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Prospective Study To Compare The Efficacy Of Super Oxidized Solution Vs Povidone Iodine In Diabetic Foot Ulcer"

Dr A Lakshmi Naidu[1], Dr N Mithra Vinda[2], Prof Dr Ragumani P[3]

[1]Postgraduate, Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam-603103, Tamil Nadu, India
[2]Assistant Professor, Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam-603103, Tamil Nadu, India. orcid id -0000000275239054.
[3]Professor, Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam-603103, Tamil Nadu, India

Corresponding author information:
Assistant Professor Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam-603103, Tamil Nadu, India
Email id: mitravindanarra@gmail.com

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1. Introduction

The metabolic diseases known as diabetes mellitus all have the phenotype of hyperglycemia. It is a complicated, chronic condition that needs ongoing medical attention as well as risk reduction techniques that go beyond glycemic management. Worldwide, the prevalence of diabetes is rising due to rising rates of overweight/obesity and unhealthy lifestyles, especially in emerging countries like India. According to estimates, 77 million Indians had diabetes in 2020, and by 2045, that number is expected to rise to over 134 million. [1]

As a result of the metabolic dysregulation brought on by DM, several organ systems experience secondary pathophysiological alterations that result in microvascular and macro vascular problems. In the future, DM is projected to be a major cause of morbidity and death due to its rising occurrence around the globe. The effects of diabetes on quality of life and health care expenses are influenced by a variety of elements in addition to issues related to diabetes. Diabetes has a negative influence on employment, absenteeism, and job productivity and is linked to a high prevalence of depression. [2]

Diabetes risk factors include ethnicity, age, obesity and physical inactivity, bad food and behavioral habits, genetics, and family history. [3] Type 2 diabetes [T2DM] in adults and makes up 90–95 percent of all cases of diabetes. This category includes those who have peripheral insulin resistance and relative insulin insufficiency. The majority of patients are asymptomatic when they first appear, but regular laboratory testing reveals hyperglycemia, which calls for further testing. [4] Improved attempts to detect diabetes earlier through screening have been accompanied by a decrease in the prevalence of symptomatic diabetes.

Diabetes-related morbidity is brought on by both macro vascular and microvascular issues. Diabetes type 2 usually shows symptoms gradually, delaying diagnosis. As a result, diabetes-related problems are present at the time of diagnosis and become more prevalent over time. [5]

The most prevalent consequence of diabetes mellitus, diabetic foot ulcers (DFUs), can frequently worsen and need lower limb amputation. Early and efficient DFU treatment, especially when provided by a multidisciplinary team, also improves the quality of life for the patient. Education, blood sugar control, wound debridement, advanced dressing, unloading, advanced treatments, and, occasionally, surgery are all components of early and effective DFU therapy. Complications of diabetes mellitus (DM), with foot ulcers being the most frequent secondary reason for these amputations. As a result, diabetics have hazardous complications including foot ulcers. [6]

The diseases of neuropathy, ischemia, and infection are significant ones that are linked to diabetic foot ulcers. The most prevalent and harmful consequence, which affects more than 50% of diabetics, is diabetic neuropathy. Amputation, deformity, and ulceration risk are all increased by 1.7, 12 or 36 times, respectively, by diabetic polyneuropathy. The loss of protective feelings is caused by diabetic neuropathy, which also affects the sensory, motor, and autonomic pathways. ulcer brought on by a loss of sensibility to external stimuli. [7]

The main risk factor for the onset of peripheral arterial disease in the diabetic population is inadequate glycemic control. Type 2 diabetic neuropathy individuals who have 30% of their feet ischemic are said to have neuroischemic feet. The surrogate marker for the onset of cardiovascular disease is peripheral artery disease. [8]

The creation of DFU has been linked to a number of risk factors, according to recent studies. Risk factors include being a man, diabetes that has been present for more than ten years, advanced age, high BMI, and other comorbidities.

One of the main negative effects of diabetes is foot ulcers. An estimated 15% of diabetic persons may have these ulcers. The cause of 88% of all limb amputations was diabetic foot ulceration. While treating ulcers, the pace of wound healing was accelerated by the application

of many biological therapies. Growth factors from Platelet Rich Plasma (PRP), which are utilized to speed up wound healing, were compared to standard treatments in recent research. Local growth factors that were released during the initial stages of wound healing drew stem cells to the area. PRP promoted capillary development while reducing cytokine secretion. PRP also has modest bactericidal and bacteriostatic effects against E. coli, MRSA, and Candida albicans. [9]

However, due to the complication of underlying peripheral vascular disease, the majority of diabetic foot ulcers remain asymptomatic in the prompt stages of the disease. Evidence of tissue loss is more obvious in the latter, more severe phases; this is commonly shown as persistent, non-healing foot ulcers.

Antiseptics' role in wound healing

An ideal antiseptic should have a broad spectrum of action, be capable of penetrating biofilms, necrotic tissue, and eschar, have a low chance of acquiring acquired resistance, promote wound healing by lowering excessive inflammation, and be well tolerated locally. [10]

SUPER OXIDE SOLUTION:

The best antiseptic is one that kills all bacteria and their spores fast, has long- lasting bactericidal activity, and has no detrimental effects on the tissues mending the wound.

It has long been sought after a perfect antiseptic that kills all bacterial spores immediately and has long-lasting bactericidal effects without hurting the host's tissues. Superoxidized solutions might be used to clean skin and wounds instead of antiseptics that are presently on the market. A superoxidized solution is made consisting of water that has a little amount of salt (sodium chloride) mixed in it. An electric current is then sent through the mixture. This results in the formation of a mixture of charged particles (ions), which are mostly made up of mixtures of hydrogen, oxygen, and chlorine. The solutions may be acidic as a result of the production of hydrogen ions. The pH balance of certain fluids is adjusted by further processing, which increases their shelf life. They serve both as antiseptics to treat chronic wound biofilm and stop wound infections. For simplicity of usage, the superoxidized solution can be turned into a gel. [11]

Mechanism:

The molecules in the solution disintegrate during the electrolysis process, creating ions and free radicals. The proteins in the bacterial cell wall denature as a result of their quick action. They also produce an imbalanced osmolar environment and have anti-inflammatory characteristics, which have an impact on single cell organisms. The differential in osmolarity between the concentrations of the same ions in solution and the cell is what causes the damage. Host tissues are safeguarded because multicellular organisms are less susceptible to these osmolarity variations. The ions in the end product denature the bacterial proteins once the single cell membrane has been broken.

In biofilms, super oxidized solutions may aid in the reduction of the number of bacteria present while also breaking down the molecular structure of the film on which the bacteria dwell. Superoxidized solutions are believed to hasten healing in chronic wounds by lowering bacterial counts, increasing blood flow, and lowering inflammation. Additionally, they lessen wound odor by interacting with dying material.

