

## Antimicrobial Screening of Different Extract of *Anacardium occidentale* Linn. Leaves

Akash P.Dahake<sup>1\*</sup>, Vishal D.Joshi<sup>2</sup>, Arun B.Joshi<sup>3</sup>

<sup>1</sup>Pharmacy college, Rampura, Kakanpur, Godhara, Panchmahal, Gujarat, India.

<sup>2</sup>K.N.V. Pharmacy College - Metoda, Rajkot, Gujarat, India.

<sup>3</sup>N.G.S.M Institute of Pharm.Sciences, Paneer, Dearalakte, Mangalore, India.

\*Corres.author: akashpdahake@gmail.com

\*Tel No. : +919898169449

**Abstract:** The antibacterial and antifungal activities of the ethanol and petroleum ether extracts of *Anacardium occidentale* Linn. were determined against a wide variety of pathogenic bacteria and fungi. The extracts were tested against various bacteria like *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherchia coli* and various fungi like *Candida albicans* and *Aspergillus niger* by cup plate method. Minimum Inhibitory Concentration (MIC) values of each active extract were determined. It is concluded that petroleum ether extract and ethanolic extract of *Anacardium occidentale* Linn. Leaves exhibited significant antimicrobial and antifungal activity.

**Key Words:** *Anacardium occidentale* Linn., Antibacterial, Antifungal, Cup plate method

### Introduction

Over the last few decades the great advances in our understanding of the causes of transmission, treatment and prevention of infectious diseases have fostered complacency about infections in a society which is well nourished and has access to vaccines, antibiotics and other drugs<sup>1</sup>. Alternative System of Medicine viz. Ayurveda, Siddha, and Traditional Chinese Medicine have become more popular in recent years. According to one estimate, more than 700 mono and poly-herbal preparations in the form of decoction, tincture, tablets and capsules from more than 100 plants are in clinical use<sup>2</sup>. In fact, plants produce a diverse range of bioactive molecules, making them a rich source of different types of medicines. Plants with possible antimicrobial activity should be tested against an appropriate microbial model to confirm the activity and to ascertain the parameters associated with it<sup>3</sup>.

*Anacardium occidentale* is a tree belonging to family Anacardiaceae<sup>4</sup>. The cashew nutshell liquid (CNSL), a by-product of processing cashew, is mostly composed of anacardic acids<sup>5</sup>. These acids have been used effectively against tooth abscesses due to their lethality to gram-positive bacteria. The bark is scraped and soaked overnight or boiled as an antidiarrheal. Seeds are ground up into powders used for antivenom for snake

bites. The nut oil is used topically as an antifungal and for healing cracked heels<sup>6</sup>. Teas and fruit juices from the cashew apple and leaves are known to have antimicrobial, anti-inflammatory, astringent, diuretic, hypoglycemic, and other medicinal properties<sup>7</sup>.

Due to the fact that the plant *Anacardium occidentale* is very useful, as found by above mentioned reports and there is a need to find out more about the potentiality of this plant as an antimicrobial agent. The present study is, therefore, designed to assess the potency of ethanolic and petroleum ether extracts of *Anacardium occidentale* on some selected microorganisms.

### Experimental

#### Plant material and extraction

The Leaves of *Anacardium occidentale* leaves were obtained from Paneer, Mangalore in India in March 2008 and its botanical identity was confirmed by a taxonomist Dr. Gopalkrishna Bhat, Department of Botany, Poornaprajna college, Udupi. A Voucher specimen was deposited in NGSIM Institute of Pharmaceutical Sciences, Paneer, Mangalore, India.

Preparation of the extract-leaves were collected from Mangalore, India and dried. Dried leaves were then crushed in a coffee grinder. The powdered leaves (500

gm) were exhaustively extracted with 70% ethanol and then successively with petroleum ether. The extracts were filtered and concentrated on a rotary evaporator. The dried extracts were then re dissolved in 10% DMSO (v/v) to yield solutions containing 100.0 mg of extract per ml.

#### Antimicrobial Screening

In vitro antibacterial and antifungal screening were performed with ethanolic and petroleum ether extracts of leaves of *Anacardium occidentale* against 4 pathogenic bacteria (2-gram positive and 2-gram negative) and 2 fungi by the standard disc diffusion method<sup>[8-10]</sup>.

Each Petridish was inoculated with one of the bacterial cultures suitably diluted to contain above  $10^6$  cells/ml by spreading 0.1ml suspension of the organism with a sterile cotton swab. In each plate cups of 6 mm diameter were made at equal distances using sterile cork borer. One cup was filled with 0.1 ml of standard drug, another with 0.1 ml of DMF, and others were filled with 0.1 ml of samples in sterile DMF. The Petridish were incubated at 37°C for 48 hours. The diameter of zone of inhibition in mm was recorded after incubation. The experiment was performed in triplicates and average diameter of zone of inhibition was obtained.

