e-ISSN: 2455-667X

Annals of Natural Sciences
(Peer Reviewed and UGC Approved International Journal)
Vol. 4(1), March 2018: 114-117
Journal's URL: http://www.crsdindia.com/ans.html
Email: crsdindia@gmail.com

Annals of Natural Sciences

ORIGINAL ARTICLE

Evaluation of Antibacterial Potential of Different Extracts of *Moringa oleifera*

Anoop Kumar Tiwari and Madhu Prakash Srivastava
Department of Botany, Maharishi School of Science
Maharishi University of Information Technology, Lucknow (U.P.)
Email: anoop7778tiwari.tiwari@gmail.com

ABSTRACT

The antibacterial potential of different extracts of Moringa oleifera was screened against four bacteria using disc diffusion assay. Lowest concentration of the extract, which inhibits any visual microbial growth after treatment with p-iodonitrotetrazolium violet, was considered to be minimum inhibitory concentration (MIC). Methanol extract of Moringa oleifera exhibited good activity against all the bacteria tested and the MIC was recorded in range of 9.375-37.5 µg/ml.The other extracts of Moringa oleifera showed antimicrobial activity in a range of 75-1200 µg/ml.

Key words: *Antibacterial Potential, Different Extracts, Moringa oleifera*

Received: 19th Feb. 2018, Revised: 23rd Feb. 2018, Accepted: 26th Feb. 2018

How to cite this article:
Tiwari A.K. and Srivastava M.P. (2018): Evaluation of Antibacterial Potential of Different Extracts of *Moringa oleifera*. Annals of Natural Sciences, Vol. 4[1]: March, 2018: 114-117.

INTRODUCTION

The number of multi-drug resistant microbial strains and the appearance of strains with reduced susceptibility to antibiotics are continuously increasing. This increase has been attributed to indiscriminate use of broad-spectrum antibiotics, immunosuppressive agent, intravenous catheters, organ transplantation and ongoing epidemics of HIV infection (Graybill, 1988; Ng, 1994; Dean and Burchard, 1996; Gonzalez *et al*, 1996). In addition, in developing countries, synthetic drugs are not only expensive and inadequate for the treatment of diseases but also often with adulterations and side effects. Therefore, there is need to search new infection-fighting strategies to control microbial infections (Sieradzki *et al*, 1999).

A number of higher plants have been used for centuries as remedies for human diseases. This has encouraged scientists to screen higher plants for various biological activities including antibacterial and antifungal effects (Eilert *et al.,* 1980; 1981; Omer and Elnima, 2003; Saadabi, 2006; Saadabi *et al.,* 2006; 2007; 2009). The acceptance of traditional medicine as an alternate form of health care and the development of microbial resistance to the available antibiotics has led researches to investigate the antimicrobial activity of medicinal plants (Hemmer *et al.,* 1999).

*M. oleifera*tree is also known as a 'Miracle tree' as almost every part of this tree possess products useful for humans. The leaves and pods are eaten. The plant is also reported to be medicinally important and almost all parts of the *M. oleifera*tree are considered to possess medicinal properties and are used in the treatment of ascites, rheumatism and venomous bites and as cardiac and circulatory stimulant (Shindano and Kasase, 2009). Leaves are also known to have anti-oxidant properties and are known to cures hallucinations, dry tumors, hiccups and asthma (Mehta and Agrawal, 2008). The root and bark are useful in treatment of heart complaints, eye diseases, inflammation, dyspepsia,

and enlargement of spleen. The flowers are known to cure inflammations and muscle diseases. Seed oil is known to be useful in treatment of leprous ulcers Fahey (2005).
During recent years, considerable work has been done to investigate the pharmacological actions of the leaves and seeds of *Moringaoleifera* on scientific lines. But only limited work has been reported so far on antibacterial activity of *Moringaoleifera*leaves and bark.. Therefore, it was considered worthy to investigate the antibacterial activity of *Moringaoleifera*leaves bark.

MATERIALS AND METHODS

PLANT MATERIALS

For conducting the present study, the plant material was collected from different locations of Agra and Plant parts (bark) devoid of contaminant parts were carefully collected and kept in polythene bags which were then subsequently sealed. The stored specimens were thoroughly washed with tap water. They were shade dried and ground with grinder to obtain course particle.

