ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-7 | JULY-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PERIPHERAL VASCULAR DISEASE IN TYPE 2 DIABETES MELLITUS PATIENTS – A HOSPITAL BASED STUDY

General Surgery

Dr. Alex Arthur Edwards — Professor of surgery, Tirunelveli medical college, Tirunelveli

Dr. B. M. Pabitha Devi — Associate professor of surgery, Tirunelveli medical college, Tirunelveli. - Corresponding Author

DR. Navaneetha krishnan — POST GRADUATE IN SURGERY

ABSTRACT

INTRODUCTION :Diabetic peripheral neuropathy and PVD both contribute to the development of a diabetic foot. The risk of amputation increases in the presence of PVD. The modifiable risk factors associated with development of PVD in diabetes are found to be advancing age, uncontrolled hyperglycemia, hypertension, dyslipidemia and smoking. Effective implementation of preventive measures in the targeted highrisk group will pave the way for limb protection.

AIM OF STUDY: The main objectives of the study are as follows

1. To estimate the proportion of PVD among type 2 diabetes mellitus patients.
2. To determine the risk factors associated with the development of PVD.
3. To determine the role of ABPI in predicting PVD.

MATERIALS AND METHODS : After obtaining informed written consent, 75 randomly chosen established cases of type 2 diabetic mellitus attending Tirunelveli Medical College between September 2014 and September 2015 have formed the study sample and followed up every 3 months for subsequent 1 year. Lipid profile, h/o smoking and h/o hypertension were recorded. During each follow up the glycemic control of the patient, Hypertension control were analyzed. A comprehensive physical examination was done with focus to the peripheral nerve and vascular examination. ABPI was recorded during the start of the study, during each follow up and at the end of 1 year.

RESULTS AND OBSERVATION: The incidence of PVD is 9.33%. Incidence of PVD was maximum in the geriatric age group with a mean age of 63.57 years Incidence of PVD was 10% among the Males and 7% among the Females. The mean duration of diabetes for the PVD in the sub group is 13.57 years. 33.33%of HT with DM had PVD compared with 3.33% of Normotensives with Diabetes. The incidence of PVD in smoker male was 25% when compared with that of non-smokers (0%). Those with elevated lipid profile had an increased incidence of PVD (20%) when compared with that of the normal lipid profile patients (2.22%). In this study, among 8 patients with ABPI of <0.9, 7 patients had the duplex evidence of PVD.

CONCLUSION : Incidence of PVD is about 10% in the present study. This has to be viewed seriously considering the huge diabetic population and due importance to be given for screening and prevention of PVD.Almost all of the PVD patients are totally asymptomatic and hence the need for active screening with estimation of ABPI is to be done annually for all diabetes patients. Modifiable risk factors to be controlled to prevent the development of PVD.

KEYWORDS:

Peripheral vascular disease (PVD), diabetes mellitus, hypertension, smoking, dyslipedemia

BACKGROUND OF STUDY

Diabetic peripheral neuropathy [1] and PVD both contribute to the development of a diabetic foot. But, the risk of amputation increases only if there is an associated PVD. In the presence of PVD in an individual, the time duration taken up for development of gross limb ischemia and life threatening sepsis after an injury is very rapid. Diabetes predominately leads to PVD involving the anterior and posterior tibial and the peroneal arteries[2].

The modifiable risk factors associated with development of PVD in diabetes are found to be advancing age, uncontrolled hyperglycemia, hypertension, dyslipidemia and smoking[3-5].Moreover, PVD is a sign of severe generalized atherosclerosis (especially CAD), which should be treated aggressively. Early diagnosis and treatment is of utmost importance in any patients with all those risk factor associated with diabetes mellitus[6].

Effective implementation of preventive measures in the targeted highrisk group will pave the way for limb protection.

This include the following changes in the life style of the patient.

1. Cessation of smoking
2. Physical activity and exercise
3. Diet modification

These changes along with oral hypoglycemic, insulin, anti-hypertensives, lipid lowering agents, anti-platelets & haemorrheological agents will also keep the risk factors under control thereby delaying the of disease process[7-9].

AIM OF STUDY

The objectives of the study are

1. To estimate the proportion of PVD among type 2 diabetes mellitus patients.
2. To determine the risk factors associated with the development of PVD.
3. To determine the role of ABPI in predicting PVD.

