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Research Article

**Comparative Studies Of
Anti Bacterial Activity In
Aloe vera And
Achyranthes aspera
Against Wound
Pathogens**

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Abstract

Wound is a breakdown in the protective function of the skin; the loss of continuity of epithelium with or without loss of underlying connective tissue. In this study antibacterial activity in *Achyranthes aspera* and *Aloe vera* were investigated against two strains of human pathogenic bacteria from wound infected adult people. A total of 10 pus samples were collected from Tuticorin Government hospital, among that two strains were isolated as *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The above isolated organisms were tested for their sensitivity towards these plant leave extracts and antibiotic disc by disc diffusion method. In this study the highest antibacterial activity were observed in ethanol extracts of *Achyranthes aspera* than compared with *Aloe vera* and antibiotic disc. The maximum inhibitory effect was in (30%) ethanol extracts of *Achyranthes aspera* against *Staphylococcus aureus* (22mm) and *Pseudomonas aeruginosa* (20mm) in disc diffusion.

Keywords: *Achyranthes aspera*, *Aloe vera*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, antibacterial activity.

Introduction

The development of a wound infection depends on the complex interplay of many factors. If the integrity and protective function of the skin is breached large quantities of the cell types will enter the wound and initiate an inflammatory response. This may be characterized by classic signs of redness, pain, swelling, raised temperature and fever [1]. Many of the plants were known to the people of ancient cultures. Scientific experiments on the antimicrobial properties of plants and their components have been documented in the late 19th

century [2]. *Aloe* gel is most widely recognised herbal remedy. It is used to relieve thermal burn, sun-burn and promote wound healing [3]. In addition, researches have suggested that *Aloe* gel can help stimulate the body's immune system [4]. *Achyranthes aspera* (Amaranthaceae) is distributed throughout India and other topical regions of the World. The various parts of the plants (leaves, roots, seeds and seed oil) are widely used in variety of ailments in traditional system of medicine such as Ayurveda and Siddha. The aim of the present research is to determine the antibacterial activity of leaves extracts of *Aloe vera* and *Achyranthes aspera*.

Material and methods

Sample collection

The pus sample was collected from 3 adult wounded lesions by using sterile cotton. The cotton swabs were swabbed on the wound lesions and the specimen (Swab) introduced nutrient broth containing. The inoculated Nutrient broths were placed in a ice box and transported to the laboratory [5].

Isolation of wound infection pathogens

The samples were streaked on the following selective media for the isolation of wound infection pathogens. Pseudomonas isolation agar, Mannitol salt agar, Blood agar and Nutrient agar. The plates were incubated at 37°C for 24 hours. Individual colonies were obtained and maintained in Nutrient agar slants. The isolated wound infection pathogens were identified from the microbiological procedures that include Gram's staining and Biochemical tests [6].

Bacterial strains

All the bacterial cultures were isolated from wound infection person at Tuticorin Government Hospital. The bacteria were *Staphylococcus aureus* and *Pseudomonas aeruginosa*. From stock culture, one colony was taken to be streaked on Mannitol extract agar and Pseudomonas agar, were incubated for 24hours at 37°C. Culture purity of each organisms were confirmed through colony Morphology identification, Gram stain, Coagulase test, Catalase test and biochemical testing where one colony was taken to perform the confirmation.

Collection of plants materials

Aloe vera (leaves) and *Achyranthes aspera* (leaves) were collected from local area of Tuticorin. The plants were identified based on its Morphological characteristics.

Preparation of plants extracts

Aloe vera fresh gel was dried in hot air oven at 80°C for 48hrs, and powered in a grinder [7]. *Achyranthes aspera* leaves were air dried and crushed to small using Mortar and Pestle, and powdered is an electric grinder[8]. 20g of powdered two different plants material mixed with 200ml of solvents (Ethanol). These plants extracts were collected by using Soxhlet apparatus[9] and stored in a vial for further studies.

Disc preparation

The 5mm (diameter) discs were prepared from Whatman No.1 filter paper. The discs were sterilized by autoclave at 121°C. After the sterilization the moisture discs were dried on hot air oven at 50°C. The discs were impregnated with 10, 20 and 30% of each extracts and left to dry on hot air oven at 40°C.

