Original Research Article **Pharmacology**

International Journal of Pharma and Bio Sciences **ISSN 0975-6299**

ANTIBACTERIAL ACTIVITY OF METHANOLIC EXTRACTS OF MORINGA CONCANENSIS NIMMO

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ABSTRACT

The aim of present investigation was to evaluate the antibacterial activity of methanolic extracts of leaves, flowers and seeds of *Moringa concanensis* Nimmo belonging to the family Moringaceae. The antibacterial activity of the extracts was studied by using pathogenic bacterial strains such as *Staphylococcus aureus* (MTCC 737) and *Escherichia coli* (MTCC 433). Using disc diffusion method, different concentration of the extracts (20, 30, 40 and 50 mg/µl) was compared with the control Streptomycin. The extracts showed potential antibacterial properties comparable with that of standard Streptomycin against the test organisms. The methanol extract of leaves and flowers of *M. concanensis* showed that higher antibacterial activity when compared to the seed extracts.

KEYWORDS: **Moringa concanensis, Streptomycin, leaves, flowers, seeds, antibacterial activity.**

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INTRODUCTION

To disease free healthy life, the medicinal plants are gift from nature to human beings[1] . In many rural areas of developing countries, the plants are the primary source of medicine for the treating human diseases. It is said that about 80% of the world population relies on the traditional medicine for the primary healthcare[2]. The medicinal plant contains some phytochemical constituents such as tannins, alkaloids which are produced in physiological action on the human body. In the recent years, the importance of medicinal plants increasing the awareness and the plant kingdom is a treasure house of potential drugs. The plants are easily available from drugs rarely side effects less expensive and safe. The selected medicinal plants are used above thousands of years constitute the more obvious choice of examining for the therapeutically effective new drugs such as anticancer drugs[3], antimicrobial drugs[4] for current antibiotics are one of the most important weapons to fight bacterial infections[5]. Many diseases are caused by many microorganisms proliferate in extreme environment and ubiquitous[6]. The human beings caused several infections by microorganisms such as *Staphylococcus aureus* (Gram positive) and *E.coli* (Gram negative). Some organisms such as *Staphylococcus aureus* causes skin infection, Pneumonia, meningitis, osteomyelitis, toxic shock syndrome (TSS), bactoraemia and sepsis. Virulent strains of *E.coli* can cause gastroenteritis, urinary tract infections and neonatalmeningitis[7]Some medicinal plants have been well documented in the past two decades, the antibacterial properties of various plant parts such as leaves, fruits and seeds[7]. The medicinal plants possess antimicrobial properties used in numerous biochemical compounds[8]. Application of these compounds are considered safe to humans and preferred over synthetic drugs as they have long been used in traditional medicine[5]. In the development of new drugs to combat problems associated with drug resistance in new and effective antimicrobials identified from plants can consequently[9]. The additional advantage of low production cost, minimal environmental damage and higher accessibility to rural communities used effective plant extracts to control human diseases[10,11,12,]. The medicinal plants are expected the alternative source of new antimicrobial products in future[8,13]. The medicinal plant of *M. concanensis* belonging to the family Moringaceae, with 13 species, Only 2 species originated in India. Locally Tamil name is Kattumurungai or Peyimurungai. It is an evergreen tree with a spreading crown up to 8 feet. The plant *M. concanensis* has used as anti-fertility agent for tribal peoples of Nilgiris region[14]. The various parts of *M. concanensis* have important bioactive compounds[15]. The *M. concanensis* plant parts are used to reduce cholesterol, and treatment of fertility in women, abortion, Eye care, leucorrhea, menstrual pain and intestinal worms, *etc*[16]. The aim of the present study was to evaluate in detail with the goal of the antibacterial activity of methanolic extracts of *M. concanensis* from leaves, flowers and seeds so as to highlights its future prospects in medicinal applications.

MATERIALS AND METHODS

Selection of plant species

The plant materials (Leaves, flowers and seeds) of *M. concanensis* were collected from the Kunnam of Perambalur District, TamilNadu. The plant materials were washed thoroughly 2-3 times with running tap water and once sterile with distilled water. Then the plant parts were shade dried, coarsely powdered separately and stored in well closed bottles for further analysis in laboratory.

