academicJournals

Vol. 7(4), pp. 128-130, April 2013
DOI: 10.5897/AJPS13.1029
ISSN 1996-0824 ©2013 AcademicJournals
http://www.academicjournals.org/AJPS

African Journal of Plant Science

Full Length Research Paper

Antibacterial activity of various extracts of *Abutilon pannosum* (Forst.f.) Schlecht. leaves

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Accepted 22 March, 2013

In our present study, we carried out the antibacterial activity of the plant *Abutilon pannosum* (Forst.f.) Schlecht., which is a cosmopolitan genus belonging to the family of Malvaceae. Different parts of this plant are in use to treat various ailments in ethnomedicine especially its leaves have been used for treating infections. We studied the anti bacterial activity of the extracts prepared from the dried leaves of *A. pannosum* (Forst.f.) Schlecht., using agar-well diffusion method against both Gram positive and negative microorganisms. Among all the extracts the ethanolic extract of the leaves showed significant (P<0.001) antibacterial activity comparable to the standard penicillin potassium and streptomycin sulphate against selected gram positive and gram negative bacteria.

Key words: *A. pannosum*, antibacterial activity, agar-well diffusion method.

INTRODUCTION

Malvaceae is a cosmopolitan family with 88 genera and more than 2300 species distributed in tropical, subtropical and temperate regions. *Abutilon* is one of the important genus of this family (Nasir and Ali, 1979). Various species of the genus *Abutilon* is used in indigenous medicines for the treatment of various ailments (Bagi et al., 1985; Rahuman et al., 2008, Land and Norton, 1973). Among this, *Abutilon pannosum,* is an under shrub and is distributed in India, Pakistan, Tropical Africa, China and Arabia. The only reference available in the literature on this species describes the presence of quercetine kaemferol and flavonoids derivative (Sharma and Ahmad, 1989; Abedin, 1980; Akiyama et al., 2001; Sammia, 2008; Gaind and Chopra, 1976). *A. pannosum* roots are medicinally used in jaundice (Hatil, 2009; Badami et al., 1976). No information in the literature was found concerning its possible antibacterial activity. However, some experiments have shown antibacterial activity on some other species of genus *Abutilon* (Robert, 1986; Muhammad et al., 2009; Arulsamy et al., 2009; Survase et al., 2012).

The present study was carried out to determine the antibacterial activity of different extracts of the leaves on Gram positive and negative micro-organisms against penicillin potassium (20 units/ml) and streptomycin sulphate (25 µg/ ml).

MATERIALS AND METHODS

Collection of plant materials

The leaves of *A. pannosum* used in this study were collected from Beed Parli Road, Beed District (M.S.) India, Accession no. 7781, voucher specimen deposited in the Department of Botany of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. The leaves were shade dried and powdered. Two hundred grams of the powder were successively extracted with different solvents and

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Table 1. Extractive values of different solvents of *A. pannosum*.

S/N	Extract	Extractive value (%) W/W
1	Petroleum ether	1.75
2	Acetone	1.86
3	Hexene	2.88
4	Methanol	5.36
5	Water	2.55

Table 2. Antibacterial activity of leaf extracts of *A. pannosum* Gram possitive organisms.

S/N	Name of organism	Agar-well diffusion (zone of Inhibition in mm)					
		Pet. ether	Acetone	Hexene	Methanol	Water	Penicillin
1	*B. subtilis*	-	10.0 ± 0.5*	11.0 ± 0.3*	23.3 ± 1.2**	12.5 ± 0.7*	24.1 ± 1.1**
2	*S. aureus*	-	13.5 ± 0.4*	10.2 ± 0.5*	19.4 ± 1.0**	19.5 ± 0.4	23.0 ± 1.0**
3	*S. leuka*	10.2 ± 0.5	9.0 ± 0.2*	7.2 ± 0.2	17.1 ± 0.6**	11.3 ± 0.4*	23.6 ± 0.9**
4	*B. megaterium*	10.8 ± 0.6	8.0 ± 0.1	11.0 ± 0.6*	20.5 ± 1.1**	13.0 ± 0.5*	22.5 ± 0.9**

Values are expressed as mean ± SEM, N= 6, *P<0.01 and **P<0.001 when compared to control.

the extractive values were calculated.

