

## Original Research

### Role of Pentoxifylline in treatment of diabetic foot ulcer

<sup>1</sup>Anjanjyoti Sarma, <sup>2</sup>Rajeev Kumar Johri

<sup>1</sup>Associate Professor, Department of General Surgery, N C Medical College & Hospital, Israna, Panipat, Haryana, India;

<sup>2</sup>Associate Professor, Department of General Surgery, Venkateshwara Institute of Medical Sciences, Amroha, Uttar Pradesh, India

#### ABSTRACT:

**Background:** Across India alone, diabetes mellitus affects 25 million people, making it an epidemic across the Asian subcontinent. One of the major side effects of diabetes mellitus is diabetic foot ulcers. The present study was conducted to assess role of Pentoxifylline in treatment of diabetic foot ulcer. **Materials & Methods:** 80 diabetic foot ulcer patients of both genders were divided into 2 groups of 40 each. Group I patients received only traditional treatment, i.e., bed rest with elevation, i.e., antibiotics, analgesics and dressings and Group II patients received pentoxifylline along with traditional treatment. At the start and finish of the 30-day period, the impact of pentoxifylline on vascularity and marginal blood velocity in individuals with diabetic foot ulcers was evaluated. **Results:** Group I had 24 males and 16 females and group II had 22 males and 18 females. Pre-treatment doppler velocity in group I was 24.7 and in group II was 25.2 and post-treatment doppler velocity in group I was 0.08 and in group II was 0.26. The difference was significant ( $P < 0.05$ ). In group I, 64% and in group II 89% showed signs of recovery and 34% in group I and 11% in group II showed signs of inflammation. The difference was significant ( $P < 0.05$ ). **Conclusion:** The patients on pentoxifylline had early healing as compared to patients who received only Conventional treatment.

**Keywords:** diabetes mellitus, Pentoxifylline, Wound

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**Corresponding author:** Rajeev Kumar Johri, Associate Professor, Department of General Surgery, Venkateshwara Institute of Medical Sciences, Amroha, Uttar Pradesh, India

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#### INTRODUCTION

Across India alone, diabetes mellitus affects 25 million people, making it an epidemic across the Asian subcontinent. One of the major side effects of diabetes mellitus is diabetic foot ulcers.<sup>1</sup> An estimated 15% of diabetics are thought to have diabetic foot ulcers, which occur prior to nearly 85% of foot amputations. Charcot foot, peripheral vascular disease, peripheral neuropathy, and infection are the four primary causes of diabetic foot ulcers.<sup>2</sup>

In diabetes mellitus a number of blood flow characteristics are altered, including increased blood plasma viscosity, decreased red blood cell deformability, increased fibrinogen level, decreased fibrinolytic activity, platelet hyperactivity, and plasma hypercoagulability.<sup>3</sup> Pentoxifylline has been found to have a unique hemorheologic effect in patients with chronic peripheral arterial disorders. It increases both the initial and absolute claudication distance. Though

pentoxifylline has been found to accelerate healing in postthrombotic leg ulcers, there is no report of its use in diabetic foot ulceration.<sup>4</sup>

Pentoxifylline is a derivative of xanthenes that improves tissue oxygenation by lowering blood viscosity, increasing RBC flexibility, and increasing blood flow to microcirculation, which in turn lowers leukocyte adherence.<sup>5</sup> It works well for venous leg ulcers because it is also mildly fibrinolytic. Pentoxifylline is reported to improve microcirculation by reducing the production of RBC rouleaux. It has been extensively utilized to treat sporadic claudication.<sup>6,7</sup> The present study was conducted to assess role of Pentoxifylline in treatment of diabetic foot ulcer.

#### MATERIALS & METHODS

The study was carried out on 80 diabetic foot ulcer patients of both genders. All gave their written

consent to participate in the study. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 40 each. Group I patients received only traditional treatment, i.e., bed rest with elevation, i.e., antibiotics, analgesics and dressings and Group II patients received pentoxifylline along with traditional treatment. At the start and finish of the 30-day period, the impact of pentoxifylline on vascularity and marginal blood velocity in individuals with diabetic foot ulcers was

evaluated. This was accomplished by taking a baseline biopsy from the diabetic ulcer's edge, measuring the marginal blood flow velocity using Doppler, and administering pentoxifylline for 30 days. Subjectively, objectively, histologically, optically, and using Doppler, the response was examined. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Groups	Group I	Group II
Method	traditional treatment	traditional treatment+ pentoxifylline
M:F	24:16	22:18