Authentication of plant materials

The plant was authenticated at The Botanical Survey of India [BSI], Southern Circle, Coimbatore, India. The specimen was labelled, numbered and annotated with the date of collection and locality.

Extraction of the plant materials

The coarse powder (25g) were then subjected to extraction in 250ml of methanol solvent separately for all plant parts by using Soxhlet apparatus. The collected extracts were stored and then used for further laboratory analysis.

SCREENING OF ANTIBACTERIAL ACTIVITY

Bacterial strains

The two bacterial strains were used throughout investigation namely *Staphylococcus aureus* (MTCC 737) and *Escherichia coli* (MTCC 433). The bacterial cultures were obtained from Microbial Type Culture Collection (MTCC), Institute of Microbial Technology, Chandigarh, India. The young bacterial broth cultures were prepared before the screening procedure.

Preparation of inoculums

Stock cultures were maintained at 4^{o}C on slopes of nutrient agar. Active cultures of experiment were prepared by transferring a loopful of cells from the stock cultures to test tube of Muller-Hinton broth (MHB) for bacteria that were incubated without agitation for 24 hrs at 37^{o}C and 25^{o}C respectively. The cultures were diluted with fresh Muller-Hinton broth to achieve optical densities corresponding to 2.0 X 10^{6} colony forming units (CFU/ml) for bacteria.

Antimicrobial susceptibility test

The disc diffusion method (Bauer *et al.,)*[17] was used to screen the antimicrobial activity. *In vitro* antimicrobial activity was screened by using Muller Hinton Agar (MHA) obtained from Hi-media (Mumbai). The MHA plates were prepared by pouring 15 ml of molten media into sterile petriplates. The plates were allowed to solidify for five minutes and 0.1% inoculums suspension was swabbed uniformly and the inoculums were allowed to dry for five minutes. The extracts were done in different concentrations and were loaded on 6 mm sterile disc. The control is used as Streptomycin disc. The loaded disc was placed on the surface of medium and the extract was allowed to diffuse for five minutes and the plates were kept for incubation at 37^{o}C for 24 hrs. At the end of incubation, inhibition zones formed around the disc were measured with transparent ruler in millimetre.

RESULTS AND DISCUSSION

The antibacterial activity observed for the methanol extracts of the different plants parts (leaves, flowers and seeds) of *M. concanensis* are given in the Table- 1; Figure1,2. Based on the results, it was found that the flower and leaf extract showed the highest zone of inhibition against tested microorganisms, when compared to the seed extract followed by the flower extract which was more active against *E.coli* (8, 15, 21 and 28 mm) than *Staphylococcus aureus* (8, 14, 21 and 25 mm). The leaf extract was seen to be more active against *Staphylococcus aureus* (9, 17, 23 and 27 mm) compared with *E.coli* (7, 14, 19 and 24mm). The seed extract showed no activity against tested microorganisms in 20 µg concentration. The zone of inhibition increased with the increase in concentration. The results of the present investigation showed broad spectrum of antibacterial activity against the bacteria *E. coli* and *Staphylococcus aureus.*

Table 1

Antibacterial activity of M. concanensis leaves, flowers and seeds extracts with methanol solvent

S.no	Organisms	Control (µg/ml) (Streptomycin)	Zone of Inhibition (mm)											
			Leaves				Flowers				Seeds			
			20µg	30 µg	40 µg	50 µg	20 µg	30 µg	40 µg	50 µg	20 µg	30 µg	40 µg	50 µg
1.	Escherichia coli	17	7	14	19	24	8	15	21	28	-	9	15	19
2.	Staphylococcus aureus	22	9	17	23	27	8	14	21	25	7	14	19	24

