Indian J.Sci.Res. 13 (2): 135-139, 2017

ISSN: 0976-2876 (Print)
ISSN: 2250-0138 (Online)

ANTIBACTERIAL ACTIVITY OF ROOT OF *Senna alata* FROM AMBIKAPUR AGAINST STANDARD MTCC STRAINS

PRANITA SHARMA[a1], M.G. ROYMON[b] AND RANJANA SHRIVASTAVA[c]

[ac]Govt. V.Y.T.PG. Autonomous College, Durg, Chhattisgarh, India
[b]Department of Microbiology & Biotechnology, St. Thomas College Bhilai, Chhattisgarh, India

ABSTRACT

Plants produce large amount of drugs comprising to different groups such as antispasmodic, anti nauseant, anti-cancer, antimicrobials etc. A huge number of the plants are claimed to acquire the antibiotic properties in the traditional system and are also used widely by the tribal people worldwide. Interest has also been highlighted to the antimicrobial properties of plants and their metabolites due to the increasing prevalence of drug resistant pathogens of clinical importance. Medicinal plants have their natural ability to resist pathogenic microorganisms and this led to investigate their mechanism of action and isolation of active compounds. Here we have selected an important medicinal plant, *Senna alata* (family Caesalpinaceae; local name, Dadmardan or Hinglaj) the root was extracted with hexane, chloroform, ethyl acetate, acetone, methanol and aqueous respectively antibacterial activity was tested against standard MTCC isolates and preliminary phytochemical screening was done. *Senna alata* is an underutilized shrub in Chhattisgarh region. This plant is known to contain various phytochemicals and possess biological activity against a number of diseases which reveals the need of future research with *Senna alata*.

KEYWORDS: *Senna alata*, Antibacterial Activity, Medicinal Plant and Phytochemical

Medicinal plants are known to be an initial line of defense against various diseases. In the recent years, there has been enduring revival of interest to use medicinal plants in developing countries. This is due to fact that herbal medicines are found to be safe without any adverse side effect as compared to synthetic drugs. Therefore, search of new drugs with better and cheaper substitutes from the plant origin are a natural choice. Some plants have shown the ability to overcome resistance in some organisms and this has led to researchers to investigate their mechanisms of action and isolation of active compounds. Particular, focus is on establishing the effect of the plant extracts in terms of their microstatic and microbicidal action and the spectrum of organisms affected. This has enabled to utilization of plants for the treatment of microbial infections and in the development of new antimicrobial agents. Since ancient times, medicinal plants have always been the principle sources of medicine in India. Herbal medicines also playing a crucial role in health care for a large part of the population living in developing countries. Present study is designed to understand antibacterial potential of eco-friendly plant *Senna alata* (Family - Fabaceae) from Ambikapur, Chhattisgarh against some bacterial strains *viz*., *Aeromonas hydrophila*, *Salmonella enteric*, *Listeria monocytogenes* and *Micrococcus luteus*.

METHODOLOGY

Collection and Identification of Plant

The plant material (*S. alata*) was collected from Ambikapur (Latitude 23.1355° N, Longitude 83.1818° E) Chhattisgarh, India. (Figure: 1). A voucher specimen has been deposited in Herbarium of BSI Allahabad, India. Collected root were cleaned, dried under shade at room temperature then grounded and stored till use (Figure 1).

Extraction of Plant Material

The dried powder material was extracted sequentially in six different solvents based on their polarity index viz., hexane, chloroform, ethyl acetate, acetone, methanol and aqueous. 15 g powdered material was extracted with 150 ml of solvents using soxhlet apparatus for 6-8 hours. The crude extract obtained was concentrated in rotary evaporator at 40°C until the solvent evaporated completely and later stored at 4°C till use.

Test Organisms

Test bacteria *viz*. *Aeromonas hydrophila* MTCC 1739, *Salmonella enteric* MTCC 3219, *Listeria monocytogenes* MTCC 1143 and *Micrococcus luteus* MTCC 7950.

Antibacterial Susceptibility Test

The antibacterial assay of the extracts was performed using agar well diffusion method (Sen and Batra, 2012). The 1000 µl of inoculum was spread on

[1]Corresponding author

Muller Hinton agar (Hi-media) plate using a sterilized swab. 6 mm well was bored in the plate and filled with 20 µl of crude test extract. The zone of inhibition was measured in mm and expressed as Mean ± Standard Error (SE).

Preliminary Phytochemical Analysis

Preliminary phytochemical test was performed for presence of alkaloid, flavanoid, quinone, saponin, tannin and terpanoid (Harborne, 1998).

