ORIGINAL RESEARCH PAPER

General Surgery

COMPARATIVE STUDY BETWEEN DOPPLER ULTRASONOGRAPHY AND CLINICAL PALPATION OF PULSE IN DIAGNOSING PERIPHERAL VASCULAR DISEASE IN DIABETES FOOT PATIENTS.

KEY WORDS: Doppler ultrasonography, diabetic foot patients, peripheral vascular disease.

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ABSTRACT

Aims: To study the effectiveness of Doppler ultrasonography in diagnosing peripheral vascular disease in diabetic foot patients when compared to clinical palpation of pulse.

Materials and method: The study was carried out in 115 diabetic patients. Peripheral pulses like posterior tibial and dorsalis paedis artery were checked. The presence of vasculopathy was checked with Doppler scanning of Dorsalis pedis artery and Posterior tibial artery. Qualitative waveform analysis was performed by visual interpretation of continuously displayed waveforms. Thus we observe the presence of degree of stenosis in the lower limb arteries with the help of pulse waveform ultrasonography and results were calculated by statistical method.

Results: In the present study, it was found that in affected right lower limb patients of diabetic foot, by clinical method of palpating the peripheral pulses no pulse was felt (positive finding) in 15 patients and weakly palpable or strongly palpable pulse (negative finding) were felt in 51 patients. Also by doing Doppler study for the same group of patients, stenosis was found (positive finding) in 59 patients and no stenosis (negative finding) was found in 7 patients. By using chi square test the p value found to be <0.00001 which was statistically significant. In affected left lower limb patients of diabetic foot, by clinical method of palpating the peripheral pulses no pulse was felt (positive finding) in 9 patients and weakly palpable or strongly palpable pulse (negative finding) were felt in 40 patients. Also by doing Doppler study for the same group of patients, stenosis was found (positive finding) in 41 patients and no stenosis (negative finding) was found in 8 patients. By using chi square test the p value found to be <0.00001 which was statistically significant.

Conclusion: Doppler ultrasonography of lower extremities had a greater accuracy in diagnosing peripheral vascular disease of diabetic foot patients when compared to clinical palpation of pulses.

AIMS:

To study the effectiveness of Doppler ultrasonography in diagnosing peripheral vascular disease in diabetic foot patients when compared to clinical palpation of pulse.

INTRODUCTION:

Patients with diabetes mellitus are more likely to develop severe forms of angiopathies at an earlier age compared with their nondiabetic counterparts. Diabetic foot is one of the major complication in diabetic patients. people with diabetes are 20 times more likely to undergone an amputation than rest of the population[1]. At present there is a clear need of diagnose peripheral vascular angiopathies in settings of primary health care. The unreliable nature of the symptoms and signs of the lower limb arterial insufficiency in diabetes means that noninvasive tests are essential to achieve effective screening[2].

The main risk factors for the development of diabetic foot disease are peripheral neuropathy and peripheral arterial occlusive disease. The detection of significant arterial disease is vital to the prevention and treatment of diabetic foot complications. The disease itself, initially asymptomatic, can cause considerable patient suffering later on with complaints of lower limb pain, ulceration and gangrene which, can necessitate limb amputation in complicated case scenarios. Screening techniques commonly used in assessing lower limb perfusion are the palpation of peripheral pulses and calculation of ankle brachial index (ABI), ankle brachial pressure index (ABPI), toe-brachial pressure index (TBPI). Imaging modalities for evaluating peripheral arterial disease in the lower extremities include conventional angiography, computed tomography (CT) angiography, pulse wave Doppler US and color Doppler ultrasound[3,4]. Doppler US is noninvasive technique that does not require contrast, patient preparation before study, or radiation exposure hazards. It is a good method for screening and follow-up, as well as for the definitive diagnosis[5].