The extracts that showed antimicrobial activity were subjected to minimum inhibitory concentration (MIC) assay by serial two fold dilution method<sup>11</sup>. MIC was interpreted as the lowest concentration of the sample, which showed clear fluid without development of turbidity.

#### Results and Discussion

The antibacterial activities of the ethanolic and petroleum ether extracts of *Anacardium occidentale* showed significant variations as shown in Table 1. Among the Two extracts tested, ethanolic extract had greater antibacterial potential, followed by Petroleum ether extracts. The largest zones of inhibition were observed for ethanolic extract against *Staphylococcus aureus* (20mm) and *Bacillus subtilis* (19mm). Petroleum ether extract was very effective against *E.Coli* (16 mm).

The antifungal and anti-yeast activities of the ethanolic and petroleum ether extracts of *Anacardium occidentale* also varied significantly among the test organisms as shown in Table 2. Ethanolic extract had greater antifungal potential and Petroleum ether extract showed mild antifungal activity.

Antimicrobial potency of the leaf extract of *Anacardium occidentale* against the tested bacteria and fungal strains were expressed in MIC as presented in Table 1 and Table 2 respectively. The MIC values against these bacteria, and fungal strains ranged from 15.62 to 31.25µg/ml.

In our present study, a wide range of human pathogenic microorganisms were examined, including not only Gram-positive and Gram-negative bacteria, but also fungi. Significant antifungal activities also found against *C. albicans* in this study. This may indicate that the *Anacardium occidentale* extracts have broad inhibitory activities to pathogenic microorganisms and promising to act as potential antibacterial and antifungal agents from natural plant sources.

**Table 1: Antibacterial activities of different extracts of leaves of *Anacardium occidentale* Linn.**

Micro-organism	Zone of Inhibition (mm)			MIC (µg/ml)	
	Ethanolic Extract	Petroleum Ether Extract	Amoxicillin	Ethanolic Extract	Petroleum Ether Extract
<i>S.aureus</i>	20	11	25	15.62	31.25
<i>B.subtilis</i>	19	11	24	15.62	31.25
<i>P.aeruginosa</i>	13	12	20	31.25	31.25
<i>E.coli</i>	11	16	26	31.25	15.62

**Table 2: Antifungal activities of different extracts of leaves of *Anacardium occidentale* Linn.**

Micro-organism	Zone of Inhibition (mm)			MIC (µg/ml)	
	Ethanolic Extract	Petroleum Ether Extract	Ketoconazole	Ethanolic Extract	Petroleum Ether Extract
<i>C.Albicans</i>	17	13	21	15.62	31.25
<i>A.Niger</i>	16	11	19	15.62	31.25

## Acknowledgement

The authors are thankful to Pharmacy college, Rampura, for providing us all necessary facilities.

## References

1. Vahidi H., Kamalinejad M. and Sedaghati N., Antimicrobial Properties of Croccus sativus L., Iranian Journal of Pharmaceutical Research 2002, 1, 33-35.
2. Chakraborty G.S., Antimicrobial activity of the leaf extracts of Calendula Officinalis (Linn.), Journal of Herbal Medicine and Toxicology 2008, 2(2), 65-66.
3. Ali M.A., Alam N.M., Yeasmin S., Khan A.M. and Sayeed M.A., Antimicrobial Screening of Different Extracts of Piper longum Linn., Research Journal of Agriculture and Biological Sciences 2007, 3(6), 852-857.
4. <http://en.wikipedia.org/wiki/Cashew>
5. Tullo A.H., A Nutty Chemical, Chemical and Engineering News 2008, 86(36), 26-27.
6. <http://botany.si.edu/bdg/index.html>
7. <http://organiccashewnuts.com/learnmore.htm>
8. Barry A.L., Procedures for testing antimicrobial agents in agar media. In antibiotic in laboratory medicine, Williams and Wilkins Co., Baltimore, USA. 1980, 1-23.
9. Bauer A.W., Kirby W.W.M., Sherris J.C. and Turck M., Antibiotic susceptibility testing by a standardized single disc method, American Journal of Clinical Pathology, 1966, 45, 493-496.
10. Rios J.J., Reico M.C., and Villar A., Antimicrobial screening of natural products, Journal of Ethnopharmacology, 1988, 23, 127-149.
11. Florey H.W., Chain E. and Florey M.E., TheAntibiotic, Vol.I, Oxford University Press, NewYork 1989.

\*\*\*\*\*