INCLUSION AND EXCLUSION CRITERIA

After obtaining informed written consent, 75 randomly chosen established cases of type 2 diabetic mellitus attending Tirunelveli Medical College between September 2014 and September 2015 have formed the study sample and followed up every 3 months for subsequent 1 year.

Patients who have other potential causes for PVD other than diabetes related factors were excluded from the study.

The exclusion criteria used were

1. Clinical evidence of thromboangitis obliterans, as per Ollin's criteria
2. Suspected arteritis subjects
3. Collagen vascular disorders
4. Known case of diabetic PVD.

Clinical criteria (Ollin's criteria) for thromboangiitis obliterans includes:

1. Age <45 years
2. Tobacco exposure
3. Absolute peripheral vascular involvement (distal to knee & elbow)
4. Absence of other atherosclerotic risk factors

STUDY DESIGN
Cross sectional study

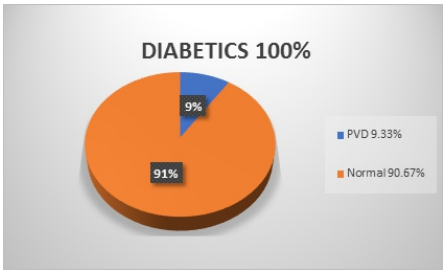
PROTOCOL
Patients were interviewed with special note on elicitation of history regarding symptoms of PVD, in the form of intermittent claudication, ischemic rest pain, history of foot ulcers in the past and present. Smoking habit also was recorded and classified as smokers and non-smokers. HbA1C values and duration of diabetes since diagnosis was recorded and they were grouped accordingly. Fasting lipid profile was taken and results were compared with normal limits and patient classified as dyslipidemic patients. Also, they are documented as normotensive, hypertensive not on drugs or on anti-hypertensive medications. In hypertensive, the duration of hyper tension since diagnosis was also noted.

A comprehensive physical examination was done with focus to the peripheral nerve and vascular examination. ABPI was recorded during the start of the study, during each follow up and at the end of 1 year.

STATISTICAL TOOL
The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done and 'p' values were calculated. Chi-square test (socscistatistics.com) was used to test the significance of difference between quantitative variables. 'p' < 0.05 denotes significant relationship.

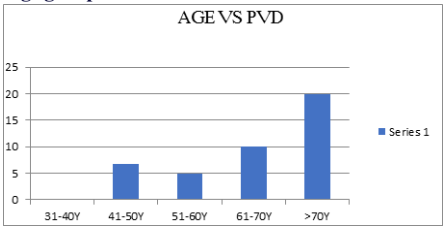
RESULTS AND OBSERVATION
Incidence of peripheral vascular disease
The total number of cases studied - 75. The incidence of PVD - 9.33% (n = 7) (Chart1).

Chart 1. Incidence of PVD in diabetic patients.



Age distribution of PVD
The age of patients studied ranged from 33 years to 73 years. Incidence of PVD was maximum in the geriatric age group with a mean age of 63.57 years (chart 2).

Chart 2. Age group wise distribution of cases



Sex distribution of PVD
Males constituted 64% (n = 48) and Females 36% (n = 27) of the study group (Table 3). Incidence of PVD was 10% among the Males (n = 5) and 7% among the Females (n = 2).

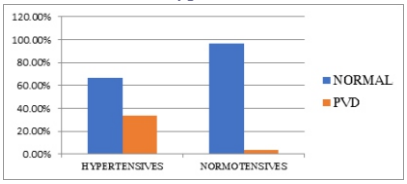
Duration of diabetes mellitus and PVD
The duration of diabetes ranged from 1 to 20 years. The mean duration of diabetes for the PVD in the sub group is 13.57 years. (Table 1).

Table – 1. Relation of duration of diabetes with PVD

Diabetes duration years	Total number of case	PVD	NO PVD
< OR = 5	49 (65.33%)	1 (2.04%)	48 (97.96%)
6 – 10	8 (10.67%)	1 (12.5%)	7 (87.5%)
>10	18 (24%)	5 (27%)	13 (73%)
Total	75 (100%)	7 (9.33%)	68 (90.67%)

Hypertension and PVD
Prevalence of hypertension was 20% (n = 15) among the study group. Among the hypertensive diabetic subjects (n=15), 33.33% had PVD and the incidence of PVD among normotensive diabetes subjects (n = 60) was 3.33% which was statistically significant (p = 0.0329) (chart 3).