A wound care routine for either acute or chronic wounds may include superoxidized fluids, such as:

- Heat burns
- Surgical incisions
- Unclean wounds
- Diabetic foot Ulcers

• Persistent leg ulcers
The mixture can be used as a wash, a gel, or a gauze swab to apply it. Superoxidized solutions may also be used for the following purposes: after dental root canal procedures or surgeries, infection prevention. [12]

POVIDONE – IODINE SOLUTION:
• There aren't many sterilizers available for use in disease prevention and injury care. Models include speciality colors like eosine and iodine transporters (iodophores, for example, polyvinylpyrrolidone (PVP or povidone) iodine), as well as silver, chlorhexidine, benzalkonium chloride, triclosan, octenidine, and polihexanide (PHMB).
• Iodine is mostly used as an antibacterial specialist in the treatment of injuries. Povidone iodine has long been used and focussed on in the healing of injuries. The evolution of in vitro, animal, and clinical knowledge utilizing various definitions and doses in studies with shifting philosophies, goals, and quality is similar to that of different disinfectants. However, a few questions remain unresolved.
• Povidone iodine is framed when povidone, a manufactured transporter polymer with low microbicidal action, and iodine blend. In a watery medium, the povidone iodine complex deliveries free iodine and a harmony is laid out. All the more free iodine is set free from the povidone iodine supply while iodine- eating germicidal movement rises.
• The definition , fixation , and temperature-subordinate balance of povidone- bound iodine to free iodine takes into account the decrease of security and decency concerns brought about by skin openness to prior basic iodine plans, as well as what has all the earmarks of being insurance from hindrance of granulation tissue development.
Mechanism
Iodine's microbicidal effects appear to involve the suppression of important bacterial cellular functions and structures. Additionally, it oxidizes cytosolic enzymes associated to the respiratory chain, fatty acids, and nucleotides of bacteria, rendering them inactive and denatured. It is still unclear exactly how processes work at the molecular level in relation to one another. Studies on cytotoxicity have shown that the bactericidal effect occurs even before individual human cells are damaged. According to in vitro research, iodine not only has broad-spectrum antibacterial actions but also lowers immune response and inflammation brought on by infections. These clinically substantial anti-inflammatory benefits, which have been shown, appear to be complicated.
Clinical separates remember most of data for bacterial opposition and cross- protection from cleaning agents, for example, triclosan, chlorhexidine, and quaternary ammonium salts. Protection from anti-infection agents and disinfectant drugs has likewise been distinguished. Also, careful testing to yet has not brought about the acceptance of povidone iodine obstruction. As opposed to different germ-killers, iodine has not been related with obtained opposition or get obstruction in more than 150 years of utilization (evidently except for an absence of silver-obstruction). The numerous techniques through which iodine acts are likely to fault for this absence of obstruction.
Toxicity:
Studies on cytotoxicity were generally conducted in fibroblasts, keratinocytes, and other cell lines. While all antiseptics may cause some cytotoxicity as a result of nonspecific effects, this may or may not have clinical significance for the healing of a wound.
Povidone Iodine in Diabetic Foot Ulcer
Recent study on ulcer patients, the majority of whom had diabetes, discovered that povidone iodine dressings were less painful than cadexomer-iodine and silver dressings. When treating diabetic foot ulcers, split thickness skin grafting, or allografts may be used. If cost is a problem, povidone iodine antisepsis can assist assure graft success by reducing the bacterial burden. The

specific effects of these antiseptics on skin grafts must be thoroughly analyzed, which will need further research in standardized clinical trials. [76]

AIM

This study compared the effectiveness of applying povidone-iodine vs a super oxidized solution to diabetic foot ulcers in patients at the Chettinad Hospital and Research Institute.

OBJECTIVES

• To compare the reduction in size of the wound at different time intervals.
• To estimate the dimensions of diabetic foot ulcer at different time intervals.

Research hypothesis:

Between the super oxidized solution and the povidone-iodine solution, there will be a substantial difference in the pace of ulcer healing.

Null hypothesis:

Between the super oxidized solution and the povidone-iodine solution, there will not be a substantial difference in the pace of ulcer healing.

2. Materials And Methods

Study design: A Double-blind, Randomised control trial.
Study objectives: "A PROSPECTIVE STUDY TO COMPARE THE EFFICACY OF SUPEROXIDIZED SOLUTION VERSUS POVIDONE IODINE IN DIABETIC FOOT ULCERS"
Sample size: 50
Subject selection: All patients diagnosed with diabetic foot ulcers in Chettinad Hospital and research institute.
Timeline of study: 18 months [2022-2024] post ethical clearance. Inclusion Criteria:
• Patients with diabetic foot ulcers.
• Age above 45 yrs
• Grade I & 2 Wagners classification
• Sex- both sexes
Exclusion Criteria:
• Age below 45
• Grade 3,4,5 Wagners classification
• Patients with peripheral vascular disease
• Patients not willing for the study
Size and surface area - 10-20 sq.cm
Time scale for measurement: SUPEROXIDIZED solution is applied every day on diabetic foot ulcer and the wound dimensions are measured once in three days and are compared with povidone iodine solution dressings in similar way.
Colour coding of granulation tissue: A] PINK B] PALE RED C] SHINY RED
END POINT OF STUDY - 40 % ulcer surface area reduction or appearance of pink granulation tissue or 2 weeks whichever is earlier.

3. Methodology

Initial visit
Using alternative randomization, all patients via inclusion criteria were randomly allocated to groups A and B. The initial visit was planned for the selected patients. Patients were randomly assigned to one of two groups at this appointment. Group 1 received a superoxidized solution, whereas Group 2 received a Povidone Iodine solution. A thorough medical examination was

performed, the ulcers were measured, and images were taken. The patient [his or her] family was informed about DFU medication, the right way to apply patches on a daily basis, and the detection and notification of bad effects.

Follow up visits

The procedure lasted 15 days. During this time, patients were examined by the study group every three days until the ulcer healed or the therapy ended. The frequency of the visits varied according to the patient's clinical progress. The healing course of the ulcer and the patient's health state were examined at each visit. The patch was applied, and the ulcers' progression was photographed. A graduated ruler was used to measure the ulcer's maximum and minimum diameters. The BATES JENSEN Wound Assessment Score was utilized to determine the statistically significant effect of both treatments.

Study tools:

• Wounds are measured by placing a sterile translucent paper on the wound and marking the wound boundaries with it.

• Using a ruler [in cm], measure the two biggest perpendicular diameters. • The wound will be photographed with the ruler side by side.

• The wound area is calculated by multiplying these two diameters by the area of the ulcer in square centimeters.

• Ulcer size is measured once in 3 days until 15 days of study.

• Blinding of observer or person who assessed the wound.

• The study's end goal was set at 40% decrease in ulcer surface area.

• Wound healing rate is computed as the difference between the main wound on day 1 and full wound healing and is provided in cm2/15 days as a healing marker.

STATISTICAL ANALYSIS

A value of $P < 0.05$ was considered statistically significant when using the student T-test and 2 test for statistical analysis. Quantitative variables were provided as mean +/- standard deviation whereas categorical data were represented as percentages of numbers.

OBSERVATION AND RESULTS

This is prospective research with 50 individuals who were diagnosed with diabetic foot ulcers. All 50 patients with diabetic foot ulcers were randomly selected and allocated into two groups, out of which 25 were with the application of Superoxidized solution daily dressing, and 25 were with the application of the povidone-iodine daily dressing. The study was done after receiving clearance from the Chettinad Hospital and research institute's ethics committee in Chennai. Those who satisfied the inclusion criteria were asked to participate in the study.

