

**A STUDY OF EFFICACY OF TOPICAL INSULIN THERAPY IN THE TREATMENT OF CHRONIC DIABETIC FOOT ULCERS**Mahidhar Reddy Venkatapuram<sup>1</sup>, Ashika Reddy Padamati<sup>2</sup>, Rishita M<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** Chronic wounds are an economic burden to the patient as they put him out of work and consume quality working days. Local insulin therapy is an innovative method in wound care which accelerates wound healing by increasing angiogenesis and granulation tissue formation. This study aims to evaluate its efficacy. **OBJECTIVES:** To study the efficacy of topical use of insulin in terms of (1) Rate of wound healing (2) Hospital stay. **MATERIALS AND METHODS:** This is a prospective study carried out in a tertiary health care center in 46 patients after taking informed and written consent. All patients who were satisfying inclusion and exclusion criteria were randomised into two groups A and B. Local insulin therapy was given to group A and normal saline dressing were done to group B. Size and depth were recorded at the start of the treatment and every week thereafter during the period of study. Strict glycemetic control was maintained. Results were compared at complete wound healing or at the end of 8 weeks which was earlier. **RESULTS:** Improvement of the wound in the form of diameter and depth is seen. Significantly increased proliferation of granulation tissue is noticed in most of the patients belonging to group A, that is who received local insulin therapy. **CONCLUSION:** Local insulin therapy appears to be an efficacious method in the treatment of chronic diabetic foot ulcers and is safe and effective without any systemic side effects. It significantly reduces the hospital stay.

**KEYWORDS:** Insulin, Diabetes Mellitus, Chronic Ulcers.

**INTRODUCTION:** Foot ulcers are common in diabetics due to angiopathy and neuropathy.<sup>(1)</sup> They respond poorly and slowly to conventional dressings, thus increasing hospital stay of the patient and putting him out of work for prolonged period. Loss of quality working days is an economic burden to the patient. Additionally this delay in wound healing has been associated with increased morbidity and mortality.

Insulin being a growth factor was proved to stimulate angiogenesis, collagen formation, matrix formation and granulation tissue proliferation in several preclinical studies.<sup>(2),(3)</sup> so we carried out a randomized study to know the efficacy of local insulin therapy by comparing insulin dressings with regular saline dressings.<sup>(4)</sup>

**MATERIALS AND METHODS:** This study was conducted in general surgery department, Narayana Medical College and Hospital, Nellore during the period Jan. 2015- July 2015. About 46 patients were selected and by simple randomization divided between two groups, one with regular saline dressings and the other with insulin dressings. Insulin mixtard (30/70) is selected for insulin dressings, which is injected intralesionally into the wound during wound dressing.<sup>(5)(6)</sup>

Patients with severe malnutrition, renal failure, liver dysfunction and ischaemic limbs were excluded from the study.

## ORIGINAL ARTICLE

Before the start of the treatment and once in a week thereafter, depth and size of the wounds were recorded. The recordings were carried for a period of 4 weeks or healing of ulcer whichever is earlier. Strict glycaemic control was brought in all the patients before study and also underlying anemia and hypoproteinaemia were corrected. Systemic antibiotics were given based on pus culture and sensitivity. Dressings were performed once in a day, with normal saline in one group and additionally insulin intralesional injection in another group.

Vernier calipers was used to measure ulcer depth in its biggest diameter and ulcer area was used to define ulcer improvement. Study protocol was approved by ethics committee of Narayana Medical College and Hospital. All patients participating in the study were informed and their consent taken.

**Statistical Analysis:** Numerical data was analysed with SPSS latest version 2015 and expressed as mean+/-standard deviation (SD). Mann-Whitney test was performed to evaluate size of ulcer and depth of ulcer before and after the treatment in the two groups. P value less than 0.05 was considered statistically significant.

**RESULTS:** In the present study, all the 46 participants were allocated by simple randomization method to two groups, insulin therapy group and saline dressing group. Demographic characteristics are tabulated below. Maximum frequency was seen in male patients. Most common site of ulcer was right forefoot. Both in male and female patients it was type 2 diabetes which was more common.

	<b>Insulin Group Count</b>	<b>Insulin Group Percent</b>	<b>Saline Group Count</b>	<b>Saline Group Percent</b>
Male	14	70%	16	61.5%
Female	6	30%	10	38.5%
Type1diabetes	2	10%	0	0%
Type 2 diabetes	18	90%	26	100%
Right foot	15	75%	16	61.5%
Left foot	5	25%	10	38.5%
Average size of ulcer	4.2cm <sup>2</sup>		4cm <sup>2</sup>	
Average depth of ulcer	9mm		8.6mm	

Table 1

The average depth of ulcer in insulin group was 9mm before start of treatment whereas it was 8.6mm in saline group. There was statistically significant difference ( $p < 0.05$ ) in the improvement of ulcer depth wise in insulin therapy group before and after treatment.

<b>Depth of Ulcer</b>	<b>Insulin Group</b>	<b>Saline Group</b>
Before treatment	9mm	8.6mm
After treatment	3mm	7.2mm

Table 2

## ORIGINAL ARTICLE

The average size of the ulcer was 4.2cm<sup>2</sup> in insulin group and it was 4cm<sup>2</sup> in saline group. Here was statistically significant difference ( $p < 0.05$ ) in the improvement of ulcer area wise in insulin therapy group before and after treatment.

Size of Ulcer	Insulin Group	Saline Group
Before treatment	4.2cm <sup>2</sup>	4cm <sup>2</sup>
After treatment	1.7cm <sup>2</sup>	3.1cm <sup>2</sup>

**Table 3**

**DISCUSSION:** Diabetic foot ulcers by their delayed healing nature produces lot of morbidity and mortality. by increasing hospital stay they consume quality working days and bring economic loss to the patients. Several new methods of wound care were designed among which local insulin therapy is gaining popularity. Several studies established the role of insulin as growth factor in stimulating angiogenesis, collagen formation and granulation tissue formation thus encouraging speedy healing of diabetic foot ulcers<sup>(7)(8)(9)</sup>. Our study showed statistically significant improvement in both area and depth of ulcer due to insulin therapy thus establishing the role of insulin in wound healing.<sup>(10),(11)</sup>

**CONCLUSION:** Local insulin therapy appears to be an efficacious method in the treatment of chronic diabetic foot ulcers and is safe and effective without any systemic side effects. It significantly reduces the hospital stay.<sup>(12),(13),(14)</sup>

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## ORIGINAL ARTICLE

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