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CLINICAL ANALYSIS OF PERIPHERAL VASCULAR DISEASE IN PATIENTS WITH DIABETES MELLITUS

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Abstract

Introduction: Diabetes Mellitus (DM) is clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. The metabolic dysregulation associated with DM causes multitude of secondary pathophysiological changes in multiple organ system causing macro vascular (coronary artery disease, peripheral vascular disease, cerebrovascular disease) and micro vascular (retinopathy, neuropathy, and nephropathy) complications. This study aimed to study the prevalence of peripheral vascular disease in patients with diabetic mellitus presenting to this tertiary care centre. **Methods:** This clinical study was conducted in first affiliated hospital of Yangtze university, Jingzhou. All patients with a diagnosis of diabetic mellitus who came to Out patient department of Endocrinology & diabetic clinic and admitted in the hospital during a period between October 2013 to October 2014, who fulfill, were enrolled for the study. This was a single centered retrospective observational analytical study conducted in Department of Endocrinology of First affiliated Hospital of Yangtze, China. **Results:** Peripheral vascular disease was found in 35% of patients studied . There was significant correlation. **Conclusion:** A significant number of diabetics presenting with diabetes mellitus have underlying peripheral vascular disease .The patients might not all be symptomatic or show obvious signs of PVD but need to be investigated for the same. The older the individual the more the chances of having peripheral vascular compromise. Also a tobacco user and patient presenting with worse clinical findings is more likely to have PVD. Thus the detection of peripheral vascular disease in patients using Arterial Doppler studies along with routine clinical and laboratory assessment can be of great value in long term care of these individuals with age, and history of tobacco use.

Key Words: arterial Doppler: diabetic foot: peripheral vascular disease

INTRODUCTION

Diabetes is a common affliction in all parts of the world. Its incidence is rising in developing countries like china with high incidence in the developed world . Diabetic foot infections are one of the most common manifestations of the disease necessitating hospital admissions and special care. Diabetes is also commonly associated with PVD. At least 20-30% of patients with PVD have diabetes and it is the most common cause of non-traumatic lower extremity amputation. More than 60% of these amputations occur in people with hyperglycemia. Diabetes duration and poor control

increase the risk for peripheral vascular disease. It has been estimated that with every 1% increase in hemoglobin A1C, peripheral vascular disease risk increases by 28%. In addition to neuropathy and trophic ulcers, peripheral vascular disease plays a major role in the evolution and outcome of diabetic foot infection.

The early detection of peripheral vascular disease in seemingly asymptomatic and early cases is useful in correction and improving the blood flow and hence healing and reduction of risk of major limb amputations.

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Arterial Doppler studies are useful in determining the presence of peripheral arterial occlusive disease,

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the level of occlusion or stenosis, the extent as also the presence of collaterals. Doppler studies however need to be coupled with angiography for further vascular interventions.

There is a need for systematic evaluation of peripheral vascular disease in all diabetic patients especially patients presenting with diabetic foot infections. The information can help in formulating protocols for affective management of diabetic patients with the aim of limiting the morbidity and social costs associated with the disease.

The Objectives were to estimate the prevalence of peripheral vascular disease among diabetic patients receiving inpatient and outpatient service at People's First Hospital, to find out the association of the duration of symptoms suggesting of diabetes mellitus with peripheral vascular disease and to study the correlation of clinical manifestation and arterial doppler test in peripheral vascular disease in diabetic patients receiving outpatient and inpatient service in People's First Hospital.

MATERIALS AND METHODS

This clinical study was conducted in first affiliated hospital of Yangtze university, Jingzhou. All patients with a diagnosis of diabetic mellitus who came to Out patient department of Endocrinology diabetic clinic and admitted in the hospital during a period between October 2013 to October 2014, who fulfill, were enrolled for the study. After recording the pertinent information ,patients were subjected to a lower limb arterial Doppler as a routine examination and findings were tabulated. The Inclusion Criteria was patients with diagnosed Diabetes mellitus and comes to our opd with clinical features of Peripheral vascular disease like Intermittent claudication ,pain and Numbness on foot aged above 18 yrs, Patients admitted to inpatient department of Endocrinology department with diabetic related disease who underwent Doppler study as routine examination as per protocol of the department, Patients willing for arterial Doppler study as a routine examination. The Exclusion Criteria was patients with previous amputation of lower limbs digits or any degree of

amputation due Diabetic foot and now presenting with necrotizing fasciitis and severe sepsis.