ActivityIindex

This was calculated by dividing diameter of inhibition zone with extract to diameter of the zone of standard antibiotic (Usman et al., 2007).

Figure 1: *Senna alata* in field

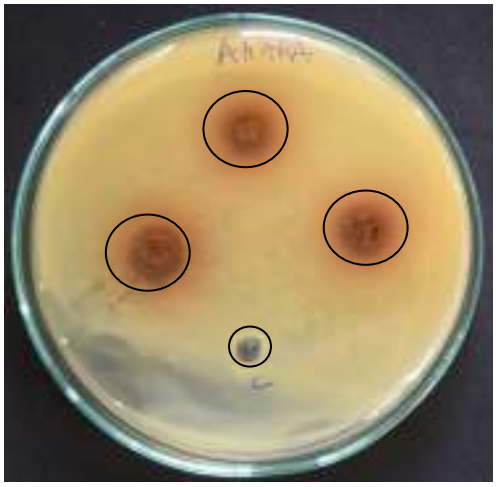

Figure 2: Zone of inhibition with acetone extract of root of *S. alata* against *A. hydrophila* MTCC 1739

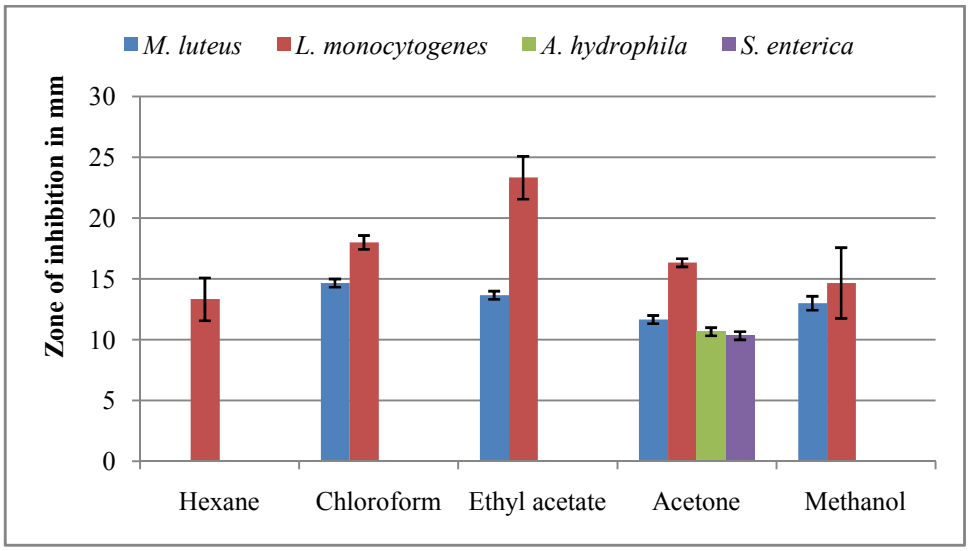

Figure 3: Antibacterial activity of *S. alata* root extracts against MTCC strains

