EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 2
Issue: 6
216-219
Year: 2015

ANTIMICROBIAL ACTIVITY OF *ACACIA ARABICA* LEAF EXTRACT

Gopala Krishna Ch*, Aparna S, Sneha Latha T, Sudhakar Babu A M S, Ashok Kumar D, Gopi M

Department of Pharmacology A. M Reddy Memorial College of Pharmacy Petlurivaripalem, Narasaraopet Guntur District- 522601.

***Author for Correspondence: Gopala Krishna Ch.**
Department of Pharmacology A. M Reddy Memorial College of Pharmacy Petlurivaripalem, Narasaraopet Guntur District- 522601.

Article Received on 04/09/2015 **Article Revised on 25/09/2015** **Article Accepted on 16/10/2015**

ABSTRACT
The antimicrobial activity of *Acacia Arabica* extract was tested against pathogenic bacteria like *Staphylococcus aureus, Pseudomonas aerugenosa and E.coli* and fungi like *Aspergillus niger* and *Candida* at a dose of 1:20 mg/ml and 2:40 mg/ml by using cup plate diffusion method. Various solvents such as petroleum ether, chloroform and methanol were used for extracts. The results reveal that, methanol and petroleum ether at a dose of 20 mg/ml has showed significant activity against *E.coli* whereas in fungi, methanol extract showed significant activity against *Aspergillus niger* and *Candida*. Methanol extract has showed maximum inhibitory activity against *E.coli* and *Candida*. Petroleum ether has showed moderate inhibitory activity against *Pseudomonas aeruginosa* and *Candida*. The zone of inhibition was measured and compared with standard Gentamycin (1 mg/ml). However, in none of the above mentioned extracts the inhibition zone was not more than that found in standard i.e., Gentamycin.

KEYWORDS: *Acacia Arabica*, antimicrobial activity, Gentamycin.

INTRODUCTION
Traditional medicine is in practice for many centuries by a substantial proportion of the population of many centuries. It is recognized that in some developing countries, plants are the main medicinal source to treat various infectious diseases. Plant extracts represent a continuous effort to find new compound against pathogens. Approximately 20% of the plants are found in the world have been submitted to pharmacological or biological test, and a substantial number of new antibiotics introduced on the market are obtained from natural or semisynthetic resources. *Acacia arabica* is a plant, which belongs to the family of Leguminaceae and The bark is dark either brownish or greyish with longitudinal cleavages. The branches are simple, spiked. Spikes are white, sharp and 0.5 to 2 inch long. There are two spikes below the petiole of the leaf. There is 10 to 12 pair of leaflets of 1/8 to 1/4 inch long. The uppermost and lowermost leaflets have small glands at the roots. Yellow flowers of 1/2 inch diameter are sweet and fragrant. Flowering occurs in August to September. It is 3 to 6 inch long, 1/2 inch wide. There are 8 to 12 seeds in the flat legume. The legume is constricted in between seeds. Fruition period is from January to April. Acacia arabica is commonly found in dry forest areas. It is commonly found in India particularly in Punjab, Rajasthan and Southern states of India. About 85% of world supply of acacia is from sudan. The species is frequently cited as being used in herbal medicine. *Acacia Arabica* is annual, drought resisting, demulgent plant. Concentrated extracts of *acacia* leaves is used as anti bacterial and as mouth ulcer treatment. The use of plant product for pharmaceutical purpose has been gradually increased. According to World Health Organisation, medicinal plantswould be the best source for obtaining a variety of drugs. The use of plant extracts, with known antimicrobial properties, can be of great significance in the treatment of various microbial infections. In the last decade, numerous studies have been conducted in different countries to prove such efficiency in number of medicinal plants. Most of the studies are restricted with crude extracts. Many scientific studies of the use of Acacia arabica have been undertaken. Despite these limitations, there is some preliminary evidence that *Acacia* extracts may be useful in the treatment of wound healing and minor skin infections, prevent subsequent infections. These positive effects are thought to be due to the presence of compounds such as polyuronides, arabin, calcium, magnesium, potassium salts. "The use of acacia, the common musabbar, for external application to inflamed painful parts of the body and for causing purgation [internal cleansing] are too well known in India to need any special mention."