AGE PROFILE

The current study included patients ranging in age above 45 years old, with an average age of 60.8±7.804 in group A and 59.68±7.7713 in group B. Only 8% and 4% of the group A and group B patients were between the ages of 76 and 85. About 64% and 56% of group A and group B were between the ages of 56 and 65. (Table 1).

Table 1: Age distribution

Age distribution	**Povidone iodine (GROUP A) N (%)**	**Super oxidized solution (GROUP B) N (%)**
45-55	4 (16%)	5(20%)
56-65	16(64%)	14(56%)

66-75	3(12%)	5(20%)
76-85	2(8%)	1(4%)
Mean ± SD	60.8±7.804	59.68±7.7713

SEX DISTRIBUTION

Of the 50 patients in each of the two trial groups. In both group A (84% men, 16% women) and group B (88% men, 12% women), there were more men than women. Table: 2 demonstrates that there were no significant sex differences in this example and that the sex distribution was uniform.

Table 2: Gender distribution

GENDER	Povidone iodine (GROUP A) N (%)	Super oxidized solution (GROUP B) N (%)
MALE	21(84%)	22 (88%)
FEMALE	4(16%)	3(12%)
TOTAL	25	25

DURATION OF DIABETES IN YEARS

Among total cases, only 4% of patients in both groups were between diabetes duration of 14 - 20 years. Meanwhile, 40% of patients in both groups were between the diabetes duration of 6 - 9 years. Mean ±SD range was 8.6 ±3.37. [Table: 3]

Table: 3 DURATION OF DIABETES

DURATION OF DIABETES	Povidone iodine (GROUP A) N (%)	Super oxidized solution (GROUP B) N (%)
2-5 Years	4 (16%)	5 (20%)
6-9 years	10 (40%)	10 (40%)
10-14 years	10 (40%)	9 (36%)
14-20 years	1 (4%)	1 (4%)
Chi square test 0.1637; p=0.9832		

ANTI-DIABETIC TREATMENT

Only one instance was observed to take insulin in group A, whereas two cases were seen to take insulin in group B. Rest of the therapy received by patients in both groups is shown in table 4 and figure 4. As a result, the total chi square value was 0.3974 and the p-value was 0.8198, both of which were statistically insignificant.

Table: 4 Anti-diabetic treatment

TREATMENT	Povidone iodine (GROUP A) N	Super oxidized solution (GROUP B) N
INSULIN	1	2

INSULIN + OHA	11	12
OHA	13	11
Total	25	25
Chi square test = 0.3974 P value = 0.8198		

GRADE OF ULCER

Among 25 cases of group A, 64% belong to grade 2 ulcers, 36% belong to grade 1 ulcer. Among 25 cases of group B, 40 % belong to grade 2 ulcers, 60% belong to grade 1 ulcer. [table: 5]. As a result, the total chi square value was 2.8846 and the p-value was 0.089, both of which were statistically insignificant.

Table: 5 Grade of ulcer distribution

GRADE OF ULCER	**Povidone iodine (GROUP A)**	**Super oxidized solution (GROUP B)**
I	9 (36%)	15 (60%)
II	16 (64%)	10 (40%)
Total	25	25
Chi square test = 2.8846 P value = 0.089 not statistically significant		

LAB FINDINGS

Table 6 shows the mean and SD range of the lab test results for two groups of Hb% and HBA1C. None of the groups appear to be significant.

Table: 6 Mean ± SD of Lab test findings

Lab test	**Mean ± SD [Group A]**	**Mean ± SD [Group B]**	**T value**	**P value**
Hb %	11.95±1.155	11.52± 0.834	1.4923	0.142
HBA1C	11.20± 1.84	11.03±1.389	0.3727	0.711

DURATION OF HOSPITAL STAY

Approximately 48% of patients in Group A were hospitalized for 25 - 30 days. In addition, 68% of patients in Group B stayed in the hospital for 25 to 30 days. Only 4% of patients in Group A stayed longer than 35 days, but none of the patients in Group B stayed longer than 35 days. [Table: 7]

Table: 7 Frequency and Percentage distribution of length of hospital stay

Duration of hospital stay	**Povidone iodine(GROUPA)**	**Super oxidized solution (GROUP B)**
20-25	4 (16%)	5 (20%)

25-30	12(48%)	17 (68%)
31-35	5 (20%)	4 (16%)
36-40	1 (4%)	0

SIZE OF ULCER

The predicted healing period in diabetic foot ulcers may be accurately approximated. On the 12th day of infection, about 18 and 21 individuals in groups A and B developed ulcers ranging in size from 2 to 5 cm. [Table: 8]

Table: 8 Distribution of ulcer size among 2 groups

Size of ulcer	2-5		6-8		8-10	
	Group A	Group B	Group A	Group B	Group A	Group B
Baseline	0	0	17	15	13	13
3 days	0	1	18	11	13	6
6 days	14	11	10	8	4	6
9 days	17	17	7	6	1	4
12 days	18	21	7	3	1	2
15 days	18	21	7	3	-	2

DEPTH OF ULCER

In 6 cases of group A and 8 cases of group B, grade 1 non blanchable erythema on undamaged skin was seen. In 16 instances in group A and 18 cases in group B, the epidermis and/or dermis both lost some of their thickness. Grade 3 denotes full thickness skin loss with necrosis or injury to subcutaneous tissue, which may extend to but not through underlying fascia. It may also indicate mixed partial and full thickness tissue loss, as well as tissue layers that are hidden by granulation tissue. Almost all 15 days of the treatment saw Grade 3 patients. similar to Obscured by necrosis, a grade 4 condition seen for practically all 15 days. [Table: 9]

Table: 9 Depth of ulcer among 2 groups in 15 days

Depth of ulcer	1		2		3		4	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Baseline	0	0	0	0	8	15	16	10
3	0	0	0	0	9	15	16	10
6	0	0	0	0	8	15	16	10
9	0	0	0	0	9	15	16	9
12	0	0	3	8	14	10	8	7
15	6	8	13	10	6	6	0	0

EDGES

In 13 and 16 cases, respectively, of group A and group B, indistinct, hazy, and not clearly discernible borders were seen. In 45 and 48 cases of group A and group B, respectively, distinct, contour clearly visible, adherent, even with wound base were seen. Nearly all instances of group A and group B had well-defined lesions that were not connected to the wound base. [Table 10]

Table: 10 Distribution of Edges among two groups

Edges	1		2		3		4	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Baseline	0	0	7	9	6	10	12	6
3	0	0	7	9	6	10	12	6
6	0	0	7	9	6	10	12	6
9	3	4	8	6	8	13	5	2
12	3	4	8	6	8	13	5	2
15	7	8	9	9	7	7	1	1

UNDERMINING

The benefit of undermining is that it releases the wound edges and lessens pressure on the wound, which promotes faster wound healing and lowers the risk of scarring and keloid formation. In grade 1 of undermining, only 2 and 5 cases of group A and group B respectively were observed. Between the two groups, grade 2 saw almost all of the instances. In groups A and B of grade 3, there were about 11 and 14 instances, respectively.

Table: 11 UNDERMINING DISTRIBUTION

Edges	1		2		3	
	Group A	Group B	Group A	Group B	Group A	Group B
Baseline	0	0	14	11	11	14
3	0	0	14	11	11	14
6	0	0	14	11	11	14
9	0	0	14	11	11	14
12	0	0	25	25	0	0
15	2	5	23	20	0	0

NECROTIC TISSUE TYPE

White/grey non-viable tissue &/or non-adherent yellow slough seen at 15 days only in 44% and 36% cases of group A and group B. Loosely adherent yellow slough necrotic tissue seen during the initial day in 52% and 24% cases of group A and group B. This grade 3 decreased at 15 days. Adherent, soft, black eschar was seen during the initial day in 76% cases and 48% cases of group B and group A respectively. This grade 4 decreased to 12% at 15 days. [Table: 12]

Table: 12 Distribution of different necrotic tissue type among two groups

Necrotic tissue type	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	7	8	0	0	0	0	3	11
3	13	13	13	13	12	15	6	6	6	6	15	9
4	12	12	12	12	6	2	19	19	19	19	7	5

NECROTIC TISSUE AMOUNT

At day 0, < 25% of wound bed covered were not seen in both the groups. At day 15, < 25% of wound bed covered were seen in 36% and 44% of group A and group B. At day 0, 25% to 50% of wound covered were seen in 52% and 24% of group A and group B. At day 15, 25% to 50% of wound covered were seen in 56% and 36% of group A and group B. At day 0, > 50% and < 75% of wound covered were seen in 48% and 76% of group A and group B. At day 15, > 50% and < 75% of wound covered were seen in 8% and 20% of group A and group B.

Table: 13 Distribution of different necrotic tissue amount among two groups

Necrotic tissue amount	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	6	8	0	0	0	0	3	11
3	13	13	13	13	12	15	6	6	6	6	15	9
4	12	12	12	12	5	2	19	19	19	19	7	5

EXUDATE AMOUNT

At day 0 and 15, Scant, wound moist but no observable exudate was not seen in both the groups. At day 15, small amount was seen in 44% and 36% of group A and group B. At day 0, small amount was seen in 44% and 36% of group A and group B. At day 15, moderate amount was seen in 24% and 12% of group A and group B. At day 0, moderate was seen in 12% of group A and group B. At day 15, large amount was seen in 20% and 28% of group A and group B.

Table: 14 Distribution of Exudate amount among two groups.

Exudate amount	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**

1	0	0	25	25	25	25	0	0	0	25	25	25
2	11	11	0	0	0	0	9	9	0	0	0	0
3	6	6	0	0	0	0	6	6	0	0	0	0
4	3	3	0	0	0	0	3	3	0	0	0	0
5	5	5	0	0	0	0	7	7	0	0	0	0

EXUDATE TYPE

At day 0 and 15, bloody exudates were seen in both the groups. At day 0 and 3, Serosanguineous: thin, watery, pale red/pink were seen in 11 and 9 cases of group A and group B. At day 0 and 3, Serous: thin, watery, clear were seen in 6 cases of group A and group B. At day 0 and 3, Purulent: thin or thick, opaque, tan/yellow, with or without odor were seen in 3 cases of group A and group B.

Table: 15 Distribution of Exudate type among two groups.

Exudate type	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	25	25	25	25	0	0	25	25	25	25
2	11	11	0	0	0	0	9	9	0	0	0	0
3	6	6	0	0	0	0	6	6	0	0	0	0
4	3	3	0	0	0	0	3	3	0	0	0	0
5	5	5	0	0	0	0	7	7	0	0	0	0

SKIN COLOUR

Pink or normal for ethnic group were seen only in 2 and 5 cases at day 15 of group A and group B respectively. Bright red &/or blanches were seen in 56% and 44% at day 0 of group A and group B respectively. Bright red &/or blanches were seen in 92% and 80% at day 15 of group A and group B respectively. White or grey pallor or hypopigmented were seen in 56% and 44% at day 0 of group A and group B respectively. White or grey pallor or hypopigmented were not seen on day 15 of both groups.

Table: 16 Distribution of skin colour among two groups

Skin colour	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	0	0	0	2	0	0	0	0	0	5
2	14	14	14	14	25	23	11	11	11	11	25	20
3	11	11	11	11	0	0	14	14	14	14	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0

PERIPHERAL TISSUE EDEMA

No swelling or edema seen in 84% and 92% of group A and group B at day 15. Non-pitting edema extends were seen in 40 % and 28% of group A and group B at day 0. Non-pitting edema extends were seen in 16 % and 8% of group A and group B at day 15. Non-pitting edema extends >4 cm around wound were seen in 36% of both groups at day 0. Pitting edema extends < 4 cm around wound were seen in 40% and 24% of group A and group B at day 0.

Table: 17 Distribution of Peripheral tissue edema among two groups.

Peripheral tissue edema	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	15	15	19	21	0	0	12	12	23	23
2	10	10	10	10	6	4	7	7	13	13	2	2
3	9	9	0	0	0	0	8	7	0	0	0	0
4	6	6	0	0	0	0	10	10	0	0	0	0

PERIPHERAL TISSUE INDURATION

None of the cases had peripheral tissue induration at day 0 to day 6. Induration, < 2 cm around wound were seen in 44 % and 36% of group A and group B at day 15. Induration 2-4 cm extending < 50% around wound were seen in 54 % and 66% of group A and group B at day 0. Induration 2-4 cm extending < 50% around wound were seen in 45 % and 52% of group A and group B at day 15. Induration 2-4 cm extending > 50% around wound were seen in 24% of both groups at day 0.

Table: 18 Distribution of Peripheral tissue induration among two groups.

Peripheral tissue induration.	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	0	6	6	6	0	0	0	4	4	14
2	0	0	6	15	15	19	0	0	4	12	12	7
3	13	16	15	4	4	0	11	10	13	8	8	4
4	12	9	4	0	0	0	14	15	8	0	0	0

GRANULATION TISSUE

At day 15, 48% and 52% of group A and group B, respectively, had skin intact or a partial thickness wound. Bright, meaty red; 75% to 100% of the incision was filled and/or tissue overgrowth was visible in 44% of group A on day 1. Bright, meaty red; 48% of both groups at day 15 had wounds that were 75% to 100% filled and/or had tissue overgrowth. At day 1, 24% and 40% of group A and group B respectively showed bright, meaty red; 75% & > 25% of wound filled. At day 15, neither group A nor group B displayed bright, muscular red. At the first day, 12% and 44% of groups A and B, respectively, and 25% of the wounds, were pink or dark red. Absence of granulation tissue was seen in 20% and 16% of group A and group B at day 1.

Table: 19 Distribution of Granulation tissue among two groups

Granulation tissue	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	4	12	12	0	0	1	1	13	13	13
2	0	5	6	12	12	0	2	7	7	12	12	12
3	8	10	9	1	1	11	15	15	15	0	0	0
4	10	6	3	0	0	11	6	2	2	0	0	0
5	7	4	2	0	0	4	2	0	0	0	0	0

EPITHELIALIZATION

100% wound covered, surface intact was seen in 40% and 36% of group A and group B at day 15. Grade 2 epithelialization was seen in 64% and 60% of group A and group B at day 15. Grade 3 epithelialization was seen in 48% and 40% of group A and group B at day 0. Grade 4 epithelialization was seen in 24% and 20% of group A and group B at day 0. Grade 5 epithelialization was seen in 36% of group A and group B at day 0.

Table: 20 Distribution of Epithelialization among two groups.

Epithelialization	Group A						Group B					
	0	**3**	**6**	**9**	**12**	**15**	**0**	**3**	**6**	**9**	**12**	**15**
1	0	0	0	0	9	9	0	0	0	1	10	10
2	0	0	0	19	14	16	0	1	1	18	13	15
3	10	19	19	6	2	0	12	19	19	6	2	0
4	6	6	6	0	0	0	5	5	5	0	0	0
5	9	0	0	0	0	0	8	0	0	0	0	0

BATES JENSEN WOUND ASSESSMENT SCORE

Mean ±SD of Bates Jensen Wound Assessment Score for povidone- iodine solution was 23.08 ±1.53. Mean ±SD of Bates Jensen Wound Assessment Score for Super oxidized solution group was 21.88 ±1.86. T score values of both groups were 2.4978. a result, the p value of 0.05 is statistically significant. [Table: 21]

Table: 21 Bates Jensen wound assessment score among two groups.

Bates Jensen Wound Assessment Score	Povidone solution	Super oxidized solution group	T score	P value
Mean ±SD	23.08 ± 1.53	21.88± 1.86	2.4978	<0.05 significant

4. Discussion

Lower limb ulcers are disabling and are linked to high rates of morbidity, diminished productivity, decreased quality of life, and high medical expenses. The majority of antiseptics

used in wound care today are cytotoxic, may harm granulation tissue, obstruct wound healing, and are far from optimal wound care items.

This is a prospective study including 50 people with diabetes-related foot ulcers. Using a computer-generated design, all 50 patients with diabetic foot ulcers were randomly chosen and divided into two treatment groups, 25 of whom received daily dressings containing super oxidized solution and 25 of whom received daily dressings containing povidone-iodine. Those who matched the inclusion requirements received an invitation to participate in the study.

US Devan et al., 2022 compared the efficacy of super oxidized solution to povidone-iodine (Betadine) on wounds with comparable features. Superoxidized was utilized as a topical therapy and dressing in group A of this trial, while betadine was employed in group B. Different types of wounds in both groups were graded based on a percentage reduction in wound size, peri-wound oedema/erythema, pus discharge, and an increase in granulation, fibrin, and epithelialization. Betadine-treated wounds swelled less and healed more quickly than those treated with oxum. Oxum was painless to use and had no negative side effects. [13]

In research done in 2021 by R Jain and colleagues, it was determined how well super-oxidized solution dressings compared to povidone-iodine in the treatment of infected diabetic ulcers. A randomized controlled experiment with 60 participants who had infected diabetic ulcers was conducted over the course of a year. Using computer-generated randomization, patients were split into two groups of 30 each: group A and group. The wound was assessed for granulation, tissue quality, and discharge each week for two weeks. [14]

AGE PROFILE

The current study included patients ranging in age above 45 years old, with an average age of 60.8±7.804 in group A and 59.68±7.7713 in group B. Therefore, the majority of the study's participants were above 60. This is consistent with the findings of the study SO Oyibo et al.2001 which comprised of 174 patients (77% of whom were men), with a mean (SD) age and diabetes duration of 56.6/12.6 and 15.4/9.9 years, respectively. [15]

SEX DISTRIBUTION

Of the 50 patients in each of the two trial groups. In both group A (84% men, 16% women) and group B (88% men, 12% women), there were more men than women. This demonstrates that there were no significant sex differences in this example and that the sex distribution was uniform. Hence, male preponderance was noted. The gender distribution was consistent with findings from another Indian research. [16]

DURATION OF DIABETES IN YEARS

Among total cases, only 4% of patients in both groups were between diabetes duration of 14 - 20 years. Meanwhile, 40% of patients in both groups were between the diabetes duration of 6 - 9 years. Mean ±SD range was 8.6 ±3.37.

Leg ulcers were shown to be most often concomitant with diabetes. Elderly people are known to have a greater prevalence of leg ulcers, and diabetes has been recognized as one of the main risk factors. The duration of diabetes was between 2 and 6 years in Subramani R, 2018 research, in contrast. This study's chi-square value was 2.100, making it non-significant. [17]

ANTI DIABETIC TREATMENT

Only one instance was observed to take insulin in group A, whereas two cases were seen to take insulin in group B. As a result, the total chi-square value was 0.3974 and the p-value was 0.8198, both of which were statistically insignificant.

Abhyankar et al. (2009) found that 11% of diabetic patients were not receiving treatment. Diabetes medication was administered to 89% of the patients. Recent clinical data demonstrate

that keeping blood glucose levels between 80 and 110 mg/dl lowers morbidity and death in critically sick surgical patients. Intense insulin treatment regulates inflammatory mediator release and reduces abnormalities in the host's natural defensive systems. The primary advantage of intensive insulin therapy is a reduction in infection-related complications and mortality. [18]

GRADE OF ULCER

The Meggitt-Wagner 12 system, the first diabetes-specific classification scheme to be published, is a linear system with just six grades (0–5, where 0 denotes intact skin), the first three of which are connected to depth.

Among 25 cases of group A, 64% belong to grade 2 ulcers, 36% belong to grade 1 ulcer. Among 25 cases of group B, 40 % belong to grade 2 ulcers, 60% belong to grade 1 ulcer. As a result, the total chi-square value was 2.8846 and the p-value was 0.089, both of which were statistically insignificant. According to Edo AE et al. (2013), [19] the most prevalent ulcer grade upon presentation was Grade IV. The results of logistic regression revealed a significant relationship between the baseline ulcer grade and the incidence of LEA; the odds ratio was 2.36 (95% confidence interval: 1.06– 5.21). PN had an odds ratio of 1.71, however this was not noteworthy

LAB FINDINGS

Mean and SD range of the lab test results for group A of Hb% and HBA1C was 11.95±1.155 and 11.20 ±1.84 and group B was 11.52 ±0.834 and 11.03±1.389. None of the groups appear to be significant.

The relationship between hemoglobin A1c (HbA1c) levels at baseline and throughout treatment, wound healing, and death in DFU patients was examined by J Xiang et al. in 2019. [20] Similar to our study, by the conclusion of the follow-up, neither the unadjusted nor the adjusted models showed a relationship between baseline HbA1c and ulcer healing ($P > 0.05$).

DURATION OF HOSPITAL STAY

Approximately 48% of patients in Group A were hospitalized for 25 - 30 days. In addition, 68% of patients in Group B stayed in the hospital for 25 to 30 days. Only 4% of patients in Group A stayed longer than 35 days, but none of the patients in Group B stayed longer than 35 days. Hence, it's significant.

R Gadepalli et al. (2006), [21] On the other hand, it was shown that diabetic foot ulcers were not connected with patient characteristics, ulcer type and duration, or length of hospital stay, but rather with the existence of neuropathy ($P = 0.03$), osteomyelitis ($P = 0.01$), and ulcer size more than 4 cm2. Similar to our study, SM Mahmoud et al. (2008) found that the graft group's mean hospital stay and healing time were considerably shorter than those of the control group ($p < 0.001$). [22]

SIZE AND DEPTH OF ULCER

The ulcer area, a measure of ulcer size and AMD depth, can be used to predict the prognosis of foot ulcers. Its integration into a system for classifying diabetic wounds will enhance the system's prognostication capabilities. The wound etiology and wound radius can be used to properly approximation the projected healing duration in diabetic foot ulcers. On the 12th day after infection, between 18 and 21 people in groups A and B respectively developed ulcers that were 2 to 5 cm in diameter.

Non-blanchable erythema on unblemished skin of grade 1 was found in 6 instances of gathering A and 8 instances of gathering B. Skin misfortune influencing the epidermis as well as dermis was found in 16 occasions of gathering An and 18 instances of gathering B. Full thickness skin

misfortune including subcutaneous tissue injury or putrefaction; may reach out down to however not through hidden belt; or potentially blended incomplete and full thickness and/or tissue layers concealed by granulation tissue. Pretty much the entire 15-day treatment, a grade 3 was seen. Equivalent to Clouded by rot, which is grade 4 and noticed pretty much at regular intervals.

As per H Gubara Musa et al. (2012), non-mending ulcerations were fundamentally connected with a more drawn out length of the ongoing DFU > a year (p=0.002), smoking (p=0.000), poor glycemic control as exhibited by a raised HbA1c (>7%), enormous size (mean SD 8+4 cm), expanded profundity (p<0.001), the presence of skin callus (p0.000), weakened appendage perfusion (p=0.001). [23]

EDGES, UNDERMINING, NECROTIC TISSUE TYPE AND NECROTIC TISSUE AMOUNT

Through a variety of debridement techniques, tissue management tries to reduce the load of necrotic tissue. Reduced bacterial biofilms and control of infection and inflammation restore bacterial equilibrium. Moisture equilibrium is the consequence of creating a wet environment for wound healing that is free of excessive wound moisture or dryness. By reducing the biological and physical constraints on the migration of epithelium from wound edges, epithelial advancement is facilitated. (2013) (AZ Mat Saad et al.). [24]

Edges were indistinct, hazy, and not clearly apparent in 13 and 16 examples of group A and group B, respectively. In 45 and 48 cases, respectively, the outline was distinct, plainly apparent, and connected, even with the wound base. Almost all patients in groups A and B had well-defined wounds that were not linked to the wound base. Undermining has the advantage of releasing the wound margins and reducing strain on the wound, allowing for quicker wound healing and reducing the likelihood of scar spreading and keloid development.

Only 2 and 5 cases of group A and group B were seen in grade 1 of undermining. Almost all the cases were seen in grade 2 among both groups. Almost 11 cases were seen in group A of grade 3 and 14 cases were seen in group B of grade 3.

White/grey non-viable tissue &/or non-adherent yellow slough seen at 15 days only in 44% and 36% cases of group A and group B. Loosely adherent yellow slough necrotic tissue seen during the initial day in 52% and 24% cases of group A and group B. This grade 3 decreased at 15 days. Adherent, soft, black eschar was seen during the initial day in 76% cases and 48% cases of group B and group A respectively. This grade 4 decreased to 12% at 15 days.

At day 0, < 25% of wound bed covered were not seen in both the groups. At day 15, < 25% of wound bed covered were seen in 36% and 44% of group A and group B. At day 0, 25% to 50% of wound covered were seen in 52% and 24% of group A and group B. At day 15, 25% to 50% of wound covered were seen in 56% and 36% of group A and group B. At day 0, > 50% and < 75% of wound covered were seen in 48% and 76% of group A and group B. At day 15, > 50% and < 75% of wound covered were seen in 8% and 20% of group A and group B.

LJ Saap et al grading's approach in 2002 included three criteria: callus debridement, ulcer edge undermining, and necrotic tissue in the wound bed. They assigned a score of 0-2 to each of these categories based on the following criteria: 0 for debridement necessary but not performed, 1 for debridement required but completed, and 2 for debridement not required. The total of these three values is then computed, and the result can vary between 0 and 6, with the highest number indicating the optimum score. They performed a blind examination of the baseline Debridement Performance Index and discovered that wound closure occurred earlier by week 12 (p = 0.0276). This new method of rating debridement effectiveness shows great promise as a predictor of success in clinical studies. [25]

The Bates-Jensen Wound Assessment Tool's eight subscales were used to evaluate the wounds. A rating scale of 1 to 5 was used for each subscale, with 1 being the best possible rating and 5

the worst. The final score might therefore vary from 8 for normal skin to 40 for an ulcer with hyperkeratotic boundaries, no granulation tissue, a full covering of hard black eschar, and significant amounts of purulent discharge. The CCO group's mean total scores considerably increased as soon as one week into therapy (P = 0.005), while the SMG group's mean total scores significantly improved as soon as two weeks into therapy (P = 0.049).

EXUDATE TYPE AND AMOUNT

At day 0 and 15, exudates were seen in both the gatherings. At day 0 and 3, Serosanguineous: slight, watery, light red/pink were found in 11 and 9 instances of gathering An and bunch B. At day 0 and 3, Serous: slight, watery, clear were found in 6 instances of gathering An and bunch B. At day 0 and 3, Purulent: flimsy or thick, obscure, tan/yellow, regardless of smell were found in 3 instances of gathering An and bunch B.

At day 0 and 15, Meager, injury sodden yet no recognizable exudate was not seen in both the gatherings. At day 15, modest quantity was seen in 44% and 36% of gathering An and bunch B. At day 0, modest quantity was seen in 44% and 36% of gathering An and bunch B. At day 15, moderate sum was seen in 24% and 12% of gathering An and bunch B. At day 0, moderate was seen in 12% of gathering An and bunch B. At day 15, enormous sum was seen in 20% and 28% of gathering An and bunch B.

Tallis A et al. (2013) looked at the amount of exudate, which offers important information on the wound environment in terms of wetness. At any point during the study's treatment weeks or at the end, there were no discernible changes between the two groups in this assessment (mean values for treatment weeks 1–4 and study exit. All assessment time points for both groups' values were around 2, which is indicative of a moist wound with little exudate. [26]

SKIN COLOR

Pink or normal for ethnic group were seen only in 2 and 5 cases at day 15 of group A and group B respectively. Bright red &/or blanches were seen in 56% and 44% at day 0 of group A and group B respectively. Bright red &/or blanches were seen in 92% and 80% at day 15 of group A and group B respectively. White or grey pallor or hypopigmented were seen in 56% and 44% at day 0 of group A and group B respectively. White or grey pallor or hypopigmented were not seen on day 15 of both groups.

To analyze the differences from the perspective of computer vision, M Goyal et al. (2018) recommended utilizing machine learning algorithms to extract attributes for DFU and healthy skin patches. This study aims to identify the skin conditions that computer vision algorithms are most prone to misclassify. In this binary classification, convolutional neural networks were also applied for the first time. DFUNet, a new convolutional neural network architecture he developed, has improved feature extraction and can distinguish between the features of healthy skin and DFU. [27]

PERIPHERAL TISSUE EDEMA AND PERIPHERAL TISSUE INDURATION

No expanding or edema seen in 84% and 92% of gathering An and bunch B at day 15. Non-pitting edema expands were found in 40 % and 28% of gathering An and bunch B at day 0. Non-pitting edema expands were found in 16 % and 8% of gathering An and bunch B at day 15. Non-pitting edema broadens >4 cm around wound were seen in 36% of the two gatherings at day 0. Pitting edema expands < 4 cm around wound were seen in 40% and 24% of gathering An and bunch B at day 0.

None of the cases had fringe tissue induration at day 0 to day 6. Induration, < 2 cm around wound were seen in 44 % and 36% of gathering An and bunch B at day 15. Induration 2-4 cm expanding < half around wound were seen in 54 % and 66% of gathering An and bunch B at day 0. Induration 2-4 cm expanding < half around wound were seen in 45 % and 52% of

gathering An and bunch B at day 15. Induration 2-4 cm broadening > half around wound were seen in 24% of the two gatherings at day 0.
Ionic Silver Solution and Super Oxidized Solution were both found to be useful in enhancing the general state of the wound, according to B Mishra et al., 2021. However, it was discovered that Ionic Silver Solution outperformed Super Oxidized Solution in the healing of chronic wounds. Only a few individuals (6%) showed complete recovery of peripheral edema and peripheral tissue induration. Therefore, these treatments can best get the wounds ready for quick surgical intervention. [28]

GRANULATION TISSUE
Fractional thickness wound was seen in 48 % and 52% of gathering An and bunch B at day 15. Splendid, thick red; 75% to 100 percent of wound filled and/or tissue excess was seen in 44% of gathering at day 1. Brilliant, burly red; 75% to 100 percent of wound filled and/or tissue excess was seen in 48% of the two gatherings at day 15. Splendid, meaty red; < 75% and > 25% of wound filled were seen in 24% and 40% of gathering An and bunch B at day 1. Splendid, muscular red; < 75% and > 25% of wound filled were not seen in both gathering An and bunch B at day 15. Pink, and/or dull, dim red and/or fills < 25% of wounds were seen in 12% and 44% of gathering An and bunch B at day 1. Nonappearance of granulation tissue were seen in 20% and 16% of gathering An and bunch B at day 1.
According to a percentage decrease in wound size, periwound oedema/erythema, pus discharge, and an increase in granulation, fibrin, and epithelialization, various types of wounds in both groups were rated. Oxum-treated wounds healed more quickly and with less irritation than betadine-treated wounds. The use of Oxum was painless and had no adverse effects. [Tolossa et al., 2020]. [29]

EPITHELIALIZATION
100% wound covered, surface intact was seen in 40% and 36% of group A and group B at day 15. Grade 2 epithelialization was seen in 64% and 60% of group A and group B at day 15. Grade 3 epithelialization was seen in 48% and 40% of group A and group B at day 0. Grade 4 epithelialization was seen in 24% and 20% of group A and group B at day 0. Grade 5 epithelialization was seen in 36% of group A and group B at day 0.
In the group treated with the superoxidized solution, S Sridhar et al. (2017) discovered that the mean treatment time, ulcer size, discomfort, periwound edema, erythema, and microbiological development were all considerably decreased. In the superoxidized group, granulation tissue and re-epithelialization appeared earlier. [30] Superoxidized solution outperformed povidone iodine in terms of microbiological reaction, statistically higher cure rates, and lower rates of clinical failure. Thus, as compared to povidone iodine, his study indicated that superoxidized solution greatly accelerated wound healing, reduced inflammation symptoms more quickly, and achieved greater microbiological clearance.

BATES JENSEN WOUND ASSESSMENT SCORE
Povidone-iodine solution's mean SD of the Bates Jensen Wound Assessment Score was 23.08 1.53. The average Bates Jensen Wound Assessment Score for the super oxidized solution group was 21.88 with a standard deviation of 1.86. Both groups' T scores were 2.4978. Consequently, the 0.05 p value is statistically significant.
Through the use of the Bates-Jensen wound evaluation scale, Saranya A. (2014) assessed the wound severity. In accordance with the findings, experimental group II had a mean score of 21.70, whereas experimental group I had a mean score of 18.13. The resulting t value of 3.763 was significant at the P0.001 level. Super-oxidized solution dressing was shown to be more effective than povidone-iodine dressing. But this study was comparable to ours. [31]

5. Conclusion

The study, conducted at a tertiary hospital in Chennai, looked at the efficiency of super-oxidized solution dressing against povidone-iodine dressing in reducing wound severity in diabetic foot ulcer patients. In terms of wound severity, individuals with diabetic foot ulcers responded better to super-oxidized solution dressing than povidone-iodine dressing, according to the findings. This study shows that, in comparison to povidone-iodine, the super oxidized solution provides a large and early reduction in ulcer size, depth, peri-wound edema, and erythema as well as a significant and early emergence of granulation tissue and re-epithelialization. As a result, super oxidized solution is a potentially effective and safe treatment for treating diabetic foot ulcers. Overall, Super-oxidized solution dressing has the potential to lower costs and improve patient satisfaction by accelerating wound healing.

LIMITATIONS

• The study compares the efficacy of Superoxidized solution and povidone-iodine solution with a fixed dose.

• In the present study, only the act Superoxidized solution and povidone-iodine solution application is topical and on the surface of the wound in diabetic patients. This study is only done in diabetic foot ulcers

RECOMMENDATIONS

The report suggests the following further studies:

• Larger samples can be used in a similar study to achieve higher generalization.

• A study on the efficiency of additional nursing interventions, such as the synergistic application of super-oxidized solution and povidone-iodine dressing
for reducing wound severity among diabetic foot ulcer patients, can be done.

• Animal research is necessary for future work.

ETHICAL ISSUES INVOLVED AND MEASURES TO BE TAKEN TO PREVENT SUCH ISSUES:

No ethical issues.

SUMMARY

o This is prospective research with 50 individuals who were diagnosed with diabetic foot ulcers. All 50 patients with diabetic foot ulcers were randomly selected using a computer-generated plan to allocate the patient into two groups of treatment out of which 25 were with the application of Superoxidized solution daily dressing, and 25 were with the application of the povidone-iodine daily dressing. The research was completed after obtaining approval from the ethical committee of Chettinad medical college and Hospital, Chennai. Those who met the inclusion criteria were invited to take part in the research.

o The current study included patients ranging in age above 45 years old, with an average age of 60.8±7.804 in group A and 59.68±7.7713 in group B.

o Of the 50 patients in each of the two trial groups. In both group A (84% men, 16% women) and group B (88% men, 12% women), there were more men than women. This demonstrates that there were no significant sex differences in this example.

o Among total cases, only 4% of patients in both groups were between diabetes duration of 14 - 20 years. Meanwhile, 40% of patients in both groups were between the diabetes duration of 6 - 9 years. This was statistically nonsignificant.

o Only one instance was observed to take insulin in groupA, whereas two cases were seen to take insulin in group B. As a result, the total chi square value was 0.3974 and the p-value was 0.8198, both of which were statistically insignificant.

o Among 25 cases of groupA,64%belong to grade2 ulcers,36%belong to grade 1 ulcer. Among 25 cases of group B, 40 % belong to grade 2 ulcers, 60% belong to grade 1 ulcer. As a result, the total chi square value was 2.8846 and the p-value was 0.089, both of which were statistically insignificant.
o Mean and SD range of the lab test results for group A of Hb% and HBA1C was 11.95±1.155 and 11.20 ±1.84 and group B was 11.52 ±0.834 and 11.03±1.389. None of the groups appear to be significant.

o Approximately 48% of patients in Group A were hospitalized for 25 - 30 days. In addition, 68% of patients in Group B stayed in the hospital for 25 to 30 days. Only 4% of patients in Group A stayed longer than 35 days, but none of the patients in Group B stayed longer than 35 days.
o The predicted healing period in diabetic foot ulcers may be accurately approximated by the 12th day of infection, about 18 and 21 individuals in groups A and B developed ulcers ranging in size from 2 to 5 cm.
o In16 instances in groupA and 18 cases in groupB, the epidermis and/or dermis both lost some of their thickness. Subcutaneous tissue may sustain injury or necrosis in grade 3 skin loss. Obscured by necrosis, which was present for nearly all 15 days of treatment.
o The benefit of undermining is that it releases the margins of the incision and reduces strain on the wound, allowing for quicker healing and a lower risk of scar spreading and keloid development. Nearly all instances of group A and group B had well-defined lesions that were not connected to the wound base.
o White/grey non-viable tissue &/or non-adherent yellow slough seen at 15 days only in 44% and 36% cases of group A and group B. Loosely adherent yellow slough necrotic tissue seen during the initial day in 52% and 24% cases of group A and group B. This grade 3 decreased at 15 days. Adherent, soft, black eschar was seen during the initial day in 76% cases and 48% cases of group B and group A respectively. This grade 4 decreased to 12% at 15 days.
o o At day 0, < 25% of wound bed canvassed were not seen in both the gatherings. At day 15, < 25% of wound bed shrouded were seen in 36% and 44% of gathering An and bunch B. At day 0, 25% to half of wound canvassed were seen in 52% and 24% of gathering An and bunch B. At day 15, 25% to half of wound canvassed were seen in 56% and 36% of gathering An and bunch B. At day 0, > half and < 75% of wound shrouded were seen in 48% and 76% of gathering An and bunch B. At day 15, > half and < 75% of wound shrouded were seen in 8% and 20% of gathering An and bunch B.
o At day 0 and 15, Meager, injury damp yet no detectable exudate was not seen in both the gatherings. At day 15, limited quantity was seen in44% and 36% of gathering A and bunch B. At day 0, modest quantity was seen in 44% and 36% of gathering A and bunch B. At day 15, moderate sum was seen in 24% and 12% of gathering A and bunch B. At day 0, moderate was seen in 12% of gathering A and bunch B. At day 15, enormous sum was seen in 20% and 28% of gathering A and bunch B.
o At day 0 and 15, ridiculous exudates were seen in both the gatherings. At day 0 and 3, Serosanguineous: dainty, watery, light red/pink were found in 11 and 9 instances of gathering A and bunch B. At day 0 and 3, Serous: dainty, watery, clear were found in 6 instances of gathering A and bunch B. At day 0 and 3, Purulent: flimsy or thick, obscure, tan/yellow, regardless of scent were found in 3 instances of gathering A and bunch B.
o Pink or typical for ethnic gathering were seen exclusively in 2 and 5 cases at day 15 of gathering A and bunch B separately. Dazzling red and/or whitens were seen in 56% and 44% at day 0 of gathering A and bunch B separately. Dazzling red and/or whitens were seen in 92% and 80% at day 15 of gathering A and bunch B separately. White or dark paleness or hypo

pigmented were seen in 56% and 44% at day 0 of gathering A and bunch B separately. White or dim paleness or hypo pigmented were not seen on day 15 of the two gatherings.
o No enlarging or edema seen in 84% and 92% of gathering A and bunch B at day 15. Non-pitting edema expands were found in 40 % and 28% of gathering A and bunch B at day 0. Non-pitting edema expands were found in 16 % and 8% of gathering A and bunch B at day 15. Non-pitting edema broadens >4 cm around wound were seen in 36% of the two gatherings at day 0. Pitting edema expands < 4 cm around wound were seen in 40% and 24% of gathering An and bunch B at day 0.
o None of the cases had fringe tissue induration at day 0 to day 6. Induration, < 2 cm around wound were seen in 44 % and 36% of gathering A and bunch B at day 15. Induration 2-4 cm expanding < half around wound were seen in 54 % and 66% of gathering A and bunch B at day 0. Induration 2-4 cm expanding < half around wound were seen in 45 % and 52% of gathering A and bunch B at day 15. Induration 2-4cm expanding > half around wound were seen in 24% of the two gatherings at day 0.
o Skin unblemished or fractional thickness wound were seen in 48 % and
52% of gathering A and bunch B at day 15. Splendid, thick red; 75% to 100 percent of wound filled and/or tissue excess was seen in 44% of gathering A at day 1. Splendid, bulky red; 75% to 100 percent of wound filled and/or tissue abundance was seen in 48% of the two gatherings at day 15. Splendid, husky red; < 75% and > 25% of wound filled were seen in 24% and 40% of gathering A and bunch B at day 1. Splendid, muscular red; < 75% and > 25% of wound filled were not seen in both gathering An and bunch B at day 15. Pink, and/or dull, dim red and/or fills < 25% of wounds were seen in 12% and 44% of gathering A and bunch B at day 1. Nonattendance of granulation tissue were seen in 20% and 16% of gathering A and bunch B at day 1.
o At day 15, 64% and 60% of group A and group B, respectively, displayed Grade 1 and Grade 2 epithelialization. At the same period, 40% and 36% of groups A and B respectively included students in grades 3, 4, 5, and 6. At day 0, 36% and 20% of both groups, respectively, saw students in grades 5 and 6.
o Both the super oxidized and povidone-iodine groups were shown to be more responsive to wound healing, but the super oxidized group was more successful. (The T scores for the two groups were 2.4978.) Due to a considerable difference between the two groups, the p value of < 0.05 indicates that the difference is statistically significant.

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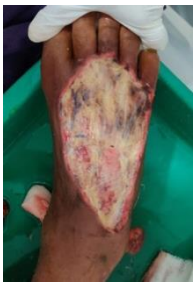
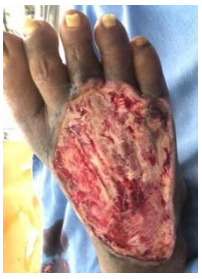
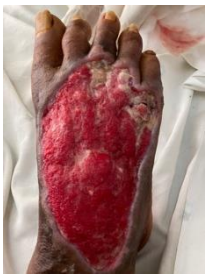
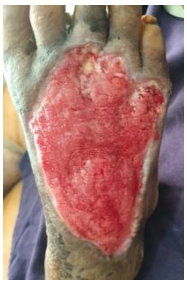
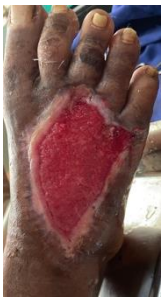
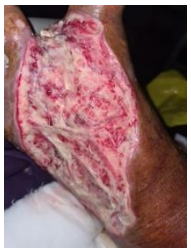
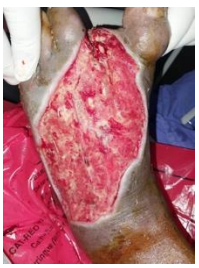
IMAGES
WITH SUPEROXIDIZED SOLUTION



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