Reagents and chemicals

Standard drugs Penicillin potassium and streptomycin sulphate were collected from Government of Science Institute and Y. B. Chavan Pharmacy College, Aurangabad. Peptone, beef extract and all other chemical grade were obtained in the Department of Botany, Dr. Babasaheb Ambedkar Marathwada University, Research Laboratories, Aurangabad.

Preparation of the extracts

Different extracts of the dry powdered leaves were prepared by successive continuous hot percolation using Soxhlet extractor with different solvents like petroleum ether, acetone, Hexene, methanol and water. All the extracts were filtered and evaporated to dryness under reduced pressure and stored in the refrigerator for future use.

Evaluation of antibacterial activity

The antibacterial activity was carried out by the agar well diffusion method using Muller Hinton agar plates (Nair and Chanda, 2004, Singh et al. 1988). Petroleum ether, acetone, hexane, methanol extract and water extract were dissolved in dimethyl sulphoxide (250 mg/10 ml). Streptomycin sulphate (25 µg/ml) and penicillin potassium (20 units/ml) were used as standards for Gram positive bacteria and Gram negative bacteria, respectively. 0.1 ml of the samples was added to each cup. The zones of inhibition produced by the extracts were compared with the standards.

Statistical analysis

The results obtained were analyzed statistically using student test and any $p < 0.001$ considered significant (Mungikar, 2003).

RESULTS

The extractive values of different solvents were tabulated in Table 1. The methanolic extract of *A. pannosum* was found to produce significant (P<0.001) anti bacterial activity, than the other extracts, against the Gram positive organisms like *Bacillus subtilis, Staphylo- coccus aureus, Sarcina leuka, Bacillus megaterium* and Gram negative organisms like *Escherichia coli, Pseudomonas aeruginosa, Proteus vulgaris, Shigella sonnie,* when compared with the standard antibiotics, Penicillin potassium and Streptomycin sulphate are tabulated in Tables 2 and 3. The petroleum ether extract did not produce any significant antibacterial activity (P>0.05) when compared with standards.

DISCUSSION

The results of the agar-well diffusion method showed that the crude methanolic extracts of *A. pannosum* exhibits antimicrobial activity against the Gram positive organisms such as *B. subtilis*, *S. aureus*, *S. leuka*, *B. megaterium* and gram negative organisms *E. coli*, *P. aerugenosa*, *P. vulgaris*, *S. sonnie* with a maximum diameter of zone of inhibition ranging from 23.3 mm accompanied by ≥19.4 and 17.1, 20.5, 21.4, 20.0, 23.5 and 21.1 mm, respectively. It produced a comparable activity similar to the standard antibiotics taken for the study.

Further, this study suggests that the isolation of the

Table 3. Antibacterial activity of leaf extracts of *A. pannosum* Gram negative organisms.

S/N	Name of organism	Agar-well diffusion (zone of Inhibition in mm)					
		Pet. ether	Acetone	Hexene	Methanol	Water	Streptomycin
1	*E. coli*	-	12.2 ± 0.5*	13.5 ± 0.9*	21.4 ± 1.2**	11.0 ± 0.5*	23.0 ± 1.2**
2	*P. aerugenosa*	-	11.4 ± 0.5*	10.2 ± 0.6*	20.0 ± 1.0**	12.2 ± 0.6*	23.4 ± 1.0**
3	*P. vulgaris*	-	13.5 ± 0.5*	10.2 ± 0.4	23.5 ± 1.2**	10.3 ± 0.5*	22.5 ± 1.0**
4	*S. sonnie*	10.0 ± 0.6	11.0 ± 0.4*	11.0 ± 0.4*	21.1 ± 1.0**	10.2 ± 0.3	24.3 ± 1.2**

Values are expressed as mean ± SEM, *P<0.01 and **P<0.001 when compared to control.

active principle responsible for the activity will reveal one or more novel antibacterial agents.

