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EFFECT OF *Moringa oleifera* Lam. LEAF EXTRACT ON SELECTED BACTERIAL PATHOGENS

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Key words : Antibacterial properties, *M. oleifera,* Methanolic extract, bacterial isolates.

The present investigation revealed that *Moringa oleifera* methanolic leaf extracts are found to be effective against the bacterial isolates like E. coli, *Pseudomonas aeruginosa* and *Staphylococcus aureu*s. The zone of inhibition of Tetracycline on selected bacterial isolates showed that *Pseudomonas aeruginosa* was the most-susceptible with the diameter of 20 mm, followed by S. aureus with 19 mm.

INTRODUCTION

Medicinal plants play an important role in the traditional system of medicines all over the world, especially India. India has vast and inexhaustible resources of plant based drugs. In ancient literature like "Rig-veda" and "Atharva-veda", later, the texts like "Charak Samhita" and "Sushruta Samhita" were documented in about 1000 years B.C, where use of plants and polyherbal formulations was highlighted for health multi-directional care. Over 7000 species out of an estimated 17,000 angiosperms recorded from India are reportedly used for medicinal puposes.

Moringa oleifera most widely cultivated in North Western India belongs to the family Moringaceae. It is a small, evergreen or deciduous tree and grows up to 10 to 12 m in its height, having drooping fragile branches, feathery foliage of innate leaves and thick corky, whitish bark. The plant has been recognized as containing a great number of bioactive compounds (Saini et al. 2016; Martin et al, 2013). The *Moringa* plant also provides a rich and rare combination of Kaempferom, quercetin, zeatin and many other phytochemicals. (Abalaka *et al*., 2012) The leaves which are rich in vitamins, carotenoids, polyphenols, phenolic acids, flavonoids, alkaloids, tannins, saponins and glucosinolates. (Leone et al. 2015) The aim of the present investigation was to screen out the antibacterial and phytochemical properties of *Moringa plant*.

MATERIALS AND METHODS

The fresh leaves of *M. oleifera* were collected from the tree growing in the campus of Patna Science College, Patna. The leaves were identified and confirmed by the herbarium of Botany Department of Patna Science College, Patna, where the voucher specimen was prepared and deposited. First of all, the leaves were air dried and pulverized into coarse powder and stored in a polythene bags.

Aqueous extracts - 40 grams of the powdered dry leaves was weighed and transferred into one liter beaker, 300 ml of distilled water was added to the powder and allow to stand for 48 hrs. and then heated on a water bath (60° C) and finally filtered while hot. The procedure was repeated three or more times and filtrate was then evaporated to dryness on a water bath (60° C) (Lar et al. 2011)

Methanolic extracts - The methanolic extracts were obtained by weighed 40g of leaves powder and then transferred into one litre beaker. 300 ml methanol was added to the powder and allowed to stand for 48 hrs. The residue was transferred to a soxhlet apparatus with methanol for 48 hrs and then evaporated to dryness on a waterbath. (Lar et al., 2011) The phytochemical analysis of methanol extracts and water for qualitative detection of alkaloids, flavonoids, glycoside, tannis, saponins, steroids and volatile oil.

The bacterial strains like *Escherichia coli, Pseudomonas aeruginosa* and *Staphylococcus aureus* were obtained from Microbiology Department, Patna Womens College, P.U. Patna. The antibacterial screening was carried out according to Onsare et al., (2013) with few modifications. Different agar plates of suitable media were prepared and inoculated with 0.1 ml of respective test organisms by spread plate method. Wells measuring 6.0 mm in diameter were cut out under aseptic conditions using a stainless steel borer and each well was filled with 30,60,90 and 120 mg/ml extracts respectively. The inoculated plates were allowed to congeal for 30 min to allow pre diffusion time and then incubated at 37° C for 24 hrs. The plates were examined for zone of inhibition which appear as a clear area around the holes (Cheesbrough, 2006). Sterile distilled water and methanol were used as negative control in each case. The diameter of zone of inhibition was measured by transparent meter ruler.

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RESULTS AND DISCUSSION

The *Moringa oleifera* having pharmacological effects and are also used as medications and recreational drugs (Patel et al, 2014) Flavonoids enhance the effects of vitamin C and also function as antioxidants and known to be biologically active against liver toxins, tumors, viruses and other microbes. (Korking and Afanas, 1996) Terpeniods are used for antibacterial, antineoplastic and other pharmaceutical functions. (Yamunadevi and Johnson, 2011) Tannins have shown antiviral, antibacterial and antiparasitic effects. Saponins are responsible for hemolysis of RBC. (Patel et al., 2014)

Table-1 Phytochemical screening of methanol and aqueous leaf extract of *M. oleifera*.

Solvent used	Alkaloids	Steroids	Glycoside	Flavonoids	Saponins	Tannins	Volatile oil
Methanol	+	-	+	+	+	+	+
Water	+	+	-	+	+	+	+

The inhibition of bacterial growth by different concentrations of leaves water extracts is shown in Table 3. At the highest concentration (120 mg/ml). E. coli showed 16.44 mm and *P. aeruginosa* with 13.22 mm. At 90 mg/ml, *E. coli* had 16.00 mm. At 60 mg/ml, *S. aureus* showed 11.22 mm. At 30 mg/ml E. coli had 09.22 mm and lastly *S. aureus* with 6.00 mm.