MATERIALS AND METHODS
Collection of Plant Material
The plant *Acacia arabica* leaves were collected from in and around the Narasaraopet in Guntur district, Andhra

Pradesh, India. This plant was botanically authenticated in the Department of Botany, A N U University P G and U G Guntur. The leaves were shade dried and used for the extraction.

Extraction of Plant Material

The leaves of Acacia arabica was air dried and crushed to small piece using Mortar and Pestle and powdered in an electric grinder. The powdered plant material was subjected for successive soxhlet extraction starting from non polar to polar solvents such as petroleum ether [PE]. Chloroform [CHCl3] and methanol [MeOH] by using soxhlet extracts. The extracts were concentrated to dryness.

Preparation of the Extract

The plant material were shade dried, powdered and subjected to Soxhlet extraction (1kg) with solvents ranging from non-polar that is Petroleum ether (60-800), Chloroform (70-800), Methanol (60-900) respectively. The extracts were concentrated to dryness in a flask evaporator under reduced pressure and controlled temperature. The petroleum ether extract (20gm), chloroform (20gm), and ethanol extract (40gm). All the extracts were prepared in Tween-80 (1%) Suspended in distilled water. The plant extracts were prepared by using soxhlet apparatus collected and stored in a air tight containers for further purpose.

Disc Preparation

The 6mm (diameter) discs were prepared from whatmann No. 1 filter Paper the discs were sterilized by autoclave at 12°C. After the sterilization the moisture discs were dried on hot air oven at 50°C.Then various solvent extract discs and control discs were prepared.

Antibacterial and Antifungal Activity of *Acacia Arabica*

The antibacterial and antifungal activity studies were carried out by disc diffusion technique. The sterile nutrient agar plates and potato dextrose agar plates were prepared. The bacterial test organisms like *Staphylococcus aureus, Pseudomonas aeruginosa, salmonella spp.* and *Escherichia coli* were spread over the nutrient agar plates by using separate sterile cotton buds. Then the fungal test organism like *Aspergillus niger* and *Candida* were spread over the potato dextrose agar plates After the microbial lawn preparation three different extracts of plant disc were placed on the organism inoculated plates with equal significant difference between extract used and also distance control discs were also prepared. All bacterial plates were incubated at 27°C for 24 hrs and fungal plates at 24°C for 72hrs. The diameter of the minimum zone of inhibition was measured in mm. For each test, three replicates were performed.

Statistical Analysis

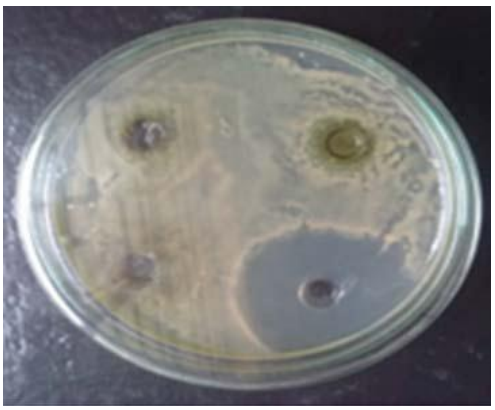
Data were expressed as mean±standard deviation. The data obtained were subjected to ANOVA test to determine whether there was significant difference between extract used and also between the lengths of incubation.

RESULTS

The present study carried out on the *Acacia Arabica* revealed to evaluate antimicrobial activities of various extracts of *Acacia Arabica.* The successive leaves extracts using petroleum ether, chloroform and methanol of *Acacia Arabica* were tested for their antimicrobial efficiency against pathogenic bacteria and fungi (*Staphylococcus aureus, Pseudomonas aeruginosa, Sallmonella spp, E.coli,*) and fungi like (*Aspergillus Niger, Candida*) at a dose 1: 20mg/ml and 2:40mg/ml. The standard drugs used for comparison were Streptomycin and Fluconazole against bacteria and fungi. Among the extracted tested for their antibacterial activity, the leaves extracts showed moderate to high activity against both gram positive and gram negative bacteria. The extracts using petroleum ether, chloroform, and methanol of *Acacia Arabica* showed active antimicrobial activity against *Staphylococcus aureus, Pseudomonas aeruginosa, Salmonella spp, E.coli* and, and antifungal activity against *Candida and Aspergillus niger.* The chloroform and methanolic extract showed highest inhibition zone at higher concentration (i.e. 40mg/ml). Overall the methanolic extracts showed greater inhibition of all pathogenic microorganisms used when compared to chloroform and petroleum ether extracts.