ACKNOWLEDGEMENTS

The authors are thankful to the Head of Department (Botany), Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, for providing laboratory facilities. The authors are also grateful to Government of Science Institute and Y.B. Chavan Pharmacy College Aurangabad, for providing Standard drug and bacteria. Authors are also thankful to the Department of Biotechnology (DBT) New Delhi for the financial support.

REFERENCES

Abedin S (1980). *Abutilon muticum* and *Abutilon pannosum* complex. Pak. J. Bot. 12(1):43-48.

Akiyama H, Kazuyasu F, Yamasaki O, Oono T, Iwatsuki K (2001). Antibacterial action of several tannins against *Staphylococcus aureus*. J. Antimicrob. Chemother. 48:487-491.

Arulsamy EP, Boovizhikannan T, Arunkanth C, Satchidanandam SK, Murugesan K, Ramadoss K (2009). Antibacterial activity of various extracts of *Abutilon indicum* (L.) sweet leaves. J. Pharm. Res. 2(8):1324-1325.

Badami RC, Deshpanda GS, Shanbhag MR (1976). Evaluation of Antidiarrheal Potential of *Trichodesma indicum* Root. J. Oil Tech. Assoc. India 7(3):76.

Bagi MK, Kalyani GA, Denis TJ, Kumar KA, Kakrani HK (1985). A preliminary pharmacological screening of *Abutilon indicum*: II Analgesic activity. Fitoterapia 56:169-171.

Gaind KN, Chopra KS (1976). Phytochemical investigation of *Abutilon indicum*. Planta Medica p. 174.

Hatil EL-Kamali H (2009). Ethnopharmacology of medicinal plants used in North Kordofan (Western Sudan). Ethnobotanical Leaflets 13:203-210.

Land JB, Norton G (1973). Asparagine accumulation in genetically chlorotic tissue. New Phytol. 72(3):493.

Muhammad AK, Sammia Y, Mushtaq A, Mohy-ud-Din A (2009). Characterization, compositional studies, antioxidant and antibacterial activities of seeds of *Abutilon indicum* and *Abutilon muticum* grown wild in Pakistan. Acta Chim. Slov. 56:345-352.

Mungikar AM (2003). Biostatistical analysis. Saraswati Printing Press, Aurangabad.

Nair R, Chanda SV (2004). Antibacterial activity of some medicinal plants of Sourastra region. J. Tissue Res. 4:117-120.

Nasir E, Ali SI (1979). Flora of West Pakistan, Malvaceae, Department of Botany, University of Karachi, 130:69-72.

Rahuman A, Gopalakrishnan G, Venkatesan P, Geeta K (2008). Isolation and identification of mosquito larvicidal compound from *Abutilon indicum* (Linn.) sweet. Parasitol. Res. 102:981-988.

Robert JK (1986). Antimicrobial Activity of Velvetleaf (*Abutilon tbeophrasti*). Seeds Weed Sci. 34:617-622.

Sammia Y (2008). Studies on bioactive natural products of selected species of family Malvaceae. Ph. D Thesis, Department of Chemistry GC University, Lahore.

Sammia Y, Muhammad AK, Kalsoom A (2011). Screening of aerial parts of *Abutilon bidentatum* for hepatoprotective activity in rabbits. J. Med. Plants Res. 5(93):349-353.

Sharma PV, Ahmad ZA (1989). Two sesquiterpene lactones from *Abutilon indicum*. Phytochemistry 28:3525.

Singh V, Sethia M, Mathur K, Nag TN (1988). Flavonoids of some arid zone plants of Rajasthan. Indian J. Pharm. Sci. 50(2):133.

Survase SA, Jamdhade MS, Chavan ST (2012). Antibacterial activity of *Abutilon bidentatum* (Hochst.) leaves. Sci. Res. Report. 2(1):38-40.