



ASSESSMENT OF PERIPHERAL ARTERIAL DISEASE IN LOWER LIMB EXTREMITIES OF DIABETIC PATIENTS USING DOPPLER ULTRASOUND

General Surgery

Dr. Deepak Sai Prasad	Junior Resident Department of general surgery, Sri Siddhartha Medical college, Tumkur, Karnataka.
Dr. Naveen .H Mahadev	Professor, Department of General surgery, Sri Siddhartha Medical college, Tumkur, Karnataka.
Dr. Narasimh Murthy	Assistant Professor Department of General surgery, Sri Siddhartha Medical college, Tumkur, Karnataka.
Dr. Kakul Kalita	Senior Resident, Department of General Surgery, All India Institute Of medical Sciences, Guwahati.

ABSTRACT

Background: In diabetic patients, peripheral artery disease (PAD) is a major complication that can result in amputations, infections, and ulcers that don't heal. Effective management and the avoidance of these consequences depend heavily on the early detection and evaluation of PAD. Doppler ultrasonography is a non-invasive blood flow measurement method that can help diabetic patients discover peripheral artery disease (PAD). **Material and Method :** Patients with diabetes who had lower limb blood flow measured by Doppler ultrasonography participated in cross-sectional research. Clinical manifestations were noted, including ulceration, discoloration, and numbness. Biochemical measures (fasting blood sugar, postprandial blood sugar, and HbA1C levels) and demographic information (age, gender) were gathered. Based on the results of Doppler ultrasonography, the severity of PAD was classified, and statistical analyses were carried out to establish relationships between clinical, demographic, and biochemical parameters and the prevalence and severity of PAD. Results The study discovered that lower limb PAD was present in a sizable portion of diabetes individuals. Doppler ultrasonography successfully classified the PAD severity in the patients, identifying a variety of patterns. Doppler ultrasonography was used to detect the existence of PAD, and clinical symptoms including ulceration, discoloration, and numbness were highly linked with this finding. Gender and age were important demographic variables, with men and older patients having greater rates of PAD severity and prevalence. Increased PAD frequency and severity were substantially correlated with biochemical variables, namely raised HbA1C values. **Conclusion :** When evaluating PAD in diabetic patients, Doppler ultrasonography is a useful technique since it offers important information on the frequency, pattern, and severity of the disease. The research emphasizes the robust associations that exist between biochemical parameters, demographic characteristics, and clinical manifestations of PAD. Using Doppler ultrasonography to diagnose diabetes early and intervene promptly can greatly lower the patient's chance of developing serious complications.

KEYWORDS

Diabetes , Peripheral vascular disease , Doppler ultrasound.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by elevated blood sugar, abnormal lipid profiles, and reduced insulin sensitivity^[1]. The disease is prevalent in South East Asia, with a projected increase to 151 million by 2045. Factors such as genetics, age, and lifestyle contribute to T2DM. Insulin obstruction and hyperglycemia are key drivers of T2DM. Insulin stimulates endothelium to produce nitric oxide (NO), which is crucial for preserving vascular function. Visceral obesity, linked to chronic inflammation, is a key risk factor for insulin resistance. Chronic inflammation modifies insulin signaling pathways, leading to various metabolic disorders and cardiovascular illnesses.

The WHO identifies a diabetic patient's foot with risk of infection, ulceration and loss of deep tissue associated with neurological abnormalities, peripheral vascular disease and/or metabolic complication. Peripheral vascular disease accounts up to 50% of diabetic foot ulcers and acts as an independent risk factor for the development of these ulcers. The higher prevalence of peripheral vascular disease in diabetic patients is noted, with up to 11% of diabetic patients². Therefore, it is important to employ DOPPLER ULTRASOUND as a routine diagnostic tool for the detection, prevention and treatment of peripheral vascular disease in diabetic foot patients³.

AIM AND OBJECTIVES

- To access Lower Limb Extremities of diabetic patients with peripheral arterial disease using doppler ultrasound.
- To access the extent of blood flow in Lower Limb Extremities.
- To access the pattern of Peripheral Arterial Disease using doppler ultrasound.
- To access severity of Peripheral Arterial

MATERIALS AND METHODS

Prospective observational study was done for a duration of 24 months patients admitted in the department of general surgery at Sri Siddhartha Medical College Hospital, Tumkur.