Chart 3. Incidence of PVD in hypertensives



Smoking and PVD
41.67% of male patients (n = 20) were smoking in the study group. There was no smoking in the female sub set. Smokers had a six fold increased risk of having PVD compared with non smokers. The incidence of PVD in smoker male was 25% when compared with that of non-smokers (0%) which was statistically significant (p = 0.05) (Table 2).

Table – 2. Incidence of pvd in smokers with diabetes

Smoking (among males)	Total number of case	PVD	NO PVD
Smoker	20 (41.67%)	5 (25%)	15 (75%)
Non Smoker	28 (58.33%)	0	28 (100%)
Total	48 (100%)	5 (10.41%)	43 (89.59%)

Dyslipidemia and PVD
Two study groups were compared. Those with elevated lipid profile (20% of study population n=30) had an increased incidence of PVD, 20% (n=6) when compared with that of the normal lipid profile patients which was 2.22% (n=1) and it was statistically significant (p = 0.0095).

Ankle brachial pressure index and PVD
In this study, among 8 patients with ABPI of <0.9, 7 patients had the duplex evidence of PVD.

DISCUSSION
Incidence of PVD
Incidence of PVD in this study was 9.33% which was comparable to the incidence as described in other studies. One meta-analysis has presented age and gender adjusted results of the incidence of PVD ranging from 5.5% to 14.7%. In one study, PVD was rare at the time of diagnosis but after 6 years of follow up 11% of the patients had PVD. Thus, it is to be noted that PVD is a significant complication of diabetes mellitus.

Symptomatic and asymptomatic PVD
The symptoms of intermittent claudication are not seen in any of the patients affected with PVD in this study as in Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II) & Meijer WT et al, This may be due to

i. Modern age sedentary life-style.
ii. Many elderly patients not walking far enough to experience symptoms of intermittent claudication.
iii. co-existing neuropathy masking pain sensation.

Since, many of the patients with PVD are asymptomatic, it's vital for active screening with ABI in all diabetic subject.

Sex distribution of PVD
The incidence of PVD was 10.4% among males and 7.4% among females in the study group. Diabetes seems to repeal the protective effect of female gender on PVD when compared to non diabetics as seen in other epidemiological studies[8]. The higher incidence among males could be partially due to smoking.

Aging and PVD
As the age advances, the incidence of development of PVD increases and in this study, age adjusted incidence rates show a linearly progressive raising trend, and the highest incidence was found among the geriatric age group as shown in the Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II).Thus it's to be noted that aging is a non-modifiable risk factor for PVD[11]. The elderly

diabetic patients must be given special attention for PVD prevention and management.

Hyper glycaemia and PVD

As the duration of diabetes increased, the risk of PVD increased in the study group. The large multi centric study also has categorically proved that the duration of hyperglycemia has a definite role in PVD[12]. In the large multi centric study, as the HBA1C increased by every 1 %, there was an increase of 26% in PVD prevalence[8]. Tight glycemic control in general reduces peripheral arterial disease and risk of amputation.

Hypertension and PVD

Hypertension raised the risk of PVD, among diabetic patients. Duration of hypertension among hypertensive diabetic subjects ranged from 2 to 15 years with a mean duration of 7.73 years. Among the hypertensive diabetic subjects, the mean duration of hypertension among PVD subjects was 11 years, which was significantly higher than the non – PVD sub group mean of 1 year (p = 0.0003). Hypertension associated with diabetes raised the risk of PVD in our study subjects in par with the Macgregor A5 et al study. Another interesting observation noted in the study group was that the duration of hypertension also significantly correlated with the risk of PVD.

Smoking and PVD

The incidence of PVD in smoker male was 25% when compared with that of non-smokers (0%) which was statistically significant (p = 0.05). Hence, smoking is one of the strongest risk factor in the pathogenesis of PVD. It is advisable for the patient not to smoke, since it will lead onto peripheral vascular disease in the future. Thereby the associated coronary vascular disease can also be prevented[9].

In the study group, smokers had more than six fold increased risk of having PVD, compared to non-smokers. Thus smoking was found to be the single most important risk factor in comparison to other risk factors.