The methanol extracts showed the diameter of inhibition of bacterial growth by different concentrations of leaf of *M. oleifera* in Table-2. Highest Zone of inhibition 14.00 mm was observed in *P. aeruginosa* at the highest concentration (120 mg/ml). This was followed by *E. coli* and *S. aureus* which had 12.44 mm as lowest inhibition. At 90 mg/ml, highest inhibitory zone was observed in *P. aeruginosa* with 12.44 mm and *S. aureus* as lowest inhibition with 10.44 mm. At 60 mg/ml, *S. aureus* had 11.22 mm and the least inhibitory zone was seen in *E. coli* with 09.44 mm. At 30 mg/ml *P. aeruginosa* has the highest activity with 12.00 mm and the lower inhibitory zone was observed in *S. aureus* with 07.22 mm. The zones of inhibition of Tetracyclin on selected bacterial strains showed that P. aeruginosa was most susceptible with the diameter of 20 mm, followed by *S. aureus* with 19mm. The nature of bacterial species produce difference in response.

In water extract *E. coli* was observed to be the most susceptible bacteria which is similar to that of P. aeruginosa is least susceptible to water extract. (Mayer & Wanke, 1995).

The susceptibility of some microbial organisms to the leaf extract of M. oleifera may be a pointer to its potential as a drug that can be used. The phytochemical constituents can be further investigated and recommended in other to search for a novel herbal drug.

Table-2: Showing zone of inhibition in different concentration of methanolic leaf extracts of *Moringa oleifera*

Bacterial isolates	Methanolic extracts concentrations			
	120 mg/ml	90mg/ml	60mg/ml	30mg/ml
	Diameter of Zone of inhibition (mm)			
E. coli	14	–	9.44	–
P. aeruginosa	14	12.44	–	12
S. aureus	12.44	10.44	11.22	7.22

Table-3 Showing zone of inhibition in different concentrations of Aqueous extracts of *Moringa oleifera*

Bacterial isolates	Different concentrations of aqueous extracts			
	120 mg/ml	90mg/ml	60mg/ml	30mg/ml
	Diameter of Zone of inhibition (mm)			
E. coli	16.44	16	–	9.22
P. aeruginosa	13.22	–	–	–
S. aureus	–	–	11.22	6

REFERENCES

Abalaka ME, Daniyan SY, Oyeleke SB and Adeyemo SO. (2012) The antibacterial Evaluation of *Moringa oleifera* Leaf Extracts on Selected Bacterial Pathogens. J Microbiol Res.;2(1):1-4. Doi:10.5923/j.microbiology.20120202.01.

Cheesbrough M. (2006) District laboratory practice in tropical countries.;

Korkina LG and Afanas' Ev IB. (1996) Antioxidant and chelating properties of flavonoids. Adv Pharmacol; 38: 151-163.

Lar PM, Ojile EE, Dashe E and Oluoma JN. (2011) Antibacterial Activity on *Moringa oleifera* Seed Extracts on Some Gram Negative Bacterial Isolates. Afrian J Nat Sci.; 14:57-62.

Leone A., Spada A., Battezzati A., Schiraldi A., Aristil J. and Bertoli S. (2015) Cultivation, genetic, ethnopharmacology, phytochemistry and pharmacology of *Moringa oleifera* Leaves: An overview. Int. J. Mol. Sci.;16:12791-12835. doi: 10.3390/ijms160612791. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Martin C., Martin G. and Garcia A., Fernandez T., Hernandez E. and Puls L. (2013) Potential applications of Moringa oleifera. A critical review, Pastosy Forrajes; 36:150&158 [Google Scholar]

Mayer HB and Wanke CA. (1995) Enteroaggregative Escherichia coli as a possible cause of diarrhoea in an HIV infected patient. N Engl J Med.; 332(4):273-274.

Onsare JG, Kaur H and Arora DS. (2013) Antimicrobial activity of *Moringa oleifera* from different locations against some human pathogens. Acad J Med Plants;1(5):80-91.

Patel P, Patel N, Patel D, Desai S and Meshram D. (2014) Phytochemical Analysis and Antifungal Activity of *Moringa oleifera*. Int J Pharm Sci.; 6(5):144-147.

Saini R.K., Sivanesan I. and Keum Y.S. (2016) Phytochemicals of Moringa oleifera: A review of their nutritional, therapeuic and industrial significance, 3 Biotech; 6 doi: 10.1007/s13205-016-0526-3 [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Yamunadevi M, Eg W, Johnson M, (2011) Phytochemical studies on the terpenoids of medicinally important plant Aerva lanata L. using HPTLC. Asain Pac J Trop Biomed;1(2): S220-S225 doi:10.1016/ S2221-1691(11)60159-7.