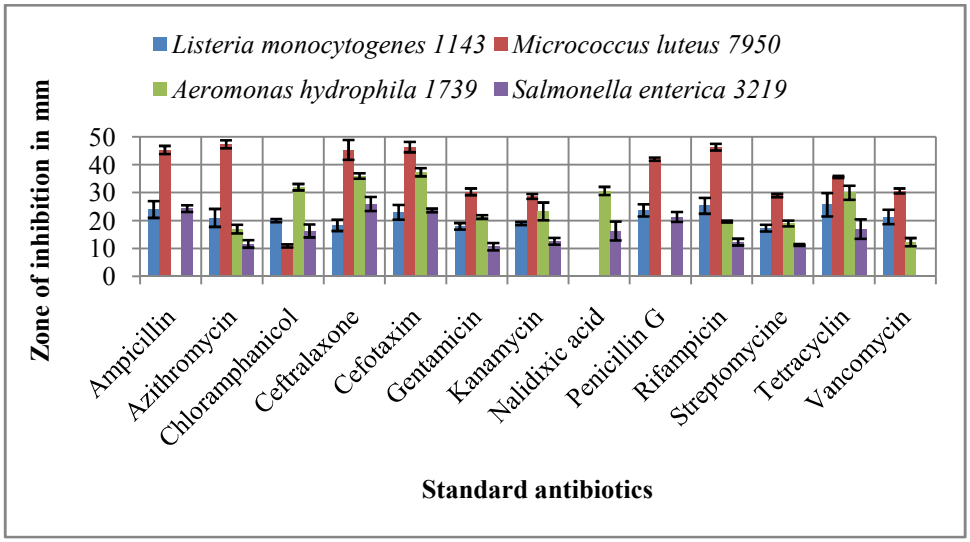

Figure 4: Antibacterial activity of standard antibiotics against MTCC strains

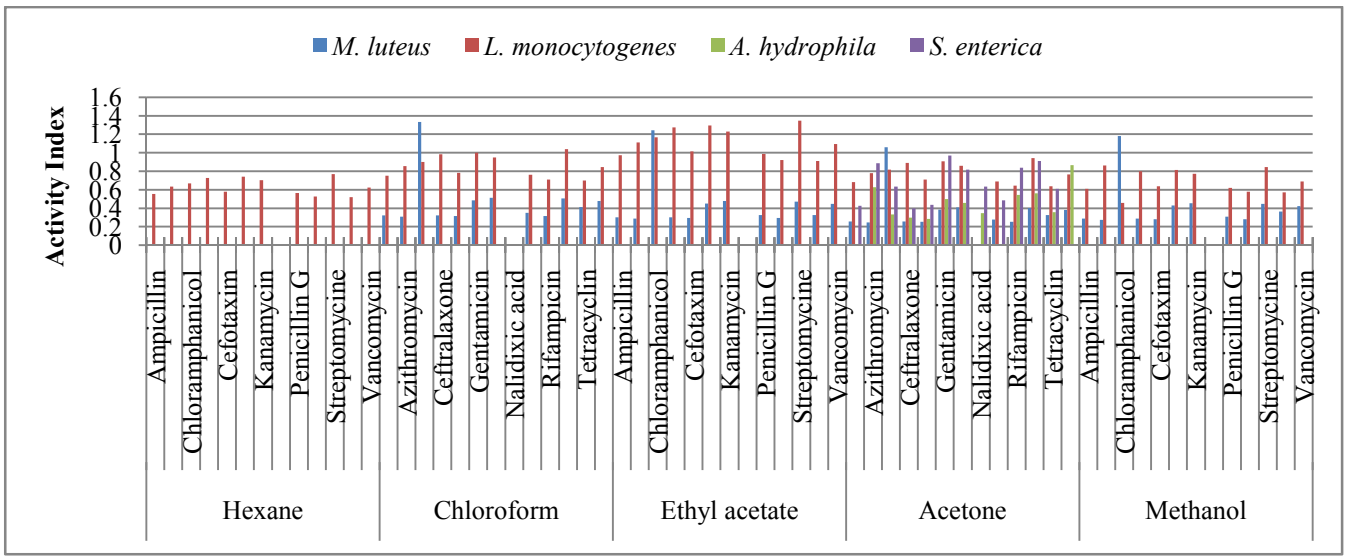

Figure 5: Activity index of *S. alata* root in various solvents against standard MTCC strains with reference to various antibiotics

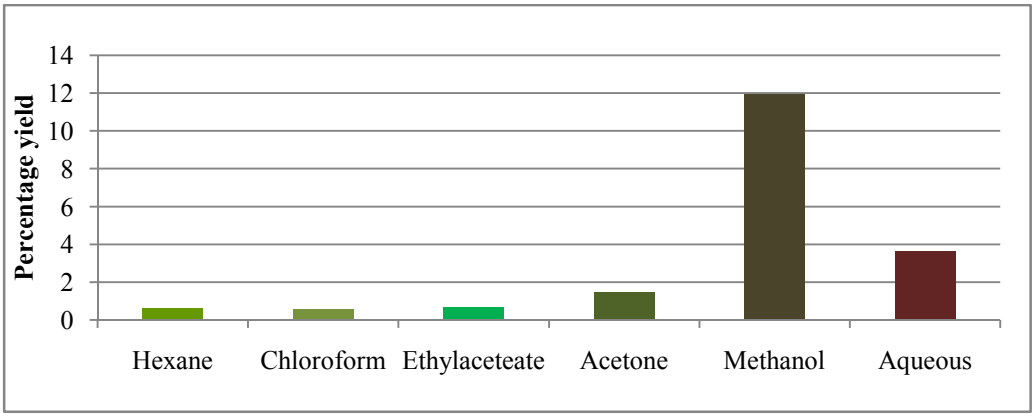

Figure 6: Yield of *S. alata* root in various solvent

RESULTS

The antibacterial activity of root ethyl acetate was highest on *L. monocytogenes* with zone of inhibition 23.3±1.7 mm and *M. luteus* with zone of inhibition 14.6±0.3 mm for root chloroform extract, while the lowest activity was observed with root acetone extract against *S. enterica* with inhibition zone 10.3±0.3 mm (Figure 2 and 3). No significant antimicrobial activity was observed in the aqueous extracts.