This was a single centered retrospective observational study conducted in Department of Endocrinology of First affiliated Hospital of Yangtze University, jingzhou, Hubei,China.

The statistical analysis of the data collected was done using XLSTAT's statistical analysis software version 2015.The results of the depended and independent variables were analyzed using Chi-square test. The p Values ($p < 0.05$) were considered statistically significant.

RESULTS

During the period of study from October 2013 to October 2014, a total of 234 patients with diabetes mellitus and peripheral vascular disease were observed in OPD and inpatient department of Endocrinology . Of them however 162 patients did not follow up to us with results of Doppler study so were excluded from our study. Thus 72 patients were included in the study.

Peripheral vascular disease was found in 35% of patients studied . There was significant correlation with age, and history of tobacco use. There were 50 males and 22 females in the study group.

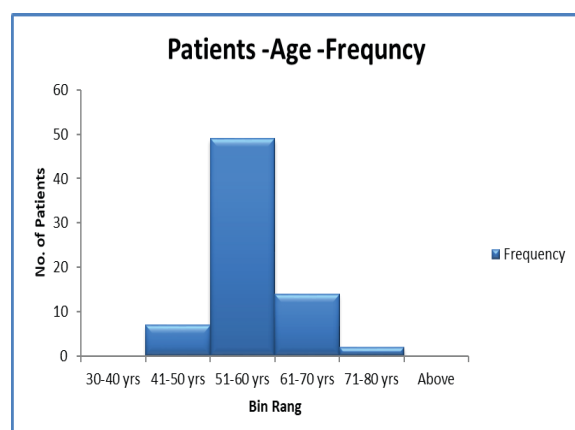


Fig 1 : Descriptive statistics on Patient age frequency

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In my study the mean value of age was 57.73 with standard deviation of 6.22. Among the male patients the mean age was 57.62. The mean value for female was 58. Our study shows that 25 of the patients had already Intermittent claudication presenting in duration of 24 months time. 76% of patients were suffering from Diabetes mellitus for 5 years. Presence of peripheral Vascular disease as diagnosed by arterial Doppler where we can see of the 72 patients in the studied population 26 patients or 34.7% were found to have some form of reduced arterial flow the lower limb vessels, 46 patients or 64.3% patients were found to have a normal lower limb arterial doppler study. 80% of the patients show a popliteal artery mild to moderate occlusion on Doppler study.

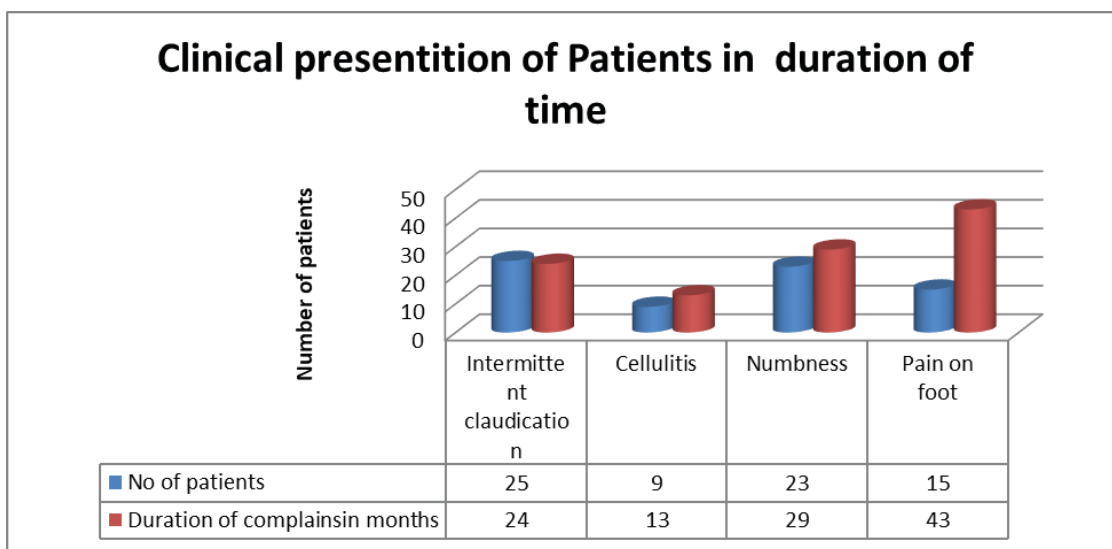


Fig 2: Relation between different clinical presentations in patients who were observed in our study, where we can see 25 of them had already Intermittent claudication presenting in duration of 24 months time

