ 13.84	0.0001, S
DBP (mmHg)	80.90 $\pm$ 9.06	76.02 $\pm$ 8.62	0.0001, S
Urine Albumin	16%	9%	0.12, NS
Hypertension	34%	0%	-
Smoking	16%	0%	-

Table 1. Baseline Characteristics

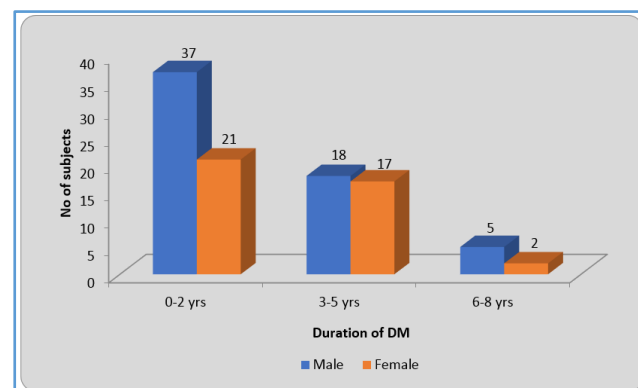
Table 1 shows the baseline characteristics of the study group and the control group.

Duration of DM	Male	Female	Total	χ^2 -value
0-2 yrs.	37	21	58	1.80 p=0.40, NS
3-5 yrs.	18	17	35	
6-8 yrs.	5	2	7	
Total	60	40	100	
Mean $\pm$ SD	2.58 $\pm$ 1.78	2.84 $\pm$ 1.78	2.68 $\pm$ 1.77	

Table 2. Duration of Diabetes in Subjects of Case Group

In the present study, mean duration of diabetes in subjects of case group was 2.68 $\pm$ 1.77 years. Minimum duration was 4 months and maximum duration was 8 years. Majority of patients (58%) had duration of diabetes between 0-2 years.

The duration was similar in both males and females with a mean of 2.58 $\pm$ 1.78 years in males and 2.84 $\pm$ 1.78 years in females.



Graph 1: Duration of Diabetes in Subjects of Case Group

Mode of Treatment	Male	Female	Total	χ^2 -value
OHA	53	37	90	1.80 p=0.40, NS
Insulin	7	3	10	
Total	60	40	100	

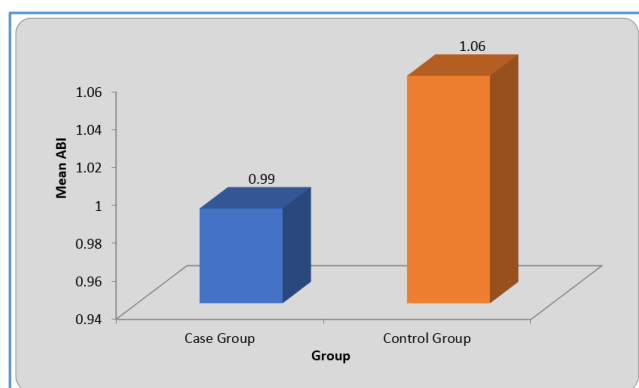
Table 3. Mode of Treatment in Case Group

Table 3 shows the distribution of subjects of case group according to the mode of treatment for diabetes mellitus.

Group	N	Mean	Std. Deviation	Std. Error Mean	z-value	p-value
Case Group	100	0.99	0.08	0.09	5.54	0.0001, S
Control Group	100	1.06	0.08	0.09		

Table 4. Comparison of ABI in Case and Control Group

Table 4 shows the comparison of mean ankle brachial index in case and control groups.

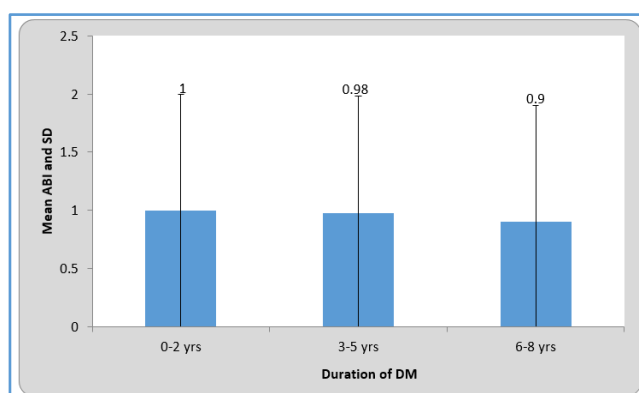


Graph 2. Comparison of ABI in Case and Control Group

Duration of DM (in years)	No. of Patients	Mean ABI	SD	F-value
0-2 yrs.	58	1.00	0.08	5.10 p=0.008, S
3-5 yrs.	35	0.98	0.09	
6-8 yrs.	7	0.90	0.05	
Total	100	0.99	0.08	

Table 5. Correlation of Duration of DM with ABI

Table 5 shows the correlation of duration of diabetes with ankle brachial index in subjects of case group.



