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

Survase S. A.1*, B. P. Sarwade2 and D. P. Chavan3

1Department of Botany, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad – 431004 (M.S.) India.
2SwamiVivekanand Arts, Commerce and Science College, Mantha, Jalna, (M.S.) India.
3Department of Botany, Shrikrishan College, Umarga – 431613, Osmanabad (M.S.) India.

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

*Corresponding author. E-mail: sasurvase@gmail.com.
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 positive 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.

**Results**

The antibacterial activity of leaf extracts of A. pannosum was investigated using the agar well diffusion method. The petroleum ether extract did not exhibit any significant antibacterial activity (P>0.05) when compared to control. The methanolic extract of A. pannosum was found to produce significant (P<0.001) antibacterial activity, compared to the other extracts, against the Gram positive organisms like Bacillus subtilis, Staphylococcus 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 were 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 exhibited antimicrobial activity against the Gram positive organisms such as B. subtilis, S. aureus, S. leuka, B. megaterium and gram negative organisms E. coli, P. aeruginosa, 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

**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 reagents and chemicals were obtained from 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 sulfoxide (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 < 0.01 considered significant (Mungikar, 2003).
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.

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.

Hall 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.