

Evaluation of burn wound healing property of *ocimum sanctum* by monitoring of period of re-epithelization in rabbits

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ABSTRACT

Background: Burns remain a major public health problem all over the world, especially in developing countries. *Pseudomonas aeruginosa* is a major cause of infection and a contributing factor in the death of patients with burns. So, there is a growing need to develop drugs which will prevent infections and complications more effectively than the presently used drugs. *Ocimum sanctum* L. (Tulsi in Hindi) has been shown to have antioxidant properties, which may be responsible and favorable for faster wound healing. The present study was carried out to evaluate the wound healing property of *O. sanctum* by monitoring the period of re-epithelization in thermal burns with and without supportive treatment of ointment silver sulfadiazine.

Methods: Wound healing property of *O. sanctum* was evaluated by monitoring the period of re-epithelization.

Results: The period of re-epithelization, in Control group was 34 ± 1.26 days, in Standard group treated with ointment silver sulfadiazine was 30.33 ± 1.37 days, in group treated with *O. sanctum* was 30.50 ± 1.87 days and in group treated with ointment silver sulfadiazine + *O. sanctum* was 26 ± 1.41 days.

Conclusions: Group treated with ointment silver sulfadiazine + *O. sanctum* showed minimum re-epithelization period. So, the most effective treatment for burn wound healing in this study was ointment silver sulfadiazine + *O. sanctum*.

Keywords: Burn, *Ocimum sanctum*, Silver sulfadiazine, Re-epithelization period

INTRODUCTION

Ayurveda remains one of the most ancient and yet alive tradition practiced widely in India, Sri Lanka and other countries that have a sound philosophical and experiential basis.¹

Burn can be defined as tissue damage caused by a variety of agents such as heat, chemicals, electricity, sunlight or nuclear radiation. The most common are burns caused by scalds, building fires and flammable liquids and gases. Every year, about two million people receive medical treatment for burn injury.²

Wounds are injuries that results in an opening and break of the skin that causes disturbance in the normal skin anatomy and function. The process of wound healing consists of integrated cellular or biochemical events leading to the building of structural and functional integrity of injured tissues. Plant products are potential

agents for wound healing, and largely preferred because of their widespread availability and effectiveness as crude preparations.³

The gold standard in topical burn treatment is silver sulfadiazine a useful antibacterial agent for burn wound treatment.⁴

Ocimum sanctum L. (Holy basil in English and Tulsi in Hindi) has been shown to have antioxidant properties, which may be responsible and favourable for faster wound healing.⁵

Pseudomonas aeruginosa is a major cause of infection and death or a contributing factor in the death of patients with severe burns.⁶

So, there is a growing need to develop drugs which will decrease the complications and prevent infections more effectively than the presently used drugs. The present

study was carried out to evaluate the wound healing property of *O. sanctum* by monitoring period of re-epithelization with and without supportive treatment of standard drug ointment silver sulfadiazine in rabbits.

METHODS

This is a preclinical experimental study on rabbits. The Study protocol was approved by Institutional Animal Ethics Committee.

Procurement of plants material

The Plant material of *O. sanctum* (Leaves Powder) was obtained from Mahatma Gandhi Ayurved College, Salod, Wardha, Maharashtra, India.

Procurement of ointment silver sulfadiazine

Ointment Silver sulfadiazine was procured from Rexcin Pharmaceuticals Private Limited, Solan, Himachal Pradesh, India.

Procurement of anaesthetic agent

Injection Aneket (Ketamine Hydrochloride Injection I.P.) was procured from Neon Laboratories Limited, Thane, Maharashtra State, India.

Animals

24 Rabbits were obtained from Central Animal House of University. Rabbits of both sex (either male or female), age group of 6-8 months and weight 1.5 kg - 2 kg were included. Unhealthy and pregnant rabbits were excluded.

Grouping of animals

24 rabbits with age group of 6-8 month and weight 1.5 to 2 kg were divided randomly into 04 groups of 06 animals each (Table 1).

Preparation of animals

Animals were acclimatized for 8 days before experiment. Animals were housed in separate cages under standard condition of light, temperature and humidity. They were fed with standard laboratory chow and provided with water ad libitum.

Infliction of burn wound

The area on the back of the rabbit was to be shaved and animal kept for fasting overnight. The next day the animals were anaesthetized using Ketamine in the dose of 50 mg/Kg of body weight I.M. (1 ml/kg of body weight). A metal disc of diameter 22 cm, thickness 5 mm and area 380.2 mm² was heated in the blue portion of the flame for

5 minute and then immediately kept on the shaved part for 30 seconds with minimal pressure.⁷

Administration and application of drugs

Ointment silver sulfadiazine was applied daily on the burn wound. *O. sanctum* was administered orally in the form of distilled water suspension in the dose of 500 mg/kg body weight once daily.

Estimation of healing by monitoring period of re-epithelization

Falling of eschar leaving no raw wound area was considered as end point of complete epithelization and the days required for this was taken as period of re-epithelization.⁸

Statistical analysis

Results were reported as mean \pm standard deviation.

RESULTS

The period of re-epithelization, in control group was 34 ± 1.26 days, in standard group treated with ointment silver sulfadiazine was 30.33 ± 1.37 days, in group treated with *O. sanctum* was 30.50 ± 1.87 days and in group treated with ointment silver sulfadiazine + *O. sanctum* was 26 ± 1.41 days (Table 2).

Table 1: Grouping of animals.

Sr. No.	Group	Animals
1.	Control group : not receiving any treatment	06
2.	Standard group: treated with silver sulfadiazine	06
3.	Test group 1: treated with <i>O. sanctum</i>	06
4.	Test group 2: treated with silver sulfadiazine + <i>O. sanctum</i>	06

Table 2: Period of re-epithelization.

Group	Period of Reepithelization (Mean \pm S.D.)
Control	34 ± 1.26
Standard	30.33 ± 1.37
Os	30.50 ± 1.87
SS+Os	26 ± 1.41

DISCUSSION

The most effective group was ointment silver sulfadiazine + *O. sanctum* and probable reason of high effectiveness was the combined effect of ointment silver sulfadiazine and *O. sanctum*, broad spectrum

antimicrobial activity of silver sulfadiazine and anti-oxidant and wound healing property of *O. sanctum*. Study conducted by Hosseinimehr SJ et al⁹ on Effect of Aloe cream versus silver sulfadiazine for healing burn wounds in rats, reported that the antimicrobial effect is the major mechanism of silver sulfadiazine in wound healing. The silver ion binds to the organism DNA and consequently releases the sulfonamides that kill the microbes.

Another study conducted by Hoekstra MJ et al¹⁰ on effect of silver sulfadiazine on histopathological parameters of burn wound in pig was reported that silver sulfadiazine causes rapid healing through stimulating of re-epithelization, formation of granulation tissue and increase in fibroblasts.

Study conducted by Asha B et al¹¹ on study of wound healing activity of topical *O. sanctum* Linn in albino rats reported that the topical *O. sanctum* treated wound, which showed greater degree of neovascularization and fibroblast proliferation indicates better granulation tissue formation and collagenization on day.⁴ Topical *O. sanctum* showed maximum collagenization and minimum with control. Epithelization was early and complete with topical *O. sanctum* on day.⁷

CONCLUSION

Group treated with ointment silver sulfadiazine + *O. sanctum* showed minimum reepithelization period. So, the most effective treatment for burn wound healing in this study was ointment silver sulfadiazine + *O. sanctum*.

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Ethical approval: Study protocol was approved by Institutional Animal Ethics Committee.

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