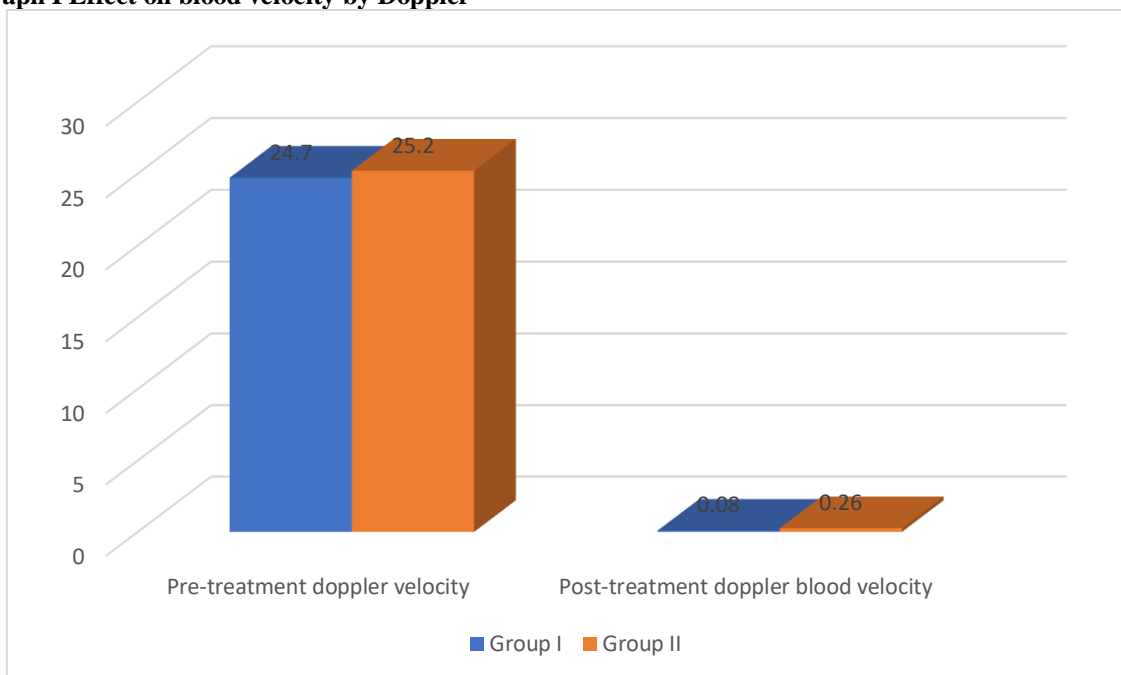
Table I shows that group I had 24 males and 16 females and group II had 22 males and 18 females.

**Table II Effect on blood velocity by Doppler**

Parameter	Group I	Group II	P value
Pre-treatment doppler velocity	24.7	25.2	0.92
Post-treatment doppler blood velocity	0.08	0.26	0.01

Table II, graph I shows that pre-treatment doppler velocity in group I was 24.7 and in group II was 25.2 and post-treatment doppler velocity in group I was 0.08 and in group II was 0.26. The difference was significant (P< 0.05).

**Graph I Effect on blood velocity by Doppler**



**Table III Assessment of wound healing**

Wound biopsy on day 30	Group I	Group II	P value
Signs of recovery	64%	89%	0.01
Signs of inflammation	34%	11%	

Table III shows that in group I, 64% and in group II 89% showed signs of recovery and 34% in group I and 11% in group II showed signs of inflammation. The difference was significant (P< 0.05).

**DISCUSSION**

In diabetics, foot ulcers are a common and problematic issue. In Britain, diabetics with foot

issues take up more hospital beds than diabetics with all other difficulties combined.<sup>8</sup> Neuropathy, ischemia, and infection are the three primary causes of

tissue necrosis in diabetic foot. Ischemia is the result of decreased blood flow in diabetics with vascular disease. Vasodilatation, an attempt to improve blood flow, has been the conventional method of treating vascular disease.<sup>9,10</sup> There are three issues: (1) It might not be feasible to expand the blood vessel's diameter over what autoregulation can do. (2) The vessel might not be able to dilate because it is sclerosed. (3) The flow of blood could be diverted to nonischemic areas at the expense of ischemic tissues (steal phenomenon).<sup>11</sup> The present study was conducted to assess role of Pentoxifylline in treatment of diabetic foot ulcer.

We found that group I had 24 males and 16 females and group II had 22 males and 18 females. Rewale et al<sup>12</sup> in their study, out of 67 patients 30 received pentoxifylline and 32 were on traditional treatment and there was loss of follow-up in five cases. The response was observed subjectively, histologically and by Doppler studies. It was observed that the patients on pentoxifylline had early healing as compared to patients receiving only conventional treatment as evident on biopsy and Doppler.

We found that pre-treatment doppler velocity in group I was 24.7 and in group II was 25.2 and post-treatment doppler velocity in group I was 0.08 and in group II was 0.26. Ramani et al<sup>13</sup>, in their study 40 diabetic patients with foot ulcers of which 20 of them received conventional therapy and 20 received Pentoxifylline (400 mg three times a day), after eight weeks healing of ulcers was significantly higher in those who received pentoxifylline.

We found that in group I, 64% and in group II 89% showed signs of recovery and 34% in group I and 11% in group II showed signs of inflammation. Weitgasser H et al<sup>14</sup>, in an open field study, 70 patients with leg ulcers, some existing already for a long time, were treated with Pentoxifylline in addition to the hitherto applied local therapy. The treatment usually comprised two months with a daily dosage of 800 mg up to 1200 mg (2 to 3 coated tablets Trental forte per day). More than 80% of patients with medium size ulcers could be cured by this therapy. The medicament was well tolerated.

Pemler K et al<sup>15</sup> in their study, 513 patients with chronic ulcers of the leg were treated with Trental 400 orally in addition to local therapy. Regarding the reduction of the symptoms: ulcer extension, coldness of the leg, paraesthesia, resting pain and improvement of walking distance, 215 patients were classified as considerably improved, 195 distinctly improved, 53 slightly improved and 44 unchanged. Four cases worsened, two cases could not be classified. The possibility of combining oral therapy with local treatment and surgical measures (skin-flaps) is shown in three case reports. Gastro-intestinal tolerance of Trental 400 was good, interactions with concomitantly administered drugs were not reported.

The shortcoming of the study is small sample size.

## CONCLUSION

Authors found that the patients on pentoxifylline had early healing as compared to patients who received only Conventional treatment.

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