PharmTech
International Journal of PharmTech Research
CODEN (USA): IJPRIF ISSN : 0974-4304
Vol.1, No.4, pp 1115-1118, Oct-Dec 2009

ABRUS PRECATORIUS L. SEED EXTRACTS ANTIMICROBIAL PROPERTIES AGAINST CLINICALLY IMPORTANT BACTERIA

Varaprasad Bobbarala[1*] and Varahalarao Vadlapudi[2]
[1]For U Biosciences, A/4A, Park lane Residency, East point colony, Visakhapatnam-17.
[2]Department of Botany, Andhra University, Visakhapatnam-3, Andhrapradesh, India

*Corres. author: varaprasadphd@rediffmail.com

ABSTRACT : *In vitro* antibacterial activities of hexane, chloroform and methanolic crude extracts of *Abrus precatorius* seeds were tested against ten clinical isolates using the agar well diffusion technique. Hexane, chloroform and methanolic extracts were obtained using the soxhlet extractor on *A. precatorius* seeds. To measure the MIC values, various concentrations of the stock, 500, 250, 100, 75, 50, 35, 25 and 12microg/ml were assayed against the test bacteria. At the different concentrations of the extracts used (500microg/ml-4microg/ml), *Enterococcus faecalis* was the most resistant organism. Methanolic seed extracts were potent when compared with hexane and chloroform extracts. This study demonstrates that *A. precatorius* particularly the seed methanolic extracts has a potent antimicrobial activity. The results supported the ethno botanical use of seed parts of *A. precatorius* for the treatment of various bacteria-related diseases.
Key Words: Medicinal plants, *Abrus precatorius*, Methanol extract, Antibacterial activity, Well diffusion assay.

INTRODUCTION

The medicinal plants are the plants whose parts (leaves, seeds, stem, roots, fruits, foliage etc.) extracts, infusions, decoctions, powders are used in the treatment of different diseases of humans, plants and animals[1]. Plant extracts are highly efficient against microbial infections. It is estimated that around 70,000 plant species, from lichens to tall trees, have been used at one time to other for medicinal purposes[2]. The use of different parts of several medicinal plants to cure specific ailments has been in vogue from ancient times. The indigenous system of medicine namely Ayurvedic, Siddha and Unani have been in existence for several centuries. This system of medicine caters to the needs of nearly 70% of the population residing in villages. Besides the demands made by these systems as their raw material, the demands for medicinal plants made by the modern pharmaceutical industries has also increased manifold[3, 4].

Plants are rich in a wide variety of secondary metabolites such as tannins, alkaloids and flavonoids, which have been found *in vitro* to have antimicrobial properties[5]. For thousands of years, natural products have been used in traditional medicine all over the world and predate the introduction of antibiotics and other modern drugs. The antimicrobial efficacy tribute to some plants in treating diseases has been beyond belief. It is estimated that local communities have used about 10% of all flowering plants on Earth to treat various infections, although only 1% have gained recognition by modern scientists[6].

Antibiotics provide the main basis for the therapy of bacterial infections. Since the discovery of these antibiotics and their uses as chemotherapeutic agents there was a belief in the medical fraternity that this would lead to the eventual eradication of infectious diseases. However, over use of antibiotics has become the major factor for the emergence and dissemination of multi-drug resistant strains of several groups of microorganisms[7] bacteria have the genetic ability to transmit and acquire resistance worldwide emergence of *Escherichia coli, Klebsiella pneumoniae, Haemophilus* and many other ß-lactamase producers has become a major therapeutic problem. Multi-drug resistant strains of *E. coli* and *K. pneumoniae* are widely distributed in hospitals and are increasingly being isolated from community acquired infections[8, 9].

Abrus precatorius is belongs to family fabaceae. It grows in tropical climates such as India, Sri Lanka, Thailand, the Philippine Islands, South China, tropica Africa and the West Indies. It also grows in all tropical or subtropical areas. The most poisonous part of the plant is the seed. The seed contains the toxic poison abrin which is close relative to ricin. Ingested seeds can affect the gastrointestinal tract, the liver, spleen, kidney, and the lymphatic system. Infusion of seed extracts can cause eye damage after contact. The most poisonous parts of the plant involved in poisoning are the small, scarlet seeds that have a black eye at the hilum. The roots, stems, and leaves also contain glycyrrhizin[10]. The seeds were also used to treat diabetes and chronic nephritis. The plant is also used in some traditional medicine to treat scratches and sores, and wounds caused by dogs, cats and mice and are also used with other ingredients to treat leucoderma. They are ground with lime and applied on acne sores, boils, and abscesses. The plant is also traditionally used to treat tetanus, and to prevent rabies. Various African tribes use powdered seeds as oral contraceptives[11] Boiled seeds of *A. precatorius* are eaten in certain parts of India[12]. The objective of this research was to evaluate the potentiality of *A. precatorius* on standard microorganism strain and clinically important bacteria.

