Journal of Medicinal Plants Research Vol. 5(15), pp. 3561-3563, 4 August, 2011
Available online at http://www.academicjournals.org/JMPR
ISSN 1996-0875 ©2011 Academic Journals

Short Communication

Bioactive compounds and antimicrobial efficacy of the extracts of *Combretum pincianum* Hook

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Accepted 30 July, 2010

Combretum pincianum **Hook is a shrub that is wide spread in the tropics. Its leaves are widely used in Africa as herbal remedies for treating typhoid fever, tonsillitis, conjunctivitis and gastrointestinal disorders. Its extract was obtained by cold extraction of its powdered dry leaves in a mixture of methanol and water at the ratio 3:2. The antimicrobial activity of the extract at a concentration of 25 mg/ml was tested against fourteen bacterial isolates using agar well diffusion method. There was inhibition of growth of *Bacillus anthracis, Bacillus cerus, Clostridium sporogenes, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa, Pseudomonas fluorescens, Staphylococcus epidermidis and Streptococcus faecalis.* The mean diameter of the zone of inhibition exhibited by the extract against the microbial isolates was between 10 and 20 mm. The minimum inhibitory concentration ranged between 0.32 and 25 mg/ml. The extract compared favourably with Streptomycin as standard. The phytochemical analyses of the plant extract review the presence of tannins, alkaloids and saponins.**

Key words: *Combretum pincianum* Hook, antimicrobial, extracts.

INTRODUCTION

The plant *Combretum pincianum* Hook belongs to the family Combretaceae and the order Mytales. It is a scadent shrub which grows into lofty lane in forests extending into savannah regions, infringing forests and thickset (Dalziel, 1936; Sheng-Liang and Sylvia, 2010). According to Sofowora (1984), it is used in the treatment of lunacy. Members of its family have strong antiviral activity against HIV-1 and HIV-2 (Asres et al., 2001). The present investigation was designed to determine the bioactive compounds and the antimicrobial efficacy of the extracts of *C. pincianum* Hook.

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MATERIALS AND METHODS

Sample collection

Fresh leaves of *C. pincianum* Hook were collected around Obafemi Awolowo University, Ile-Ife environ and identified in the herbarium of the department of Botany, Obafemi Awolowo University, Ile-Ife, Nigeria. They were dried in a hot air oven (40°C), powdered and stored in an air tight container for analyses. Bacterial isolates used were from the Department of Medical Microbiology and Parasitology, University College Hospital, Ibadan, Nigeria. They were *Bacillus anthracis, Bacillus cerus, Clostridium sporogenes, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa, Pseudomonas fluorescens, Staphylococcus epidermidis and Streptococcus faecalis.*

Extraction

Exactly 180 g of the powdered leaves of *C. pincianum* Hook was

Table 1. The antimicrobial activity of Combretum *pincianum* Hook leaf extract on selected bacterial isolates.

Isolate	Zones of inhibition (mm)*	
	***C. pincianum* Hook (25 mg/ml)**	**Streptomycin (1 mg/ml)**
Bacillus anthracis	14	20
Bacillus cereus	16	28
Bacillus polymyxa	0	15
Bacillus stearothermophilus	0	23
Bacillus subtilis	*0*	20
Clostridium sporogenes	*0*	25
Corynebacterium pyogenes	0	20
Escherichia coli	10	0
Klebsiella pneumoniae	*20*	0
Pseudomonas aeruginosa	*16*	21
Pseudomonas fluorescens	*12*	30
Staphylococcus aureus	*0*	21
Staphylococcus epidermidis	*18*	21
Streptococcus faecalis	17	23

Key: mm* = Mean of three replicates.

Table 2. The minimum inhibitory concentration of extract on bacterial isolates.

Isolate	***C. pincianum* Hook MIC (mg/ml)**
Bacillus anthracis	0.75
Bacillus cereus	3.26
Escherichia coli	0.32
Klebsiella pneumoniae	25
Pseudomonas aeruginosa	0.32
Pseudomonas fluorescens	12.5
Staphylococcus epidermidis	25
Streptococcus faecalis	25

soaked in methanol/ distilled water solution in the ratio 3:2 and left over night for four days. The extract was filtered and concentrated in *vacuo* to dryness using a rotary evaporator.

Antimicrobial activity of the crude extract

The crude extract was screened for antimicrobial activity using the Agar-Well diffusion method (Barry et al., 1979; Akinpelu, 1999; Abolhassani, 2004). The medium employed was Mueller-Hinton agar (Fluka, Biochemika).

Phytochemical analysis

Phytochemical analysis was determined using the methods of Trease and Evans (1983) and Harbourne (1973). The extract was tested alkaloids, tannins and saponins.

RESULTS

The yield of extract obtained was 24.3 g. The extract was found to be active against eight out of fourteen organisms tested at concentration of 25 mg/ml. The pattern of sensitivity of each of the isolates to the crude extract is shown in Table 1. The mean diameter of the zones of inhibition resulting from action of the extract on the isolates ranged between 10 and 20 mm. The minimum inhibitory concentrations of the extract on the sensitive isolates are shown in Table 2.

The results of phytochemical analysis screening based on chemical examination of the extract indicated that the extract tested positive for tannins, saponins and alkaloids.