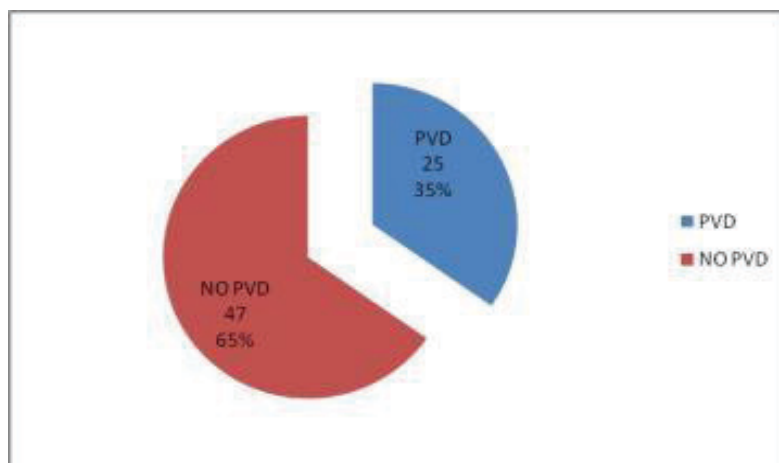


Fig 3: Presence of peripheral Vascular disease as diagnosed by arterial Doppler where we can see of the 72 patients in the studied population 26 patients or 34.7% were found to have some form of reduced arterial flow the lower limb vessels, 46 patients or 64.3% patients were found to have a normal lower limb arterial doppler study

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The male have more incidence of Peripheral Vascular disease than female, where pValue is 0.035. The mean age for peripheral vascular disease was 56.8. The duration of Peripheral vascular disease <5 years was 8 and >5 years was 18 with pValue of 0.28. 10 male and 8 female gave us past history of smoking with pValue of 0.139. 18 patients with history of smoking developed peripheral vascular disease with pvalue of 0.035