INCLUSION CRITERIA:

- All cases of diabetes patients admitted in the wards. Age range: 45 to 80 years
- History of diabetes for more than five years HBA1c value greater than 7.5%
- History of smoking and chewing of tobacco products for more than ten years
- Symptoms: numbness, claudication, and discoloration of the periphery.

EXCLUSION CRITERIA:

All instances of peripheral arterial disease, non-diabetics Chronically important medical disorders that might hinder the healing process of wounds, such as hepatic, renal, hematological, neurological, and immunological diseases, are not included in this category

Inclusion is not granted to patients less than 45 years old or older than 80 years old

METHODOLOGY:

A version 24 of the International Business Machines Statistical Package for the Social Sciences (IBM SPSS) was employed in order to carry out the statistical study.

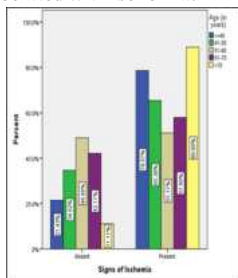
In order to calculate the predicted percentage with a precision of six percent and a confidence interval of ninety-five percent, it is assumed that twelve percent of the people in the population have ischemic changes as a factor of interest. This assumption is established for the purpose of calculating the predicted percentage. The minimum sample that is needed is 113, and it is essential.

RESULTS:

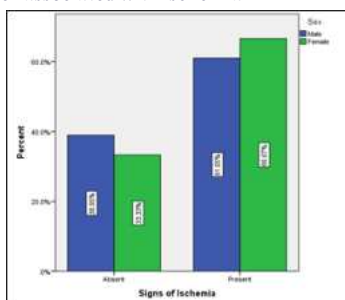
The results of the study showed that twenty -two participants or 48.9%, did not have ischemia .whereas three individuals or 51.1%, did show signs of ischemia. In the age range of 61 to 70 years old ,there are 41.1% of the people who do not have ischemia, while there are eleven individuals who have it, which accounts for 57.9% of the total.

Ischemia is observed in one of the members who are older than 70 years old which holds for 11.1%, eighty persons which holds for 88.9% of the total have ischemia. At the standard level of statistical significance ($p < 0.05$) this suggests that there is no relationship between age and the ischemia.

Graph:1 Age associated with ischemia.

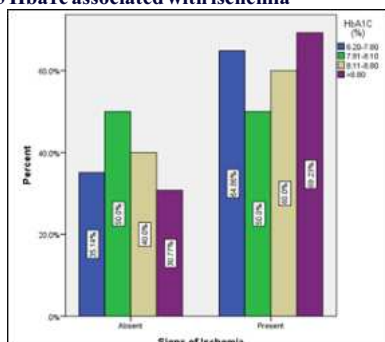


Graph: 2 sex associated with ischemia



There are 37 individuals, or 38.9% who do not exhibit ischemia among the male and the female participants. The results of the test are 0.202 the p-value is 0.653.

Graph:3 Hba1c associated with ischemia



CONCLUSION

- After investigating of the prevalence of ischemia, it was shown that a sizeable fraction of the participants had symptoms of ischemia, which affected more than half of the people who participated in the research.
- Doppler ultrasonography has become increasingly important for the assessment of peripheral arterial disease (PAD) in diabetic patients. This imaging technique allows for the assessment of disease severity, the detection of artery narrowing or blockage, and the quantification of blood flow.
- This research emphasizes the need of detecting and treating peripheral artery disease (PAD) in diabetic patients early on to prevent serious complications, such as non-healing ulcers and lower limb amputations.

LIMITATIONS OF THE STUDY

- The study's gender distribution was skewed, with 84.1% of participants being male. This might restrict the study's applicability to female patients with diabetes.
- Absence of statistically significant relationships between age, sex, HbA1C, fasting blood sugar, and postprandial blood sugar and major clinical/demographic factors.
- Focus on a narrow age range, mostly middle-aged people, who might not fully represent the variety of PAD in the diabetic community.

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