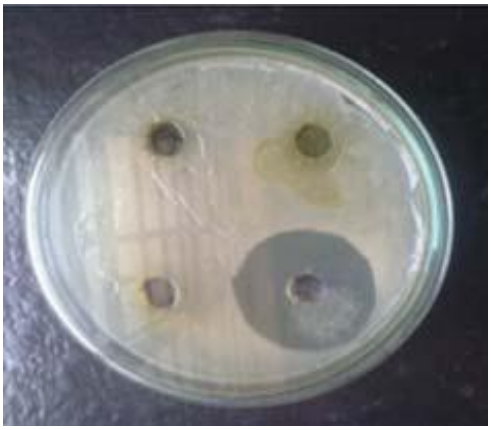
The extracts of petroleum ether at the dose level of 20mg/ml showed the inhibition zone of *Staphylococcus aureus* (15mm), *Pseudomonas* (19mm), *E.coli* (14mm), whereas the extracts of petroleum ether at the dose level of 40mg/ml showed the inhibition zone of *Staphylococcus aureus* (20mm), *Pseudomonas* (20mm), *E-coli* (10mm). The extracts of chloroform at dose level of 20mg/ml showed the inhibition zone of *staphylococcus aureus* (15mm), *Pseudomonas* (11mm), *Escherichia coli* (14mm) where as extracts of chloroform at the dose level of 40mg/ml showed the diameter by zone of inhibition of *Staphylococcus aureus* (14 mm), *Pseudomonas* (10mm), *E-coil* (12mm) (Table-1). The extract of methanol at the dose level of 20mg/ml showed the diameter of zone of inhibition of *Staphylococcus aureus* (13mm), *Pseudomonas* (13mm), *E.coli* (22mm) where as extracts of methanol at the dose level of 40mg/ml showed the diameter of zone of inhibition of *Staphylococcus aureus* (15mm), *Pseudomonas* (15mm), *E.coli* (16mm).

	Zone of inhibition in mm				
Leaf extracts	***Staphylococcus aureus***	***Pseudomonas aerugenosa .***	***E. coil***	***A. niger***	***Candida***
Chloroform (20mg)	15mm	11 mm	14mm	10mm	*15mm*
Chloroform (40mg)	4mm	10mm	12mm	12mm	*20mm*
Petroleum ether (20mg)	15mm	19mm	14mm	12mm	*14mm*
Petroleum ether (40mg)	20mm	20mm	10mm	14mm	*19mm*
Methanol (20mg)	13mm	13mm	22mm	15mm	*16mm*
Methanol (40mg)	15mm	15mm	16mm	17mm	*15mm*
Standard (40mg)	12mm	20mm	30mm	15mm	*28mm*
Standard (20mg)	*15mm*	*20mm*	*28mm*	*18mm*	*25mm*