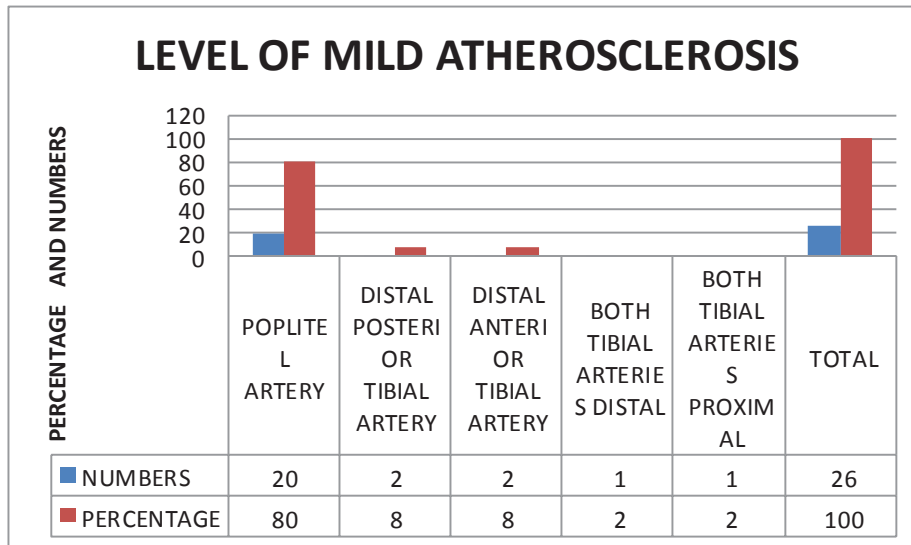


Fig 4: The location of Mild atherosclerosis found in some patients

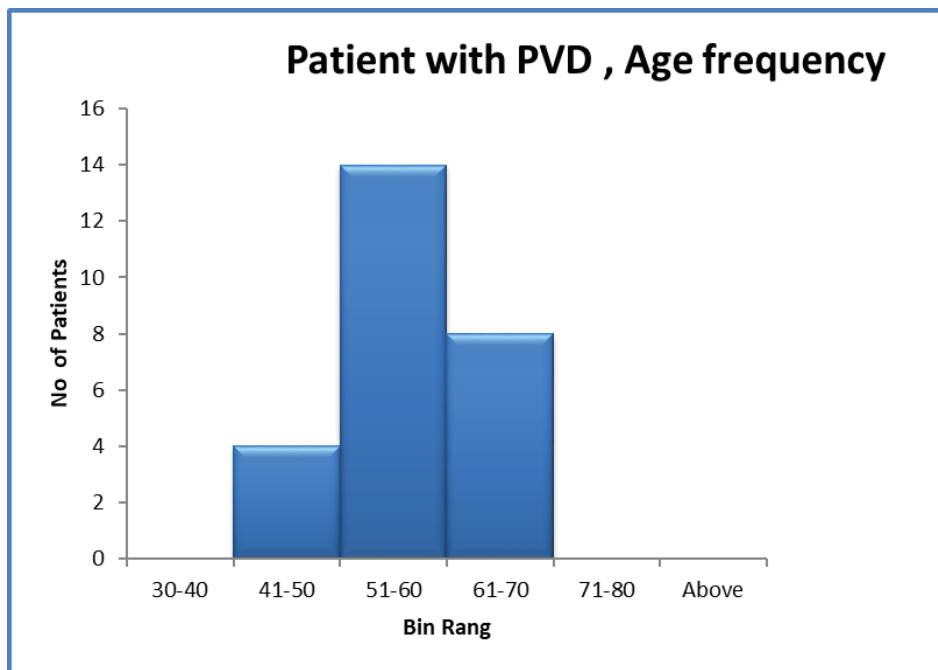


Fig 5: Shows a comparison study with age and PVD

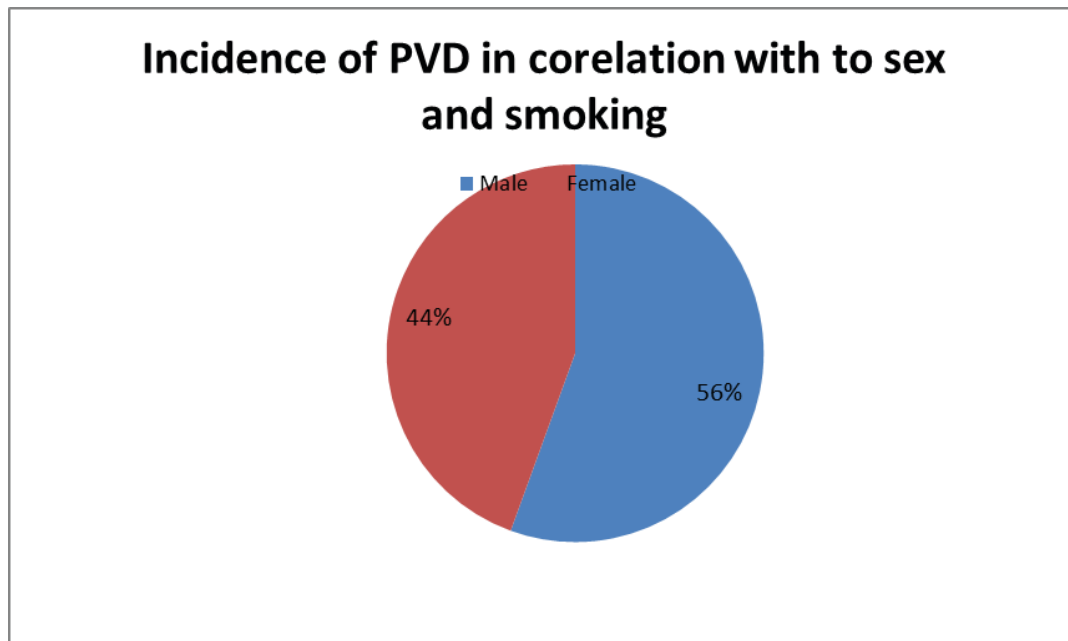


Fig 6: Pie chart with incidence PVD in correlation with sex(Male and Female) with smoking