DISCUSSION

The antimicrobial activities of the leaves of *C. pincianum* Hook were determined against fourteen organisms comprising both Gram positive and Gram negative bacteria. The results of these investigations show that the

extract exhibited in vitro antimicrobial activities against eight of the fourteen tested isolates as shown in Table 1. The organisms affected comprised both Gram positive and Gram negative bacteria. The extract at a concentration of 25 mg/ml inhibited the growth of *B. anthracis*, *B. cereus, E. coli, K. pneumoniae, P. aeruginosa, P. fluorescens, S. epidermidis* and *S. faecalis*. The extract of *C. pincianum* Hook compared favourably with Streptomycin which was used as standard in this research. The zones of inhibition observed from the extract of *C. pincianum* Hook on *E. coli* and *K. pneumoniae* were 10 and 20 mm, respectively. These organisms were resistant to Streptomycin, showing the extract to be as potent against these organisms as the standard antibiotics Streptomycin. Both Gram positive and Gram negative bacteria were found to be sensitive to the *C. pincianum* Hook leaf extract. This suggests a broad spectrum action. The phytochemical analysis on the extract of *C. pincianum* Hook revealed the presence of tannins and alkaloids.

These substances are known to possess antimicrobial activities. Tannins may exert an inhibitory influence on many enzymes due to protein precipitation (Evans, 2002), forming irreversible complexes with praline-rich proteins (Hagerman and Butler, 1981) resulting in the inhibition of cell protein synthesis. Tannins also have important roles as a stable and potent antioxidant (Trease and Evans, 1983). This may help to explain the mechanisms of action of the *C. pincianum* Hook extract on the tested bacterial isolates. Drug formular from the leaf extract of *C. pincianum* Hook could serve as a very promising remedy for the treatment and control of infections caused by *P. aeruginosa, P. fluorescens, B. cereus, B. anthracis and E. coli*. *K. pneumoniae* and *E. coli* which are susceptible to the effects of the extract are known to have developed resistance against β-lactam antibiotics such as penicillins and cephalosporins (Tortora et al., 1992; Prescott et al., 2005). They are major causes of nosocomial infections, especially of the lower respiratory tract, urinary tract and skin as well as causative agents of sepsis. Due to the importance of these organisms in disease-causation and their exhibition of resistance to various antibiotics which are synthetic, the extract from *C. pincianum* Hook may serve as an alternative means of therapy following further modification and purification.

Conclusion

The extract of *C. pincianum* Hook was found to possess potent antimicrobial properties. It has a broad spectrum antibacterial activity. The extract compared favourably with the standard antibiotics, Streptomycin, used in this research. The leaves of *C. pincianum* Hook contain tannins and other metabolities which are known to possess antimicrobial activity and thus supporting their usefulness in herbal treatment of human infections such as respiratory tract infections and gastrointestinal disorders.

The leaves of *C. pincianum* Hook are used in preparation of various concoctions, among the Yoruba tribe of Nigeria, for the treatment of gastrointestinal infections, leprosy and conjunctivitis, thus showing that the plant is safe and non-toxic. Hence, different formulations could be prepared for clinical trials. Such formulations could be more effective on pathogens than available synthetic antimicrobial agents. Such drugs from natural origin should have little or no adverse effect on users and at the same time be cheaper.

ACKNOWLEGEMENT

Adekunle Odunayo Adejuwon thanks the British Mycological Society for Grant support.

REFERENCES

Abolhassani M (2004). Antibacterial effect of borage (*Echium amoenum*) on *Staphylococcus auureus*. Brazilian J. Infect. Dis., 8: 382-385.

Akinpelu DA (1999). Antimicrobial activity of *Vernonia amygdalina* leaves. Fitoterapia, 70: 432-434.

Asres K, Bukar F, Kartnig T, Witvrouw M, Pannecouque C, Declercq E (2001). Antiviral activity against human immunodeficiency virus type (HIV-1) and type 2 (HIV-2) of ethnobotanically selected Ethiopian medicinal plants. Phytother. Res., 15: 62-69.

Barry AL, Coyle MB, Thornberry C, Gerlach EH, Hawkinson RW (1979). Methods of measuring zones of inhibition with the Bauer-Kirby disk susceptibility test. J. Clin. Microbiol., 10: 885-889.

Dalziel JM (1936). The useful plants of West Tropical Africa. Crown Agents for the Colonies, London, pp. 336-337.

Evans WC (2002). Pharmacognosy. 15th Edition. Saunders, pp. 332-334.

Hagerman AE, Butler IG (1981). The specificity of proanthrocyanidin-protein implication. J. Biol. Chem., 256: 4494-4497.

Harbourne JB (1973). Phytochemical methods: A guide to modern to modern techniques of plant analysis. Chapman and Hall, London, P. 271.

Prescott LM, Harley JP, Klein DA (2005). Microbiology, 6th Edition, McGraw Hill, Boston, New York.

Sheng-Liang L, Sylvia MP (2010). Combretum in flora of China. Science Press, Beijing, 13: 309-316.

Sofowora A (1984). Medicinal Plants and Traditional Medicine in Africa. John Wiley and sons, New York.

Tortora GJ, Funke BR, Case CL (1992). Microbiology: An Introduction. The Benjamin/Cummings Pub. Company Inc., New York, P. 810.

Trease GE, Evans WC (1983). Pharmacognosy, 12th Edition, ELBS, pp. 57-62.