Antibacterial activity was also tested with standard antibiotics *viz*., ampicillin, azithromycin, chloramphanicol, ceftralaxone, cefotaxim, gentamycin, kanamycin, nalidixic acid, penicillin G, rifampicin, streptomycine, tetracyclin and vancomycin (Figure 4). The activity index for MTCC isolates was pragmatic with reference to chloramphanicol. The highest activity index was with chloroform extract of root for *M.luteus* with reference to chloramphanicol (Figure 5).

The root extracts of *S. alata* gave a total yield of 18.8% and maximum yield was obtained for methanol extract (Figure: 6). The phytochemical analysis revealed presence of several secondary metabolites *viz*., alkaloid, flavanoid, quinone, saponin, tannin and terpanoid

DISCUSSION

The results revealed that the crude extract prepared from the roots of *S. alata* with acetone had inhibitory activity against all the bacterial strains *viz*. *Aeromonas hydrophila* MTCC 1739, *Salmonella enteric* MTCC 3219, *Listeria monocytogenes* MTCC 1143 and *Micrococcus luteus* MTCC 7950 (Deepa 2014). The gram positive bacteria were more susceptible than gram negative bacteria; nalidixic acid was impotent agains *M.luteus* and *L.monocytogenes* (Nayak, 2015). The highest activity index was noted for *M.luteus* with reference to chloramphanicol and chloroform extract of root, similar findings were also reported by Khan (2009). *Senna alata* gave a total yield of 18.8% and maximum yield was obtained for methanol extract also reported by Doughari and Okafor, 2007; Tomar, *et al.,* 2009.

In *S. alata* extracts the presence of several phytochemicals such as alkaloid, flavanoid, quinone, saponin, tannin and terpanoid was detected, which might be responsible for antimicrobial activity. Damodaran and Manohar 2012, also reported for the presence of these phytochemicals in their study extracts of *S. alata* root in this study demonstrated a wide spectrum of activity against gram positive and gram negative bacteria. The broad-spectrum antibacterial activity of the plant extracts could be attributed to the presence of varied phytoconstituents in it (Mahesh and Satish, 2008).

CONCLUSION

The results indicated root of *S. alata* extracted in acetone was potent against both gram positive and gram negative bacteria and there is possibility of extracts against wider range of bacteria. Further purification of the extracts for isolation of the pure active constituents.

ACKNOWLEDGEMENT

The authors are thankful to Department of Botany Govt. VYTPG College Durg and Department of Biotechnology and Microbiology, St. Thomas College Bhilai Chhattisgarh for providing necessary research facilities.

REFERENCES

Damodaran A. and Manohar S., 2012. Qualitative screening of phytochemicals of various solvent extracts of Cassia alata Linn. Leaves. Herbal Tech Industry, **1**:11-13.

Deepa R., Manjunath H., Krishna V. and Kumar Swamy B.E., 2014. Evaluation of antimicrobial activity and antioxidant activity by electrochemical method of ethanolic extract of *Pterocarpus marsupium* Roxb bark. J. Biotechnol Biomater, **4**:1-4.

Doughari J.H. and Okafor B., 2007. Antimicrobial activity of *Senna alata* Linn. *East and Central* African Journal of Pharmaceutical Sciences. **10**: 17-21.

Harborne J.B., 1998. Phytochemical Methods. Chapman and Hall Ltd., London, **49**-188.

Khan R., 2009. Antimicrobial Activity of *Annona squamosa* L. and *Pongamia pinnata* L. against pathogen isolates from Raipur region. M. Phil. dissertation submitted to Pt. Ravishankar Shukla University, Raipur (C.G.).

Mahesh B. and Satish S., 2008. Antimicrobial Activity of some important medicinal plant against plant and human pathogens. World Journal of Agricultural Sciences, **4**: 839-843.

Nayak B.K., Mukilarasi V. and Nanda A., 2015. Antibacterial activity of leaf extract of *Cassia alata* separated by soxhlet extraction method. Scholar Research Library, **7**:254-257.

Sen A. and Batra A., 2012. Evaluation of antimicrobial activity of different solvent extracts of medicinal plant *Melia azeadrarach* Linn. International Journal of Current Pharmaceutical Research, **4**:67-73.

Tomar U.S., Daniel V., Shrivastava K., Panwar M.S. and Pant P., 2009. Comparative evaluation and antimicrobial activity of *Ocimum basilicum* Linn. (Labiatae). Journal of Global Pharma Technology, **2**:49-53.

Usman H., Musa M., Ahmadn A.A. and Tijjani M.A., 2007. Phytochemical and antimicrobial effects of *Chrozophora senegalensis*. African Journal of Traditional Complimentry and Alternative Medicines, **4**:488-494.