DISCUSSION

Diabetes mellitus results when the pancreas is unable to meet insulin requirements to maintain euglycemia. In patients with type 2 diabetes mellitus (T2DM), insulin resistance typically precedes beta cell dysfunction and hyperglycemia. Type 1 diabetes (T1DM) is an autoimmune process whereby insulin-producing beta cells are destroyed leading to insulin deficiency. Diabetes is a common disease approximately 11.3% of the US population over the age of 20 years has overt hyperglycemia (CDC diabetes fact sheet, 2011). In people over the age of 65 years, almost 27% have diabetes. Even more staggering, approximately 79 million people over the age of 20 years have prediabetes; this makes up 35% of the US population (50% of those over the age of 65 years).

Diabetes is also commonly associated with PVD. At least 20-30% of patients with PVD have diabetes ¹⁻³ and it is the most common cause of non-traumatic lower extremity amputation. More than 60% of these amputations occur in people with hyperglycemia. Diabetes duration ⁴ and poor control ⁵ increase the risk for peripheral vascular

disease. It has been estimated that with every 1% increase in hemoglobin A1C, peripheral vascular disease risk increases by 28%.

Ultrasound technology has revolutionised vascular imaging. The availability of high resolution portable scanners, with heads accommodating a range of tissue depths, allows for non-invasive longitudinal assessment of virtually the entire circulatory tree outside of the thoracic aorta. Duplex ultrasound combines the traditional b mode two dimensional images with Doppler measurements of blood flow parameters

After reviewing the results of the study certain pertinent inferences could be made.

The prevalence of PVD was found to be 35% with 25 out of 72 patients showing vascular compromise as diagnosed by arterial Doppler study. The prevalence in males was found to be 38% while in females was 27%. This however was not found to be statistically significant owing to lesser number of female subjects in the study. Also the patients in the study were asymptomatic and the rate

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represents more of subclinical peripheral vascular compromise.

Most of the individuals in this study were in the age group of 51 - 60 years accounting for 51% of subjects .The prevalence of PVD was found to increase with age with patients above 60 yrs showing a prevalence of 75%. Although this seems a higher compared to existing studies it correlates with accepted data that progression with age is significant and indeed faster in diabetes patients.^{6,7,8}

This can also be explained by the fact that age related atherosclerotic changes independent of diabetic status worsen with advancing age.⁹ As also seen from this data most patients were diagnosed less than 5 years prior to admission to be diabetics, some with age more than 60yrs.The problem of late diagnosis of diabetic status seen in our region could explain the very high prevalence of PVD in older age groups , as by the time the patients presents to a tertiary care centre with complications of diabetes the pathophysiological changes in the foot including vascular compromise is at an advanced level. This also can explain why this study could not demonstrate a statistical correlation between the duration of diabetes and the prevalence of peripheral vascular compromise.

A significant association however was found with regard to tobacco usage either in smoked or chewed form .There were a total of 18 tobacco users in the study population 10 were males and 8 females .The females all-consuming the chewed variety of these 16 individuals (80%) showed presence of PVD,2 of these were females and remaining 14 males .This when compared to only 9 out of 52 non smokers showing presence of PVD was significant. This correlates with existing data wherein tobacco as an independent factor is implicated in the aetiology of PVD and also seen to accelerate changes in diabetic individuals.^{10,11,12}

On the basis of this study the relevance of investigating the presence of peripheral vascular

disease and the need to do it on a routine basis even in apparently asymptomatic individuals can be advocated.

CONCLUSIONS

A significant number of diabetics presenting with diabetes mellitus have underlying peripheral vascular disease .The patients might not all be symptomatic or show obvious signs of PVD but need to be investigated for the same. The rate of prevalence in the present study was 35%.

The older the individual the more the chances of having peripheral vascular compromise. Also a tobacco user and patient presenting with worse clinical findings is more likely to have PVD. Thus the detection of peripheral vascular disease in patients using Arterial Doppler studies along with routine clinical and laboratory assessment can be of great value in long term care of these individuals. This study and the others before it have consistently proven the need and benefit of investigating diabetics for peripheral ischemia and the value of the same in giving better care to these patients.

Also the need for smoking cessation especially in individuals with other risk factors for diabetes is clearly shown by this and many other studies before.

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