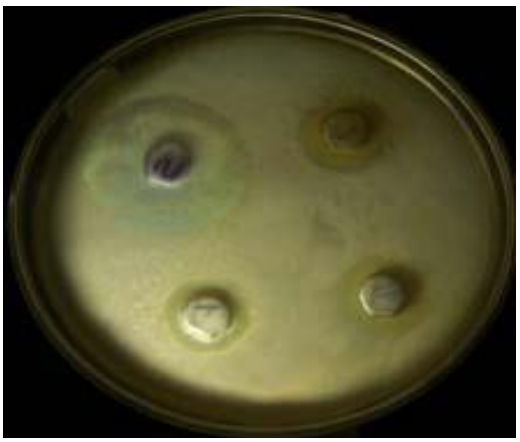


s ***Staphylococcus aureus***

Pseudomonas aerugenosa



E. coil



A. niger

Candida

DISCUSSION

In this present study the petroleum ether extract, has shown high zone of inhibition in *Escherichia coli, Pseudomonas aeruginosa,* the fungi *Aspergillus niger* and moderate zone for *Staphylococcus aureus, and Candida* . Chloroform extract has shown a high zone of inhibition in *Pseudomonas* aeruginosa, Escherichia coli and Aspergillus Niger but moderate zone of inhibition in *Staphylococcus aureus, and Candida.* Methanol extract as shown high zone of inhibition in *Staphylococcus aureus, Pseudomonas aeruginosa* and *Candida* but moderate zone in *Escherichia coli and Aspergillus Niger*. When compared the zone of inhibition with the standard drugs like Gentamycin and flucanozole. The plant extracts have shown almost equal to the standard drug. The above parameter supports the strong scientific basis for the use of these plants in traditional treatment of microbial diseases. The antimicrobial activity of the extracts and their potency was quantitatively assessed by the presence or absence of inhibition zone and zone diameter. Only alcoholic extract was found to be a better solvent for extraction of antimicrobially active substances compared to water and hexane compared the antimicrobial activities of the root and leaf of *Acacia Arabica* against *Staphylococcus aureus, Pseudomonas aeruginosa, Trichophyton mentagraphytes, T. schoeleinii, Microsporium canis* and *Candida albicans*. The antimicrobial analysis it was confirmed that this plant leaf extracts showed positive results against bacterial species such as *Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli* and fungi *Aspergillus niger* and *candida.* Hence, it can be concluded that root extracts of *Acacia arabica* can effectively act as an antimicrobial agent which have ability to replace most of medium medicines of this era.

CONCLUSION

The present study has revealed the importance of natural products to control antibiotic resistant bacteria, which have been a threat to human health. It is, therefore highly essential that medicinal plants whose properties have not been fully characterized should form a top agenda of top management in developing nations whose citizens are sometimes unable to afford expensive orthodox medicine. This study has revealed the presence of many secondary metabolites in the roots of Acacia arabica. It has the further confirmed that the plant extracts could be used for the treatment of various infections including skin transmitted infections. The results lend credence to the folkloric use, if this plant in treating microbial infection and shows that *Acacia arabica* could be exploited for new potent antimicrobial agents.

ACKNOWLEDGMENT

Authors are thankful to the Head of the Department of Pharmacology Mr. Ch Gopala Krishna. A M Reddy Memorial College of Pharmacy Narasaraopet Guntur District, for providing the necessary facility and for the support and guidance.

REFERENCES

1. Agarry, O.O., Olaleye, M.T. and Bello-Michael, C.O. Comparative Antimicrobial Activities Of Acacia arabica And Leaf. African Journal of Biotechnology, 2005; 4(12): 1413-1414.
2. Ahmad, J., Mehmood, Z. and Mohammad, F. Screening of Some Indian Medicinal Plants For Their Antimicrobial Properties. Journal of Ethnopharmacology, 1998; 62: 183-193.
3. Atefl, D.A. and Erdo Urul, O.T. Antimicrobial Activities of Various Medicinal and Commercial Plant Extracts. Turk Biol, 2003; 27: 157-162.
4. Beckford, M.M. and Badrie, N. Consumer Acceptance of Tropical Wines From Aloe Vera (Aloe Barbadensis) And Cashew Apples (Anacardium Occidentale L.) In The British Virgin Islands. Foodservice. Res. Int., 2000; 12: 185-196.
5. Davis, H. R. Acacia arabica: A Scientific Approach Published by Vantage Press (NewYork, SA<http://www.aloevera.co.uk/rhdavis.htm>Edro Urul, O.T. (2002). Antibacterial Activities Of Some Plant Extracts Used InFolk Medicine. Pharm. Biol., 1997; 40: 269-273.
6. HealthWorldOnline.http://www.healthy.net/library/articles/hfh/aloe.htm
7. Mothana, R.A. and Linclequist, V. (2005). Antimicrobial Activity of Some Medicinal Plants Of The Island Soqotra. JEthnopharmacei. Vol. 96, 1-2, 177-181. (doi: 10-1016/j.jep 2004.09.006).
8. Reddy, P.S, Jamilk, Madhusudhan, P. Antimicrobial Activity Of Isolates From Piper Longum And Taxus Baccatr. Pharm. Biol., 2006; 39: 236-238.
9. Santos, P.R.V, Oliveria, A.C.X. and Tomassini, T.C.B. Controls Microbiological Products Fitoterapices. Rev. Farm Bioquim. 1995; 31: 35-38.
10. Strickland, F. M, Kuchel, J. M. and Halliday, G. M. Natural Products as Aids for Protecting the Skin's Immune System Against UV Damage. Cutis., 2004; 74(5): 24-28.