PREPARATION OF PLANT EXTRACTS

1. **Aqueous Extract:** For aqueous extract bark powder was separately homogenized with sterile distilled water at 1:8 w/v ratio in a pestle and mortar and filtered through muslin cloth. The filtrate thus obtained was further strained through Whatman No. 1 filter paper (Zore *et al.*, 2004). The extraction was carried out at room temperature.
2. **Organic Extract**: Organic extract was prepared by Soxhlet extraction method following (Okeke *et al.*, 2001). A thimble was prepared by using a 0.5mm Whatman filter paper. About 50 gm of powder material was uniformly packed in a thimble and run in soxhlet extractor. It was run upto 48 hour or 22 cycles until the solvent in the sippon table of an extractor become colourless. After that, extracts were filtered with the help of filter paper and solvent was evaporated from extract with the help of rotary evaporator to get the syrupy consistency. The extract was then stored in refrigerator at 4ºC.

ANTIBACTERIAL SCREENING

Antibacterial activities of the extracts were determined by the microbroth dilution assay as described by Buwa and Staden (2006). The water and ethanol plant extracts were dissolved in corresponding extracting solvents at a concentration of 2400 µg/ml. Acetone extracts were also dissolved in ethanol while the other extracts were dissolved in DMSO. Proper controls were kept for each experiment. The bacterial strains used as inocula were grown at 37^{o}C to get OD 0.6 at 600 nm and used for susceptibility testing. Lowest concentration, which inhibited any visual growth, was considered to be minimum inhibitory concentration (MIC).

RESULT AND DISCUSSION

Table 1: Antimicrobial activity of *M. oleifera* methanol bark extract against different test microorganisms

Pathogens	Zone of inhibition in (mm)							
	200mg/ml	100mg/ml	50mg/ml	25mg/ml	12.5mg/ml	6.25mg/ml	3.125mg/ml	Drug
S.aureus	13.00±1.52	12.67±1.53	10.33±0.57	8.66±1.53	8.00±1.00	7.00±0.58	-	20
C.freundii	14.00±2.05	12.00±2.60	11.33±1.73	10.66±1.15	10.00±1.00	9.66±0.58	8.66±0.57	18
B.megaterium	9.66±1.52	8.67±0.58	8.00±1.00	7.00±2.00	6.67±0.58	6.33±0.57	-	18
P.fluorrescens	13.67±1.15	11.66±1.53	10.66±1.52	9.67±1.15	9.33±0.58	8.00±1.00	7.33±0.57	16

Table 2: Antimicrobial activity of *M. oleifera* aqueous bark extract against different test microorganisms

Pathogens	Zone of inhibition in (mm)							
	200mg/ml	100mg/ml	50mg/ml	25mg/ml	12.5mg/ml	6.25mg/ml	3.125mg/ml	Drug
S.aureus	9.00±1.15	8.67±0.58	7.67±1.00	7.00±0.57	6.33±0.58	-	-	17
C.freundii	11.33±0.58	10.66±1.15	9.66±0.58	8.66±1.00	8.33±1.15	7.33±0.57	-	16
B.megaterium	9.66±0.58	8.67±1.15	8.00±1.00	7.66±1.15	7.33±0.57	6.67±0.58	-	18
P.fluorrescens	9.00±1.00	8.67±0.58	8.33±0.57	8.00±1.00	7.67±0.58	7.00±1.00	7.66±0.58	13

Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the *in vitro* antibacterial activity assay (Tona *et al.*1998) Previous studies have reported that various parts of *Moringa* roots, flowers, bark, and stem including seeds possess antimicrobial properties (Lockett *et al*., 2000; Anwar and Rashid, 2007).

The various extracts of *Moringa oleifera* namely ethyl acetate, methanol, aqueous and chloroform extracts of its leaves and bark were tested against *Staphylococcus aureus, citro freundii, Bacillus megetarian, pseudomonas flouresence,* for their antibacterial activity and against *R. stlonifer* and *M.gypseum* for their antifungal activity. The extracts of methanol and water of *Moringa oleifera* leaves and bark were found to be active against all the test organisms.

Results obtained from *in vitro* antimicrobial activity of *Moringa oleifera*it was observed that the methanol extract of *Moringa oleifera* bark were found to be most active against *Citro freundii* and *pseudomonas flouresence* showing zone of inhibition up to dilution of 3.125mg/ml while it was observed that methanol extract of bark was slightly less active against *Staphylococcus aureus, Bacillus megetarian* showing zone of inhibition up to dilution of 6.25mg/ml. by Similar result was observed in the study of Rao *et al*, (2011) who investigated antibacterial activity of methanolic extract of *M.oleifera* by using well diffusion technique and reported that the most significant activity was seen against *S. aureus*, while Devi *et al*., (2011) investigate the antibacterial activity of methanolic extracts of *Moringa oleifera* bark by agar well diffusion method against *Bacillus,* and *Staphylococcus aureus* that frequently cause enteric infections in humans. The methanol extracts of *Moringa oleifera* bark, have shown strong antibacterial activity against the organisms tested.