MATERIALS AND METHODS

Abrus precatorius seeds were purchased from local herbal vendor of Visakhapatnam Dist, Andhra Pradesh, India. The seeds were dried under shade with occasional shifting and then powdered with a mechanical grinder and stored in an airtight container. The powder obtained was subjected to successive soxhlet extraction with the organic solvents with increasing order of polarity respectively.

The antibacterial activity of the *A. precatorius* extracts was assessed against microbial strains of clinical, aquatic origin i.e. *Enterococcus faecalis,* Escherichia coli, *Micrococus luteus*, *Lactobacillus fermentum*, *Klebsilla pneumonia, Staphylococcus aureus, Streptococcus thermophilus, Streptococcus mitis*, *Streptococcus mutans* and *Pseudomonas aeruginosa* bacteria were used as test organisms. The strains are maintained and tested on Nutrient Agar (NA) for bacteria. Active cultures were generated by inoculating a loop full of culture in separate 100mL nutrient broths and incubating on a shaker at $37^{o}C$ overnight. The cells were harvested by centrifuging at 4000 rpm for 5 min, washed with normal saline, spun at 4000 rpm for 5min again and diluted in normal saline to obtain 5×10^{5} cfu/mL.

The antimicrobial activity of the hexane, chloroform, methanol and water extracts of each sample was evaluated by using well-diffusion method or cup plate method of Murray[13] modified by Olurinola[14]. 20 ml of nutrient agar was dispensed into sterile universal bottles these were then inoculated with 0.2 ml of cultures mixed gently and poured into sterile petridishes. After setting a number 3-cup borer (6mm) diameter was properly sterilized by flaming and used to make three to five uniform cups/wells in each petridish. A drop of molten agar was used to seal the base of each cup. The cups/wells were filled with 50µl of the different extracts of 100mg/ml and allow diffusing for 45minutes. The solvents used for reconstituting the extracts were similarly analyzed. The plates were incubated at 37°c for 24hours.

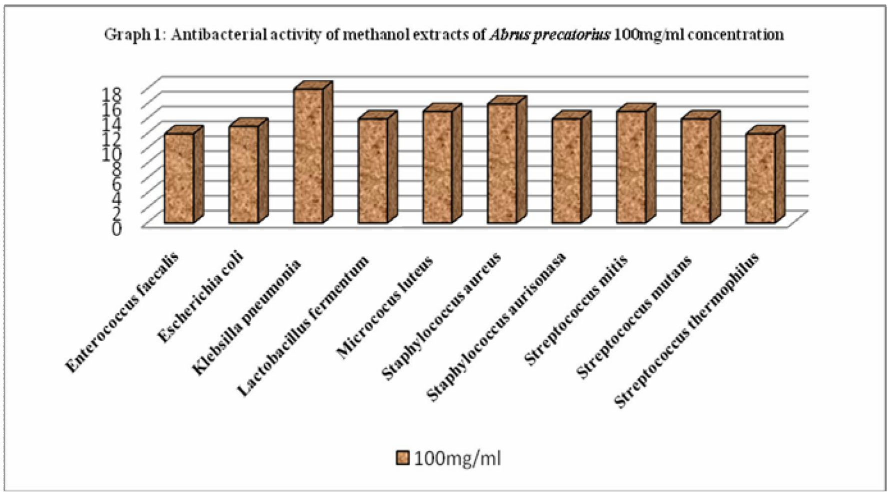
The standard antibiotic drugs was used at different concentrations to get MIC (Minimum inhibitory concentrations) the antibiotic drug used were Streptomycin. The zones of inhibition were measured with antibiotic zone scale in mm and the experiment was carried out in triplicates

RESULTS AND DISCUSSION

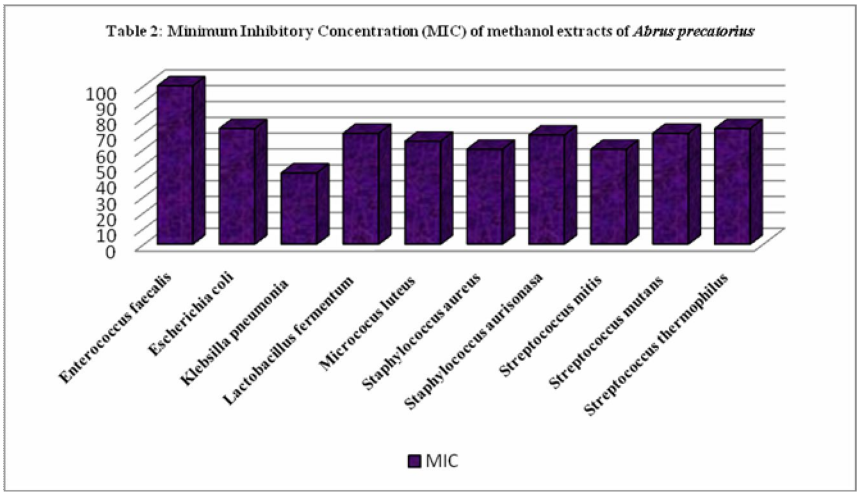
The antibacterial activity of *A. precatorius* seed extracts was assayed *in vitro* by agar well diffusion method against ten bacterial species. Graph 1 and 2 summarizes the microbial growth inhibition of methanol extracts of the screened bacterial species. Methanol extracts exhibited antibacterial activity towards almost all the bacterial microorganisms. The hexane and chloroform extracts of three plants showed less or no antibacterial activity. On the other hand, the methanolic crude extracts showed maximum antibacterial activity on *Klebsilla pneumonia*, followed by *Staphylococcus aureus*, *Streptococcus mitis* and *Micrococus luteus*, respectively. The studied plants were most active against all the bacteria tested. The significant antibacterial activity of the active plant extracts was comparable to the standard antibiotic Streptomycin (10µg/disc).

