

Evaluation of Antibacterial and Wound Healing Activity of *Cocos nucifera* (Coconut) Husk Ash Extract in Mice

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ABSTRACT

The present study was carried out to evaluate the antibacterial activity of crude ethanolic extract of *Cocos nucifera* (coconut) husk ash against some pathogenic bacteria (*Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*) and their wound healing potential in experimental rats. The wound healing potential of the ethanolic extract ointment of *Cocos nucifera* (coconut) husk ash was evaluated in albino rats using excision wound model. Eighteen rats were divided into three groups of six each. Group 1 received no treatment (blank ointment base) which is the negative control, Group II received treatment with 1% silver sulphadiazine and group III received treatment with coconut husk ash extract. 1% silver sulphadiazine ointment was used as standard for the activity comparison. Wound healing was monitored on day 4, 8, 12 and 16. Wound healing parameters such as percentage of wound contraction rate and epithelialization period were observed.

Studies on the antibacterial activity of crude ethanolic extract of coconut husk ash were conducted using agar well diffusion method and the minimum inhibitory concentration was also determined. The results showed that topical application of coconut husk ash extract incorporated into an ointment base served to accelerate the wound healing process and specifically increased epithelialization in treatment groups compared to the other groups. The ethanolic extract of *Cocos nucifera* (coconut) husk ash inhibited growth of all test organisms though it was dose dependent. The minimum inhibitory concentration values obtained for the coconut husk ash extract against *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* was 8 mg/ml, 8 mg/ml and 10 mg/ml respectively. The results obtained shows that the *Cocos nucifera* (coconut) husk ash extract has a good wound healing and antibacterial activity and may be useful in managing wounds.

Keywords: Antibacterial activity; Wound healing; Ointment; Pathogen

INTRODUCTION

Wound healing is a natural process that enables tissue repair after an injury. To shorten its duration and minimize associated complications, wounds are treated with medications [1].

But, the prices of these orthodox medications are exorbitant and many wound contaminating bacterial are becoming increasingly resistant to their effects [2].

Currently there is a growing interest in the use of alternative wound dressing agents such as plant extracts. Popular medicinal use of coconut husk fibre have been reported, hence the study was undertaken to evaluate the antibacterial and wound healing activity of *Cocos nucifera* (coconut) husk ash extract in mice [3].

MATERIAL AND METHODS

Excision wounds were created and treated with ointments (10%w/w) prepared from *Cocos nucifera* (coconut) husk ash extract using petroleum jelly as a base. The normal (control) and test (standard) group were applied topically with petroleum jelly and 1% Silver sulphadiazine ointment respectively in the form of thin layer.

The wound healing activities of *Cocos nucifera* (coconut) husk ash extract ointment on excision wound was assessed by rates of wound contraction and epithelialization. Antibacterial activity of *Cocos nucifera* (coconut) husk ash extract was also determined on common wound isolates (*Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*).

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RESULTS

Remarkable wound healing activity was observed with the husk ash extract ointment. This result showed that the ointment of plan *Cocos nucifera* (coconut) husk ash extract accelerated the wound healing process and specifically increased the epithelization in treatment groups when compared with control groups. Also the antibacterial test showed that the extract was effective against all test organisms (Table 1).

Table 1: Effect of powdered Coconut husk as extract on excision wound.

Day	Wound area (MM)		
	Group I	Group II	Group III
0	9.8 ± 1.6	9.6 ± 1.2	9.6 ± 1.2
4	7.1 ± 0.98	6.3 ± 0.89	4.8 ± 0.81
8	5.6 ± 0.67	4.3 ± 0.79	3 ± 0.26
12	3.3 ± 0.3	0.9 ± 0.1	0.2 ± 0.001

N=6; Values are in mean ± SEM significant P<0.001

DISCUSSION

Plant products are potential wound healing agents and largely preferred because of their widespread availability, non-toxicity, absence of unwanted side effects, and effectiveness as crude preparations [4].

In the present study, topical application of powdered coconut ash treatment had the highest percentage wound contraction ability followed by 1% silver sulphadizine and the untreated ones (control). When a wound occurs and is exposed to external environment, it is more prone to attack by microbes which gain entry through the skin and delay the natural wound healing process [5].

Previous study shows that aqueous extract of coconut husk fibre present important biological activities such as antimicrobial, antiviral, analgesic, anti-inflammatory, antioxidant and antimonoplastic properties [3].

So, if any plant material presents antimicrobial, analgesic and anti-inflammatory activities together, it can be supposed that this material also may help to promote wound healing and contribute skin regeneration.

The healing effects of powdered coconut husk ash ointment might be attributed to its ability to stimulate epithelial cell proliferations and angiogenesis. Stimulation of epithelial cell proliferations and angiogenesis are vital for wound healing process to take process. Powdered coconut husk ash extract might have accelerated epithelial regeneration, due to its ability to promote angiogenesis and collagen formation and deposition.

S. aureus and *P. aeruginosa* are the most common pathogens responsible for infection in skin wounds [6]. Since the crude extract showed antibacterial activity on test organisms, topical applications of powdered coconut husk ash extracts are effective both as microbicide and increasing wound healing rate.

CONCLUSION

The results obtained showed that *Cocos nucifera* (coconut) husk ash extract has good wound healing and antibacterial activities. These findings validate the use of this plant in traditional medicine for treatment of wounds.

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