A multivariate analysis, identified smoking as the strongest risk factor for development of PVD [13]. In this study, smoking in a diabetic hypertensive exponentially increased the risk of PVD. Smoking is the single most modifiable risk factor and hence smokers must be actively counselled for cessation of smoking[10].

Dyslipidemia and PVD

In this study population, the dyslipidemia patients have ten times increase in the incidence of PVD. The cardiovascular health study and the Edinburg artery study reported higher prevalence of PVD in association with dyslipidemia patients. Hence, management of atherogenic dyslipidemia is vital, and lipid level to be maintained within optimal cut-off limits[4]. Lipid lowering agents are crucial in the management of dyslipidemia and atherosclerosis thereby chronic vascular insufficiency[6,8].

Duration of diabetes mellitus and PVD

For patients affected with PVD, the duration of diabetes was found to be longer than others[13]. The mean duration of diabetes for the PVD in our sub group is 13.57 years. While for the rest of the study group it is 5.0 years which was statistically significant (p = 0.005).

Ankle brachial pressure index and PVD

In this study among 8 patients with ABPI of <0.9, 7 patients had the duplex evidence of PVD. Hence, we can conclude that the sensitivity of ABPI is 87.5%, which make the ABPI an efficient screening tool for diagnosing PVD[14] even in asymptomatic individuals.

CONCLUSION

1. Incidence of PVD is about 10% in the present study. This has to be viewed seriously considering the huge diabetic population and due importance to be given for screening and prevention of PVD.
2. Almost all of the PVD patients are totally asymptomatic and hence the need for active screening with estimation of ABPI is to be done annually for all diabetes patients. Low ABPI is also associated with cardiovascular complications.
3. Uncontrolled chronic hyperglycemia, hypertension, dyslipidemia and smoking are the modifiable risk factors associated with development of PVD. Advancing age, male gender and the duration of Diabetes were found to be the non modifiable risk factors for development of PVD.

REFERENCES

1. Fowkes FG etal smoking, lipids glucose tolerance, and Blood pressure as risk factors for peripheral atherosclerosis in the edinburg artery study. Am.j. Epidemiology. 1992; 135(4) : 331-340.
2. Strandness DE et al, combined clinical and pathologic study of diabetic and non-diabetic peripheral arterial disease, Diabetes 1964; 13; 366-372.
3. Beckman JA, et al., Diabetes and athero sclerosis J AMA 2002; 287; 2570- 81.
4. Macgregor A5 et al Role of Systolic – Blood Pressure and Plasma triglycerides in Diabetic peripheral arterial disease. The Edinburgh artery study. Diabetes care 1999; 22; 453-8.
5. Adler AI, et al – UKPDS 59; Hyperglycaemia and other potentially modifiable risk factors for peripheral vascular disease in type 2 Diabetes melitus; Diabetes care 2002; 25; 894-9.
6. Hirsch AT et al, Peripheral arterial disease detection, awareness and treatment in primary care. JAMA 2001; 286; 1317-24.
7. A pelquist J et.al., what is the most effective way to reduce incidence of amputation in the diabetic foot? Diabetes metob res rev 2000; 16 (supl 1); s75-83.
8. L. Norgren and W. R. Hiatt et al. TASC II Inter-Society Consensus on Peripheral Arterial Disease Eur J Vasc Endovasc Surg Vol 33, Supplement 1, 2007
9. Pendsey SP. Peripheral vascular disease. In Practical Management of Diabetes. Editor Pendsey SP, Jaypee Brothers, 1997; 26 :144 - 51.
10. Murabito JM et al. prevalence and clinical correlates of peripheral arterial disease in the Framingham offspring study Am. Heart J 2002; 143; 961-965.
11. Meijer WT et al, peripheral arterial disease in the elderly: the Rotterdam study. Arterio sclera thromb vasc biol. 1998; 18; 185-192.
12. Mohan V, Premalatha G, Shastry NG. Peripheral vascular disease in noninsulin dependent diabetes mellitus in South India; Diabetes Research and Clinical Practice 27 (1995); 235-40.
13. Lu JT1, Creager MA. The relationship of cigarette smoking to peripheral arterial disease. Rev cardiovascular med 2004 Fall;5(4):189-93.
14. Raman PC, Bhagwat A, Ankle Brachial Index in peripheral vascular disease in Diabetes Mellitus. JAPI, 1997; 45 : 6, 440 – 2.