REFERENCES

1. Anwar F. and Rashid U. (2007): Physico-chemical characteristics of *moringa oleifera* seeds and seed oil from a wild provenance ofPakistan *Pak. J. Bot*., 39 (5): 1443 - 1453.
2. Buwa L.V. and Staden J. V. (2006): Antibacterial and antifungal activity of traditional medicinal plants used against venereal diseases in South Africa. J. Ethnopharmacol. 103: 139-142.
3. Dean D.A. and Burchard K.W. (1996): Fungal infection in surgical patients. Am J Surg., 171: 374-382.
4. Devi G.S., Priya V., Abiramasundari P. and Jeyanthi P.G. (2011): Antibacterial activity of the leaves, bark, seed and flesh of *moringa oleifera. Int. J. Phar. Sci. Res.,* 2(8): 2045-2049.
5. Eilert U., Wolters B. and Nahrstedt A. (1980.): Antibiotic principles .PlantaMedica, 39(3): 235.
6. Fahey J. (2005): *Moringa oleifera*: A Review of the Medical Evidence for Its Nutritional, Therapeutic and Prophylactic Properties. Trees for Life J., 1(5): 415-430.
7. Gonzalez C.E., Venzon D., Lee S., Mueller B.U., Pizzo P.A and Walsh T.J. (1996): Risk factors for fungemia in children infected with human immunodeficiency virus: a case-control study. Clin Infect Dis., 23: 515-521.
8. Graybill J.R. (1988): Systemic fungal infections: diagnosis and treatment. I. Therapeutic agents. Infectious Disease Clinics of North America. 805-825.
9. Hammer K.A., Carson C.F. and Riley T.V. (1999): Antimicrobial activity of essential oil and other plants extracts. *J. Appl. Microbial*., 86: 985-990.
10. Mehta A. and Agrawal B. (2008): Investigation into the mechanism of action of *Moringa oleifera* for its antiasthmatic activity. *Oriental Pharmacy and Experimental Medicine,* 8(1): 24-31.
11. Ng P.C. (1994): Systemic fungal infections in neonates. Arch Dis of Childhood. 71: F130-F135.

12. Okeke M.I., Iroegbu C.U., Eze E.N., Okoli A.S. and Esimone C.O. (2001): Evaluation of extracts of the root of Londolphia owerrience for antibacterial activity. *J. Ethanopharmaco.,* 78: 119-127.

13. Omer M.E.F.A. and Elnima E.I. (2003): Antimicrobial Activity of *Imenia americana*. *Fitoterapia*, 74: 122-126.

14. Rao P.K., Rao D.B., Ravi C.K., Nadh M.R., Madhavi Y. and Rao T.R. (2011): *In-vitro* antibacterial activity of *Moringa oleifera* against dental plaque bacteria. *J. Pharmacol. Res*., 4: 3.

15. Saadabi A.M. (2007): An Evaluation of *Lawsonia inermis* Linn. (Sudanese henna) Leaf Extracts as Antimicrobial Agent. *Res. J. Biol. Sci*., 2(4): 419-423.

16. Saadabi A.M. and Ayoub S.M.H. (2009): Comparative bioactivity of *Hydnora abyssinica* A. Braun against different Groups of Fungi and Bacteria. *J. Med. Plants Res*., 3(4): 262-265.

17. Saadabi A.M., AL-Sehemi A.G. and Zailaie K.A.A.L. (2006): *In vitro* Antimicrobial Activity of Some Saudi Arabian Plants used in Folkloric Medicine. *International J. Botany,* 2(2): 201-204.

18. Saadabi A.M., Al-Sehemi A.G., Nepolean P., Anitha J. and Renitta R.E. (2009): *Current biotica.*, 3(1): 33-39.

19. Saadabi AM. (2006): Antifungal Activity of some Saudi Plants used in Traditional Medicine. *Asian J. Plant Scie.,* 5(5): 907-909.

20. Shindano J. and Kasase C. (2009): Moringa (*Moringa oleifera*): a Source of Food and Nutrition, Medicine and Industrial products. *ACS Symposium Series*, 1021: 421-467.

21. Sieradzki K., Wu S.W. and Tomasz A. (1999): Inactivation of the methicillin resistance gene mecA in vancomycin-resistant Staphylococcus aureus. Micro. Drug Resist. 5(4): 253-257.

22. Tona L., Kambu K., Ngimbi N., Cimanga K. and Vlietinck A.J. (1998): Antiamoebic and phytochemical screening of some Congolese medicinal plants. *J. Ethnopharmacol*., 61: 57-65.