Graph 3. Correlation of Duration of DM with ABI

DISCUSSION

The present study entitled "A Study of Ankle Brachial Index in Young Type-2 Diabetes Mellitus Patients" was carried out at Department of Medicine, Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha. The present study was primarily aimed to study the ankle brachial index in young type 2 diabetes mellitus patients. The study also had objectives to study the prevalence of Peripheral Arterial Disease in young type 2 diabetes mellitus patients and to study the comparison of ankle brachial index in young type II diabetics and non-diabetics. The correlation of Ankle Brachial Index (ABI) with duration of diabetes, lipid profile and other risk factors was also studied.

This study was a prospective type of case control study carried out over a period of 2 years and included 200 subjects.

A total of 100 patients each were selected as cases and controls based on the inclusion and exclusion criteria.

The subjects in this study can be considered as being with short duration of diabetes and relatively healthy. Intensive complication tests are not usually indicated for these patients; and patients themselves do not realize the importance of such tests. Therefore, the finding of this study may have clinical importance in this aspect.

Age Distribution

In this study, the age of the subjects of case group ranged from 30 to 45 years with a mean age of 37.75 ± 3.62 years. The mean age of the population under study in other studies done worldwide is given below:

Studies	Age (Mean $\pm$ SD) in years
Choi et al ¹² (2012)	37.0
Premalatha et al ¹³ (2000)	46 $\pm$ 15.0
Sosale et al ¹⁴ (2012)	53.21 $\pm$ 11.37
Agarwal et al ¹⁵ (2012)	59.4 $\pm$ 7.2
Solanki et al ¹⁶ (2012)	54.72 $\pm$ 10.68
Present study	37.75 $\pm$ 3.62

Table 6

Choi et al¹² (2012) conducted a study which included 103 diabetic patients aged between 34 – 39 years. Mean age of the study group was 37 years. This correlated well with our study where mean age of subjects was 37.75 ± 3.62 years with a range of 30-45 years.

Ankle Brachial Index among Cases and Controls

In the present study, an ankle brachial index ≤ 0.90 was considered as evidence of PAD (symptomatic or asymptomatic) and ABI between 0.91-0.99 was considered to be borderline PAD.

ABI between 1.0-1.3 was considered to be normal. The mean ABI in subjects of case group was 0.99 ± 0.08 and in subjects of control group it was 1.06 ± 0.08 .

The difference of mean ABI between cases and controls was statistically significant ($p=0.0001$, S) with cases having a mean ABI in the borderline range and controls having a mean ABI in the normal range.

In a study conducted by Thejaswini K.O. et al⁶ (2013), the mean ABI in subjects of case group was 0.97 ± 0.12 and in controls it was 1.02 ± 0.06 . This fairly correlates with our study where mean ABI in subjects of case group was 0.99 ± 0.08 and 1.06 ± 0.08 in controls.

In a study conducted by Solanki et al¹⁶ (2012), the mean ABI in 110 type 2 diabetes mellitus cases were found to be 0.99 ± 0.19 which correlated well with our study.

Here in our study, 13% subjects in the case group and 3% subjects in the control group had an ABI less than or equal to 0.90 who were labelled to have Peripheral Arterial Disease (symptomatic or asymptomatic). In a study conducted by Vicente et al¹⁷ (2006), the prevalence of a low ABI (≤ 0.9) in subjects with or without diabetes was 11.3% and 4.3% and the prevalence of a pathological ABI was 18.8% and 7%, respectively. This correlated well with our

study where the prevalence of low ABI (≤ 0.9) in cases and controls was 13% and 3% respectively. This indicates that subjects with diabetes mellitus have an increased probability of the prevalence of Peripheral Arterial Disease than normal subjects.

