# VASCULAR DISEASE IN DIABETES FOOT

## OF PULSE IN DIAGNOSING PERIPHERAL ULTRASONOGRAPHY AND CLINICAL PALPATION COMPARATIVE STUDY BETWEEN DOPPLER

### ORIGINAL RESEARCH PAPER

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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 pedis 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 81 patients. Also by doing Doppler study for the same group of patients, stenosis was found (positive finding) in 59 patients and 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.

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

**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=68) and left lower limb affected (n=49) group. Peripheral pulses like posterior tibial and dorsalis pedis 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. 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 patient1. Kazmers A et al concluded that Doppler sonography of lower extremities had a high sensitivity in detecting arterial disease when compared to peripheral pulse examination2. The use of hand held Doppler helps in early diagnosis of critical limb at risk of loss in diabetic patients3. 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:

<table>
<thead>
<tr>
<th>Positive finding</th>
<th>Doppler study</th>
<th>Peripheral pulse</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>15</td>
<td></td>
<td>&lt;0.00001</td>
</tr>
<tr>
<td>Negative finding</td>
<td>7</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>66</td>
<td></td>
</tr>
</tbody>
</table>

Table-2: Left lower limb affected patients:

<table>
<thead>
<tr>
<th>Positive finding</th>
<th>Doppler study</th>
<th>Peripheral pulse</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>09</td>
<td></td>
<td>&lt;0.00001</td>
</tr>
<tr>
<td>Negative finding</td>
<td>8</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

REFERENCES: