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Efficacy and Safety of Oxum Verses Neosporin Ointment in the Treatment of Chronic Wounds

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Abstract

Background: An estimated 4 million patients in India are affected by chronic nonhealing wounds with countless hours spent annually for all aspects of wound care. The aim of the study was to assess the efficacy and safety of Oxum [Superoxidised water] verses Neosporin [Topical triple antibiotic] ointment for Chronic nonhealing wounds which was conducted at Era's Medical College, Lucknow during the period from 15th November 2017 till 30th March 2018 on 30 patients. Nonhealing chronic wounds form a major health burden contributing to substantial morbidity and cost burden on patients and their families as well as on the health sector. Though several new dressing options are currently available which has revolutionized the management of chronic wounds, Oxum is cost effective to middle class patients. Oxum dressing is safe having soothing effect on wounds without causing irritation, pain and allergy to patients.

Methods: Total 30 patients of chronic nonhealing wounds were studied. They were divided in to 2 groups, Group A for Oxum dressings and Group B for Neosporin ointment dressings.

Results: The mean age group of patients was 50 years [40 to 60 years]. Male to Female ratio was 1.5:1. The patients were followed up in the surgical outpatient department [OPD] up to 20 days minimum and assessed for wound healing, epitheliazation, reduction in the pus discharge, frequency of dressings, and cosmetic healing. The usage of Oxum dressings was more successful in the treatment of chronic wounds than Neosporin. Therefore Oxum can be concluded as gold standard treatment for chronic nonhealing wounds and it is a novel technological innovation in the therapy of chronic wounds.

Keywords: Oxum; Neosporin; Dressings; Wound Healing; Chronic Wounds.

Introduction

Nonhealing chronic wounds is a leading cause of morbidity and mortality among all age groups and neglected by the patients due to its chronicity. The current study is a single center, prospective, clinical trial comparing Oxum [Superoxidised water] verses Neosporin [Topical Triple Antibiotic] ointment conducted in Indian scenario on 30 patients which were divided in to 2 groups.Group A was treated with Oxum dressings and antibiotics while Group B was treated with Neosporin ointment dressings and antibiotics at Era's Medical College, Lucknow.

This retrospective study revealed that better results in wound healing, epitheliazation, healthy granulation, reduction in the pus discharge, removal of slough without surgical intervention was possible with Oxum than with Neosporin ointment.

Wound healing is composed of 4 stages as following

A] Hemostasis and coagulation of platelets

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B] Inflammation – aggregation of neutrophils and macrophages

C] Proliferation of vascular buds and synthesis of collagen by fibroblasts

D] Remodeling – collagen synthesis verses lysis to form healthy scar

In normal healing of wound all 4 stages are seen as shown in Figure 1. While in chronic nonhealing wound only stage A and B are seen as shown in Figure 2: Healing of a chronic wound.

The ideal antiseptic is one which is (1) rapidly lethal to bacterias, viruses, spores, & fungi. (2)Nonirritant (3) with good shelf life (4) hypoallergenic (5) should absorb pus and bacteria (6) Non injurious to wound healing (7) moisten and lubricate the wound 8] should be cost effective.

In India cost factor is very important so even if many options are available like Alginates, Hydrocolloid dressings [Duoderm], hydrofibre dressings [e.g. - Aquacel], Hydrogel, Enluxtra [self-adoptive humifiber], being costly, Oxum is a better choice.

Oxum: It is a stable, noncorrosive, nonirritant, bactericidal, virucidal solution which is ready for usage as a spray.

The Ingredients of Oxum are – Oxidized solution (H_2O), sodium hypochlorite (NaOCI), Hypochlorous Acid (HOCI), Hydrogen peroxide (H_2O_2), Ozone (O_3), Chlorine dioxide (ClO_2), Sodium hydroxide (NaOH), Sodium Carbonate (Na_2CO_3) and Sodium chloride (NaCl).[1]

It acts mainly by electrolysis and release of free radicles and nascent oxygen which attack bacterial walls due to change in the osmolarity but normal body cells are spared.[2,4,5,6]

Neosporin ointment is a triple topical antibiotic which is composed of Neomycin sulfate, Polymixin B sulfate and Bacitracin zinc which mainly controls bacterial load and gives early lubricant effect on the chronic wounds but only for 6 to 8 hours.

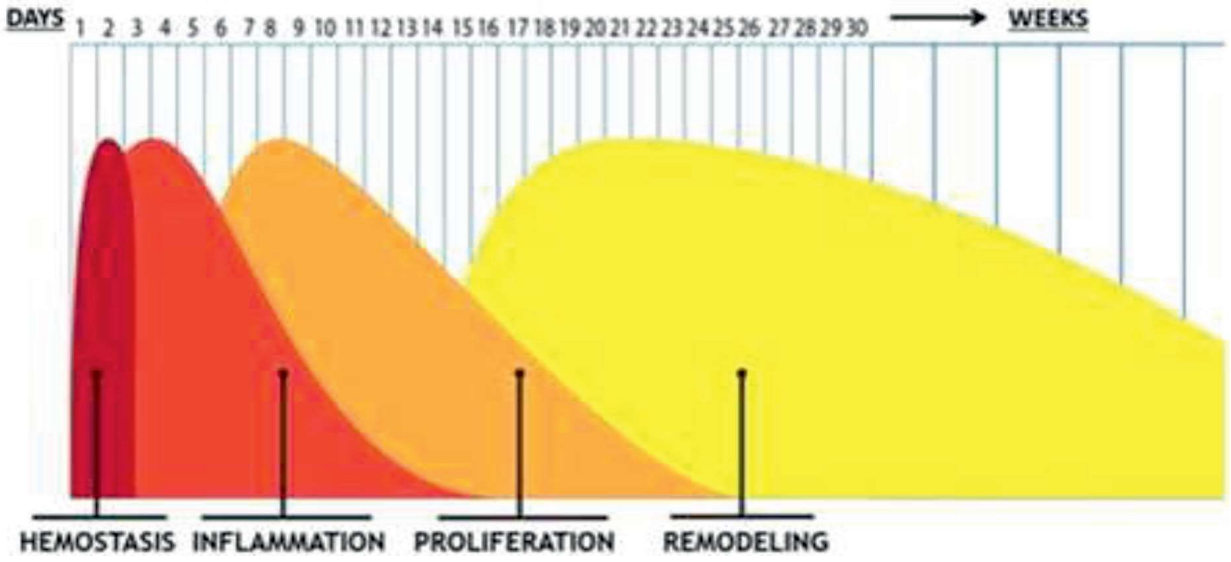


Fig. 1: Healing of a normal wound

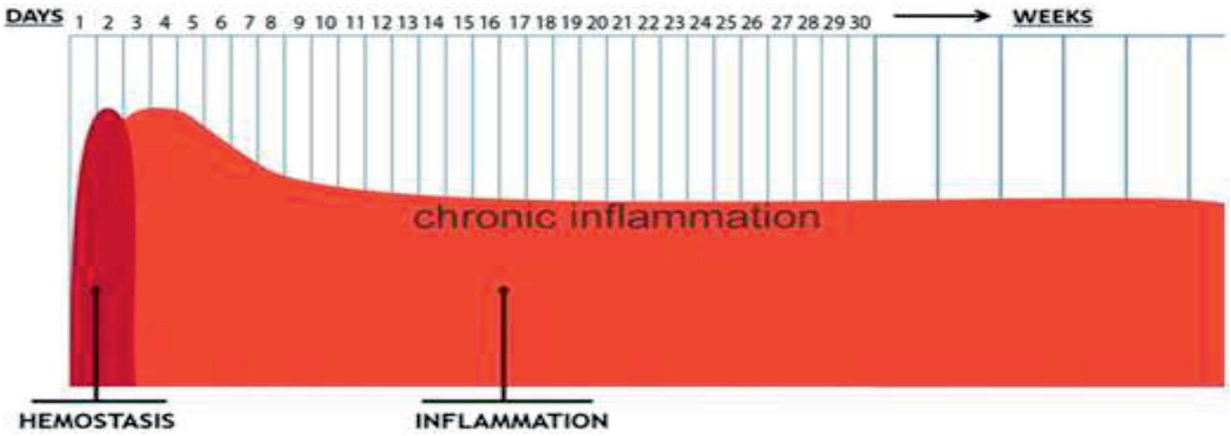


Fig. 2: Healing of a chronic wound

Materials & Methods

The current study was performed at Era's Medical College, Lucknow in the General Surgery department over 30 patients which were divided in to 2 groups A and B, each consists of 15 patients with chronic nonhealing wounds where surgical and medical cause of wounds was treated first.

Before treating the chronic wounds, detailed clinical history should be taken as:

(1) Duration of an ulcer (2) past history of ulceration (3) History of diabetes, liver cell failure, renal failure, varicose veins, AIDS, neuropathy, stroke, arterial diseases, medicines like steroids 4] history of trauma 5] Previous history of surgeries like vascular surgery, perianal fistulas, removal of foreign bodies, gunshot wounds, surgical debridement, amputations. 6] History of smoking & allergy

Detailed examination of chronic wound includes:

(1) Exact site, size, dimensions, depth, and edge of the ulcer. (2) Tenderness. (3) Pus discharge & soakage (4) surrounding skin changes like erythema, edema, maceration, ulcerations. (5) Arterial pulsations. (6)Characteristics of granulation tissue like pale, or angry red, pouting type etc. (7) examination of veins and draining lymph nodes. (8) Limb movement (9) Fever.

Table 1: Classification of patients as per etiology of chronic wounds

Etiology	No. of Male patients	No. of Female patients
1] Diabetic wound	3	2
2] Varicose venous ulcers	2	1
3] Pressure ulcers	2	1
4] Traumatic Infected wounds	3	1
5] Perianal fistula wounds	2	2
6] Burns	2	2
7] Abscesses	2	2
8] Carbuncles	2	1
Total	18	12

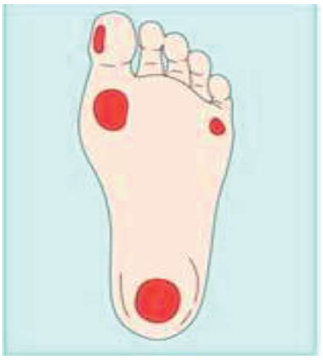


Fig. 3: diabetic foot ulcer's sites

Fig. 4: Measurement of wound size

Fig. 5: Photograph of over granulation in chronic wound

Laboratory Investigations performed in all patients were Haemogram, WBC count, Platelet count, Blood sugar levels, HaemoglobinA1c, Liver function tests, Renal Function tests, serum proteins, HIV testing, Color Doppler to assess venous and arterial function, X-Rays to know the fractures and osteomyelitis,pus culture and sensitivity reports and if malignancy suspected then biopsy was taken. Attempt was made to include similar types of cases in both the groups. The informed consent was taken in all the cases regarding dressing options of Oxum or Neomycin.

All wounds were properly cleaned with antiseptics like betadine and spirit and then as per group, they were treated with Oxum sprays or Neosporin dressings. Both groups were given oral antibiotics for 7 days as per pus culture and sensitivity reports.

Careful dressings were done in both groups as following

1] Dressing should extend at least for 2 inches beyond the wound size.

2] Dressing should be in full contact with the wound by pressure so as to remove slough and pus.

3] Dressings should be changed as frequently as per soakage & reduced in frequency once the slough is removed.

4] Care should be taken to remove dressing immediately once soaked.

Wound observations were done in the surgical outpatient department at the time of dressing on every 3rd day and as per the convenience of the patients. The days were planned as 1st, 3rd, 6th, 9th, 12th, 15th, 18th, 20th of dressings and changes in the wounds were noted. The efficacy evaluation of the wound was based on appearance, presence or absence of odour, quantity of pus discharge, necrotic tissue, granulation tissue and epithelisation at the site of wound, healing of the wound with cosmesis. The patients were also assessed based on symptoms such as pain, edema, redness, dryness and itching of the wound, & fever.

Observations

The present study comprising of 30 patients prospectively randomized into two groups of each of 15 patients were conducted. Attempt was made to include patients having similar types of wounds in both the groups.

Group A where dressing and topical management was done using super oxidizing solution (Oxum). Group B where dressing and topical management was done using Neomycin ointment.

Males were affected more frequently due to chronic non healing wounds than females with a male to female ratio of 1.5:1. And the mean age group of patients was 50 years [40 to 60 years].

The evaluation was based on healing of wound noting different parameters like reduction in size, pus discharge, pain, edema, redness, appearance of granulation tissue and epitheliasation of the wounds.

Careful surgical debridement was done as and when needed and sufficient quantities of antiseptic solutions were applied to rinse the wound bed free of debris. The dressing was held in place with bandages or sticking wherever needed and done with precautions mentioned as above.

Survey and examination of wound was done on 1st, 3rd, 6th, 9th, 12th, 15th, 18th, 20th days respectively while doing dressings. At these visits complete physical examination, concomitant therapy, clinical examination of the wound and assessment of adverse effects were carried out. The above observations were based on use of measuring scale and clinical expertise. The findings were laid down for the evaluation of the wound and effect of the antiseptic solutions.

Table 2: Effects of Oxum on Group A and Neomycin on Group B

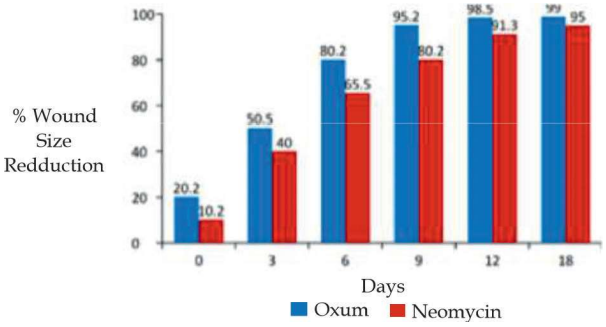
Parameters of Wound Healing	A Group	B Group
1] Pus discharge reduced	+++	+
2] Pain reduced	+++	+
3] Soothing effect	+++	++
4] Reduction in the size of wound	+++	+
5] Reduction in slough & necrotic tissue	+++	+
6] Epitheliasation of the wound	+++	+
7] Foul smell reduced	+++	+
8] Signs of inflammation reduced	+++	+
9] Reduction in dosage of antibiotics	++	+
10] Reduction in frequency of dressings	+++	+
11] cosmetic scar	+++	+

1]+++ means High 2] ++ means Medium 3] + means Minimum

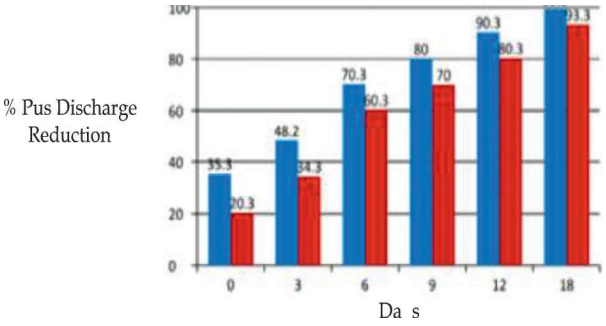
The reduction in wound size was significant right from the first dressings onwards in Group A than Group B.

The reduction in the wound size was significant in the follow up as shown below (Graph 1).

The frequency of wound dressings reduced markedly in Group A as compared to Group B due to decrease in the soakage of dressings due to pus discharge.



Graph 1: Showing average reduction in wound size [percentage] Blue column-Oxum Group, Red column - Neomycin Group



Graph 2: Showing average reduction in pus discharge [percentage]

Fig. 6: Photograph of Infected wound

Fig. 7: Photograph of Healed wound after 2 weeks of Oxum dressings

Fig. 8: Photograph of Chronic diabetic ulcer on leg 1st day and after 2 months

Discussion

In the current study the effect of superoxidised water (Oxum) was compared with Neomycin ointment on wound healing.

30 patients in Indian scenario were divided in to 2 groups A for Oxum dressings and B for Neomycin dressings. The causes of chronic nonhealing wounds are mainly Diabetic, Traumatic, Post-operative like perianal fistulas, Abscesses, Carbuncles, Pressure ulcers, Vascular ulcers due to arterial insufficiency, Varicose venous ulcers, Neoplastic ulcers, Infective types and burns.

Antibiotics were given orally to both groups as per culture and sensitivity reports.

The following conclusions were drawn:

Swab culture was positive in 28 patients out of total 30 patients.

Most common bacteria were as below

(1) Staphylococcus Aureus - 40%

(2) Staphylococcus Pyogeneus - 20%

(3) E.coli - 20%

(4) Pseudomonas - 20%

There was no systemic or local allergic reactions were seen with Oxum as compared with Neomycin.

Oxum was safe, effective in all types of wounds giving better results & faster response in both acute and chronic wound healing than Neomycin.[1,2]

Oxum dressings absorb the exudate and pus, reduces microbial load significantly, provides optimal moist environment for granulation, soothing effects to the patients and early epitheliasation with healthy cosmetically accepted scar.[5]

In a study conducted by Dr. Luca Dalla Paola on 218 patients suffering from chronic diabetic foot ulcers, 110 patients were treated with SOS (Oxum) and 108 patients with povidone iodine or antibiotic ointments. The mean healing time was lower in the oxum group (45±14) days v/s (58±20) days in antibiotic ointments group.[6]

In the current study diabetic foot ulcer and chronic leg ulcers patients treated with Oxum shows early granulation and rapid epithelisation when compared to Neomycin group. The mean follow up of 21 days shows that average reduction in wound size and reduction of periwound edema/ erythema in oxum group was 60% as compared to 40% in Neomycin group.[3,4,6]

In a study conducted at the hospital Civil de Guadalajana in Mexico in 2004–05 with superficial-

partial, deep-partial and full thickness burns the study group was treated with SOS (oxum) and was compared retrospectively with similar burns which had been treated with silver solutions/ ointments (control group). In this trial only 6 patients received antibiotics in oxum group versus 56 in control group.

Furthermore hospital stay was reduced by 50% in oxum group v/s control group.[4,5,6]

Gutierrez in his study to explore various applications of superoxidised solutions concluded that the moistening effects and minimum toxicity found with the use of this superoxidised solution made it a good choice for wound care management.[3,7,12,13]

Similarly, the global efficacy evaluation also confirms the superiority of Oxum over Neomycin as good to excellent efficacy response was recorded in relatively more number of patients in oxum treated group as compared to Neomycin treated group.[1,8,9,10,11]

Conclusions

Oxum dressing helps in wound healing in a better fashion than Neomycin ointment in the following ways-

(1) Absorbing and removing pus exudate (2) prevents skin maceration (3) Hydrates dry areas (4) Reduces foul smell and increases social acceptability of patients (5) provides soothing effect to the wounds (6) acts as a barrier to microbial attack from external environment (7) cost effective (8) reduction in the surgical debridement and dressing frequency (9) better cosmetic scars.

So worldwide it has been proved now that SOS [Oxum] gives better option as topical dressing solution which helps in wound healing drastically.

The results of this study therefore appear to show more favorable results for Oxum than for Neomycin. However, although the results are highly statistically significant, the strength of evidence depends upon the study design.

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