Antibacterial activity of *Achyranthes aspera* [10]

The antibacterial activity was carried out by disc diffusion technique. The sterile nutrient agar plates were prepared and the test organisms like *P. aeruginosa* and *S. aureus* spread over the Nutrient agar plates by wing sterile cotton buds separately. After the bacterial lawn preparation 10, 20 and 30% concentrated each plant extract discs were placed on nutrient agar medium with equal distance, and control discs are also placed. All the plates were incubated at 37°C for 24 hrs. After the incubation the plates were observed for inhibitory zones. The same procedure was followed of *Aloe vera* plant extracts to detect antibacterial activity. Antibacterial activity of *Aloe vera* and *Achyranthes aspera* were compared with Vancomycin, Kanamycin antibiotics against *P. aeruginosa* and *S. Aureus*.

The values were statistically represented as Mean \pm SD.

Results and Discussion

Two types of colonies were isolated from the wound sample and they were identified as *Staphy-*

lococcus aureus and *Pseudomonas aeruginosa*, named as WS1 and WS2 and their standard biochemical test and staining results have been noted in Table-1. The present study was investigated, with

the bacterial isolates from the wound infected adult patients. The antimicrobial activity of *Aloe vera* and *Achyranthes aspera* of ethanolic extracts were assayed against the isolated.

TABLE-1: Morphological and biochemical tests of wound pathogens

S. No	Morphology and Biochemical test	WS1	WS2
1	Shape	Cocci arranged in cluster	Rod
2	Gram staining	+ve	-ve
3	Motility	Non-motile	Motile
4	Blood agar	B-haemolysis	-
5	Mannittal salt agar	Golden yellow colonies	-
6	Indole	-ve	-ve
7	MR	+ve	-ve
8	VP	+ve	-ve
9	Citrate	-ve	+ve
10	Urease	+ve	-ve
11	Catalase	+ve	+ve
12	Oxidase	+ve	+ve
13	TST	-ve	-ve
14	Coagulase	+ve	-ve

TABLE-2: Antibacterial activity of *Aloe vera* against wound pathogens

S.No	Ethanol extract concentration %	Zone of inhibition (mm in diameter)	
		<i>Staphylococcus aureus</i>	<i>Pseudomonas aeruginosa</i>
1	10%	3±0.42	2.5±0.26
2	20%	7±0.12	4±0.48
3	30%	9±0.32	6±0.13

TABLE-3: Antibacterial activity of *Achyranthes aspera* against wound pathogens

S.No	Ethanol extract concentration %	Zone of inhibition (mm in diameter)	
		<i>Staphylococcus aureus</i>	<i>Pseudomonas aeruginosa</i>
1	10%	14±0.19	12±0.31
2	20%	16±0.28	13±0.40
3	30%	22±0.34	20±0.32

Table-4: Antibacterial activity of Ethanol plant extracts compared with commercial antibiotics

S.No	Test organisms	Zone of inhibition (mm)			
		<i>Aloe vera</i> (30%)	<i>Achyranthes aspera</i> (30%)	Kanamycin	Vancomycin
1	<i>Staphylococcus aureus</i>	9±0.32	22±0.34	10±0.32	15±0.30
2	<i>Pseudomonas aeruginosa</i>	6±0.13	20±0.32	11±0.31	9±0.21

The antibacterial activity were presented in Table 2, 3 and 4. Maximum antibacterial activity was observed in 30% ethanolic extract of *Aloe vera* and *Achyranthes aspera* than other concentration such as 10 and 20% against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. *P. aeruginosa* is known to cause skin infection especially at burns sites, wounds, pressure sores and ulcers. The maximum inhibition rate of *Achyranthes aspera* was observed in *S. aureus* (22+0.34) than *Pseudomonas aeruginosa*.

The *Achyranthes aspera* leaf juice is useful in stomach-ache, bowel complaints, piles and skin eruption. The part of leaf is used to treat bites of poisonous insects, wasps and bee. The decoction of the whole plant is given in painful delivery. The juice of the plants is used to stop bleeding of wounds. In this experiment the *Achyranthes aspera* revealed as a best wound healing plant compared with *Aloe vera* and commercial antibiotics against isolated wound pathogens.

Conclusion

The present study showed that there is a higher antibacterial activity for the *Achyranthes aspera* than *Aloe vera* and commercial antibiotics. So the study supports the traditional usage as antibacterial and anti wound infection agent. The most active *Achyranthes aspera* can be subjected to isolation of the active compounds and carry out further pharmacological evaluation. This will surely complement to the previously known therapeutic values and improve the popularization of the plants.

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