MATERIALS AND METHOD:

The study was carried out in patients admitted in surgical wards in the Department of Surgery, Shyam Shah Medical College & associated Sanjay Gandhi Memorial Hospital, Rewa (M.P.) from 1st June 2017 to 31st may 2018. **Inclusion criteria-** The study was carried out in all adult patients of foot lesions with diabetes mellitus admitted in surgical wards. **Exclusion criteria-** Patients without lower limb vascular diseases with diabetes and patients with clinical cancer, infectious diseases and severe cerebrovascular diseases, serious liver, kidney damages were excluded. So a total of 115 diabetic patients were undergone for study and they were grouped into right lower limb affected (n=66) and left lower limb affected (n=49) groups. Peripheral pulses like posterior tibial and dorsalis paedis artery were checked. Those patients who had absent pulse were said as positive finding and those with weakly palpable or palpable pulse as negative finding. The presence of vasculopathy was checked with Doppler scanning of Dorsalis pedis artery and Posterior tibial artery. The examination was usually performed with the patient placed in the supine position. The patient's hip was generally abducted and externally rotated, and the knee was flexed like frog legs in order to easily approach the posterior tibial artery in the medial calf. The posterior tibial artery (PTA) is seen along the tibia at the medial side of the posterior calf and behind the medial malleolus of the ankle and dorsalis pedis artery distal to the ankle and metatarsal artery between the metatarsal bones transducer of ultrasound was placed over an artery for transverse scanning, and then is rotated 90° for longitudinal scanning. Pulsed-wave Doppler US is performed in the longitudinal plane. Qualitative waveform analysis was performed by visual interpretation of continuously displayed waveforms[3]. If Doppler ultrasonography was triphasic, it was graded as normal, biphasic as mild, monophasic as moderate and no sound was heard then severe grade of vasculopathy was noted. So those who are normal were said as negative finding and those with mild/ moderate/severe stenosis as positive finding. Then the results were calculated.

RESULTS:

In the present study, it was found that in affected right lower limb patients of diabetic foot, by clinical method of palpating the peripheral pulses no pulse was felt (positive finding) in 15 patients and weakly palpable or strongly palpable pulse (negative finding) were felt in 51 patients. Also by doing Doppler study for the same group of patients, stenosis was found (positive finding) in 59 patients and no stenosis (negative finding) was found in 7 patients. By using chi square test the p value found to be <0.00001 which was statistically significant(table-1).

In affected left lower limb patients of diabetic foot, by clinical method of palpating the peripheral pulses no pulse was felt (positive finding) in 9 patients and weakly palpable or strongly palpable pulse (negative finding) were felt in 40 patients. Also by doing Doppler study for the same group of patients, stenosis was found (positive finding) in 41 patients and no stenosis (negative finding) was found in 8 patients. By using chi square test the p value found to be <0.00001 which was statistically significant(table-2).

DISCUSSION:

Screening of peripheral vascular disease in a diabetic foot ulcer patient is an essential component in managing these patients. As these patients are in extreme need to save their limbs from complications. If not properly screened at proper time they may end up with serious morbidity. Thus the study was conducted over the use of Doppler ultrasonography in diagnosing the peripheral angiopathy as early as possible. Studies have suggested that screening of diabetic foot patients by non invasive clinical methods alone had less sensitivity in detecting peripheral angiopathy. The commonly used non invasive clinical methods are palpating peripheral pulses, measuring ankle brachial index, toe ankle index. Doppler ultrasonography was one of the screening method to detect the arterial stenosis in affect limb of peripheral angiopathy. In a study, **Tehan PE** et al concluded that the continuous waveform Doppler sonography had the high sensitivity 74% in detecting angiopathy in diabetes patient[6]. **Kazmers A** et al concluded that Doppler sonography of lower extremities had a high sensitivity in detecting arterial disease when compared to peripheral pulse examination[7]. The use of hand held Doppler helps in early diagnosis of critical limb at risk of loss in diabetic patients[8]. When compared to clinical examination finding, using hand held Doppler provides greater diagnostic accuracy and these results were similar to present study.

CONCLUSION:

Doppler ultrasonography of lower extremities had a greater accuracy in diagnosing peripheral vascular disease of diabetic foot patients when compared to clinical palpation of pulses.

Table- 1: Right lower limb affected patients:

Right lower limb (n = 66)	Doppler study	Peripheral pulse	P value
Positive finding	59	15	<0.00001
Negative finding	7	51	
Total	66	66	

Table-2: Left lower limb affected patients:

Left lower limb (n = 49)	Doppler study	Peripheral pulse	P value
Positive finding	41	09	<0.00001
Negative finding	8	40	
Total	49	49	

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