

## Antimicrobial Activity of Aloe Vera against Pathogenic Bacteria

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### ABSTRACT

Present study was conducted to determine the antimicrobial activity of Aloe Vera with ethanol against gram positive (*Staphylococcus aureus*) and gram negative (*Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*). The Agar well diffusion method was used to test the antimicrobial activity. The result shows that maximum inhibition observed against *Staphylococcus aureus* and *Klebsiella pneumoniae* (1mm---4mm), minimum inhibition was observed against *Pseudomonas aeruginosa* while negligible activity observed against *Escherichia coli*. This is important to use Aloe Vera for cosmetic and food purpose.

**Key Words:** Antimicrobial agent, Pathogen, Aloe Vera, Medicinal plant.

### INTRODUCTION

Aloe Vera has a long history of use as a therapeutic agent with many reported medicinal properties. Amongst its therapeutic properties, it has been shown to have anti-inflammatory activity (Azfal, et al. 1991; Malterud, et al. 1993) immunostimulatory activity (Ramamoorthy and Tizard, 1998), and cell growth stimulatory activity (Tizard, et al. 1994; Rodriguez-Bigas, 1988). Furthermore, activity against a variety of infectious agents has been attributed to Aloe Vera; for instance, antibacterial (Ferro, et al. 2003), antiviral (Kahlon, et al. 1991) and anti fungal (Kawai, et al. 1998).

Aloe has a history of traditional use by Native Americans for stomach disorders and intestinal disorders including constipation, hemorrhoids, and colitis and colon problems. It is said to be a natural cleaner, powerful in penetrating tissues, relieving pain associated with joints and muscles, bactericidal, a strong antibiotic, virucidal when in direct contact

with long periods, fungicidal, anti inflammatory, instrumental in increasing circulation to the area, breaking and digesting dead tissue and moisturizing tissues. The skin absorbs Aloe Vera up to four times faster than water, it appears to help pores of the skin open and receive moisture and nutrients of the plants. Additionally, numerous constituents within Aloe Vera have demonstrated enhancement of immune system functioning within the body. Aloe Vera also has the ability to stimulate macrophages (Davis, et al. 1997).

The efficacy of Aloe Vera liquid as an antibacterial agent is shown to have a wide range of activity against gram positive and gram negative bacteria. The antimicrobial agents of Aloe Vera gel was reported to effectively kill or greatly reduce or eliminate the growth of *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Propionibacterium acne*, *Helicobacter pylori* and *Salmonella typhi* (Lawless, et al. 2000; Pugh, et al. 2001; Reynolds, et al. 1999; Reynolds, et al. 1999).

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## MATERIAL AND METHODS

### *Sample collection:*

The Aloe Vera plant was collected from Bahria Nursery, Karachi.

### *Collection of plant material:*

The collect plant gel was freeze dried and then grinds to get crude extract. The crud extract is filtered through Whatmann filter paper. The plant extract were prepared according to the method describe by (Ahmed, et al. 1998) with minor modification. Briefly 1 gm gel extract was mix in 5ml of ethanol and mixed well and kept it under shaker for overnight (Lin, et al. 1999) after overnight incubation the mixture was filtered through Whatmann No.1 paper and it was evaporated at room temperature. After evaporation pellet was resuspended with 0.5ml of Dimethyl sulfoxide (DMSO) using micro syringe and recollect it for further use.

### *Selection of Solvent:*

Polar solvent such as ethanol were used for this study.

### *Bacterial strain:*

Bacterial strains were obtained from the Department of Microbiology, Jinnah University for Women, Karachi. The bacterial strains such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Staphylococcus aureus* were used for antimicrobial assay. All the strains were grown in nutrient agar at pH 7.2 and incubated at 37<sup>0</sup>C for 24 hour.

### *Testing of antimicrobial activity:*

Take 0.5 ml each bacterial culture inoculated into each mark nutrient broth incubate at 37<sup>0</sup>C for 24 hour. Make a lawn by spreading 0.1 ml of each culture on their respective nutrient agar plates. Take sterile borer and heat on flame then make well on agar plate. Inoculate 0.1ml Aloe Vera extract on respective well and incubate at 37<sup>0</sup>C for 24 hour.

## RESULT AND DISCUSSION

Antimicrobial activity of Aloe Vera with ethanol against *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Escherichia coli* was detected. The zone of inhibition observed was range between 1mm to 4mm as shown in Table I.

**Table I. Zone of inhibition against test organisms.**

Test organism	Zone of inhibition
<i>Staphylococcus aureus</i>	4 mm
<i>Klebsiella pneumoniae</i>	3.1 mm
<i>Pseudomonas aeruginosa</i>	1.7 mm
<i>Escherichia coli</i>	0 mm

Aloe Vera as medicinal important plant gives best result against all pathogen that used in study but not show inhibitory effect on *Escherichia coli*. This result could be responsible for the popular use of Aloe Vera gel and leaf to relieve many types of gastrointestinal irritations (Foster, 1999; Grindlay and Reynolds, 1986) since *Staphylococcus aureus* form part of the normal microbial flora of the skin, upper respiratory tract and intestinal tract (Cheesbrough,1984).

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