In another study conducted by Sosale et al¹⁴ (2012) on 600 type 2 diabetes patients, 17.8% of cases were detected to have PAD with ABI ≤ 0.90 . Faglia et al¹⁸ (2005) also conducted a study in 2559 newly diagnosed type 2 diabetes mellitus subjects in whom an ABI of ≤ 0.9 indicating symptomatic or symptomatic PAD was found in 21.1% of patients.

Duration of Diabetes in Case Group and its Correlation with Ankle Brachial Index

In the present study, the mean duration of diabetes was 2.68 ± 1.77 years with a range of 4 months - 8 years. In a study conducted by Choi et al¹² (2012), the mean duration of diabetes was 3.0 years with a range of 1 to 7 years which is comparable to the present study. The mean duration of diabetes in subjects in previous studies done worldwide are as follows:

Study	Mean duration $\pm$ SD (in years)
Choi et al ¹² (2012)	3.0
Agrawal et al ¹⁵ (2012)	8.0 ± 3
Sosale et al ¹⁴ (2012)	7.95 ± 7.50
Banait VS et al ¹⁹ (2000)	9.75 ± 3.77
Premlatha et al ¹³ (2000)	11.7 ± 8.1
Present Study	2.68 ± 1.77

Table 7

Maximum cases (58%) in the present study were recently diagnosed cases of diabetes mellitus with duration of diabetes between 0 – 2 years.

In the present study, ankle brachial index was correlated with duration of diabetes in the case group.

Cases with duration between 0-2 years (58%) had a mean ABI of 1.00 ± 0.08 and those with a duration of diabetes between 3-5 years (35%) had a mean ABI of 0.98 ± 0.09 .

Cases with a longer duration of diabetes i.e. between 6-8 years (7%) had a mean ABI of 0.90 ± 0.05 which was significantly lower as compared to cases with duration of diabetes between 0-2 years (1.00 ± 0.08) and 3-5 years (0.98 ± 0.09).

In a study conducted by Borse et al (2013),²⁰ subjects with type 2 diabetes mellitus were divided into two groups according to ABI. The first group had an ankle brachial index between 0.9 and 0.6 and the second group had an ABI less than 0.6. The mean duration of diabetes in the first group was 10.57 ± 5.14 years, whereas in the second group it was 15.00 ± 5.22 years. This shows a higher prevalence of lower ABI i.e. PAD in cases with longer duration of diabetes. Our study also shows a lower ABI in cases with longer duration of diabetes and confirms the findings in the comparison study mentioned above.

In another study done by Adler et al²¹ (2002) the prevalence of PAD was estimated up to 18 years after the diagnosis of diabetes in 4, 987 subjects (United Kingdom Prospective Diabetes Study (UKPDS²² (1998))). The data showed a higher prevalence of PAD in those with longer duration of diabetes.

Ankle Brachial Index and Other Risk Factors

In the present study, a subject was said to have to have dyslipidaemia if any of the parameters of lipid profile was abnormal. Total cholesterol (TC), low density lipoprotein (LDL), very low-density lipoprotein (VLDL), high density lipoprotein (HDL) and triglyceride levels (TG) were evaluated in all cases and controls as components of the lipid profile.

Here in our study, 36 out of 100 subjects in the case group had dyslipidaemia. 64 subjects had a normal lipid profile.

The mean ABI in cases with dyslipidaemia was 0.95 ± 0.07 whereas in cases with normal lipid profile the mean ABI was found to be 1.01 ± 0.08 . The difference in mean ABI between cases with dyslipidaemia and normal lipid profile was found to be statistically significant ($p < 0.05$).

This shows the probability of the prevalence of PVD in type 2 diabetics is more in subjects with dyslipidaemia than in subjects with normal lipid profile.

Previous studies, like those of Walters et al²³ (1992), Mohan et al²⁴ (1995) and Li et al²⁵ (2007), also found serum total cholesterol levels as to be one of the predictive factors for PAD thus correlating with the findings in our study.

We did not find a correlation with other risk factors, i.e. history of hypertension, smoking and obesity in the present study.

It is of interest that smoking did not come out as the major risk factor, but this could be because the smoking history is unreliable. Smokers rarely give an accurate account of their smoking habits.

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