The variation of susceptibility of the tested microorganisms could be attributed to their intrinsic properties that are related to the permeability of their cell surface to the extracts. Due to the emergence of antibiotic resistant pathogens in hospitals and homes, plants are being looked upon as an excellent alternate to combat the further spread of multidrug resistant microorganisms

The present results therefore offer a scientific basis for traditional use of solvent extracts of the solvent extracts of *Abrus precatorius* could be a possible source to obtain new and effective herbal medicines to treat infections caused by multi-drug resistant strains of microorganisms. However, it is necessary to determine the toxicity of the active constituents, their side effects and pharmaco-kinetic properties.



0 to 18 Zone of inhibition in mm; Volume per well: 50µl, Borer size used: 6mm.



0 to 100 Zone of inhibition in mm; Extract concentration in mg/ml; Volume per well 50µl, Borer size used: 6mm.

REFERENCES

1. Nostro A.M.P., Germano, V. Angelo., A. Marino., and Cannatelli, M.A., Extraction methods and bioautography for evaluation of medicinal plant antimicrobial activity, Letters in Applied Microbiology, 2000, 30, 379-348.
2. Purohit S.S. and Vyas S.P., Medicinal plants cultivation a scientific approach including processing and financial guidelines. 1st edition. Publishers Agrobios, Jodhpur, India, 2004, 1-3.
3. Gupta M.U.K., Mazumder S., Chakrabarti M. Gupta and Chakrabarti S., CNS activities of methanolic extract of Moringa oleifera root in mice, *Fitoterapia*, 1999, 70, 244-250.
4. Shraf M. and Orooj A., Salt stress effects on growth, ion accumulation and seed oil content in an arid zone medicinal plant ajwain (*Trachyspermum ammi* (L.) Sprague). Journal of Arid Environments, 2006, 64, 209-220.
5. Lewis K. and Ausubel F.M., Prospects of plant derived antibacterials. Nat. Biotechnol, 2006, 24, 1504-1507.
6. Kafaru E., Immense help formative workshop, In Essential Pharmacology, 1st Ed. Elizabeth Kafaru Publishers, Lagos, Nigeria, 1994.
7. Harbottle H., Thakur S., Zhao S. and White D.G., Genetics of Antimicrobial Resistance, Anim. Biotechnol, 2006, 17, 111-124.
8. Khan A.U. and Musharraf A., Plasmid Mediated Multiple Antibiotic Resistances in *Proteus mirabilis* Isolated from Patients with Urinary Tract Infection, Med. Sci. Mont, 2004, 10, 598-602.
9. Akram M., Shahid M. and Khan A.U., Etiology and Antibiotics Resistance Pattern of Community Acquired Urinary Infections in J N M C Hospital Aligarh India, *Ann. Clin. Microbiol. Antimicrob,* 2007, 6, 4.

10. Windholz M., The Merck Index: an encyclopedia of chemicals, drugs, and biologicals, 10th ed. Rahway, New Jersey, Merck and Co., Inc, 1983.
11. Watt J.M. and Breyer-Brandwijk M.G., The Medicinal and Poisonous Plants of Southern and Eastern Africa. 2nd Edition, E. & S. Livingstone Ltd., Edinburgh and London, 1962, 830.
12. Rajaram N. and Janardhanan K., The chemical composition and nutritional potential of the tribal pulse, *Abrus precatorius* L. Plant Foods Hum Nutr, 1992, 42(4), 285-290.
13. Murray P.R., Baron E.J., Pfaller M.A., Tenover, FC. and Yolken H.R., *Manual of clinical microbiology*, 6th Edition, ASM Press, Washington DC, 1995, 15-18.
14. Olurinola P.F., A laboratory manual of pharmaceutical microbiology. Printed by National Institute for Pharmaceutical Research and Development, Idu, Abuja, Nigeria, 1996, 69-105.

*****