Figure 1

Antibacterial activity of various extracts *Escherichia coli*

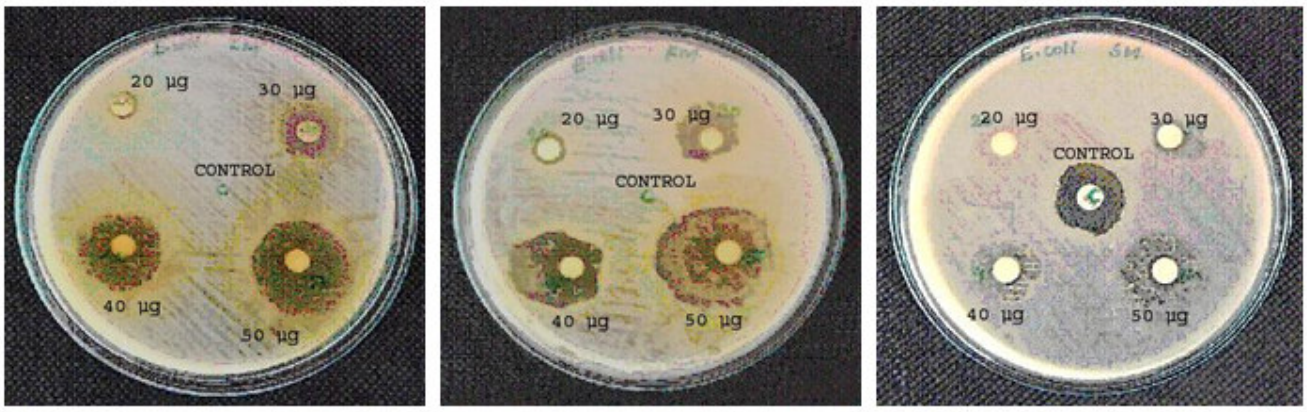
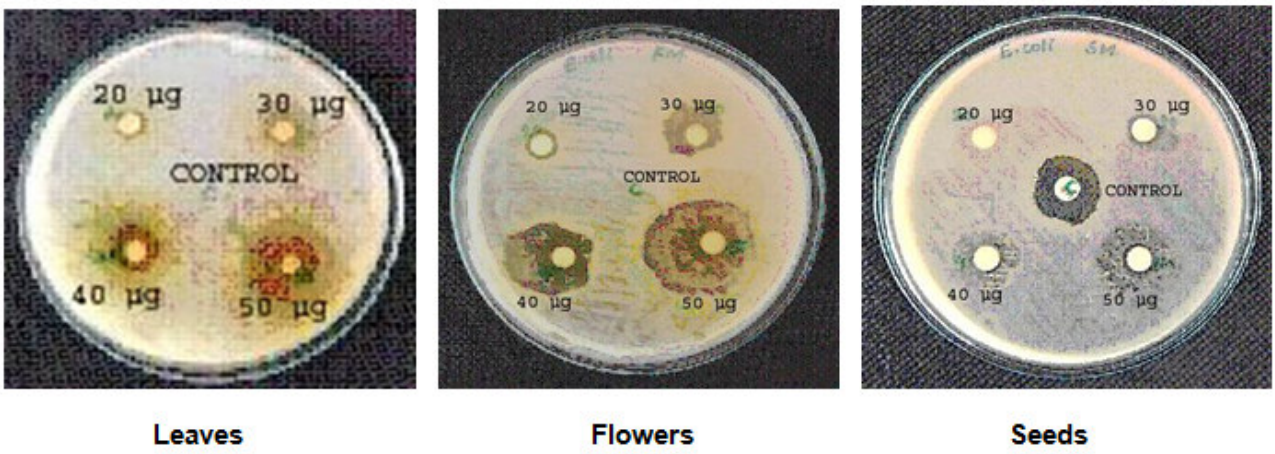


Figure 2

Antibacterial activity of various extracts against Staphylococcus aureus



Many researchers studied the effect of plant extracts on microorganisms in different parts of the world[18]. The *Ocimum sanctum* were found to be effective against *Staphylococcus aureus, Klebsiella pneumonia* and *Bacillus subtilis* in the extract of chloroform and benzene. But *E.coli* was no activity. Acetone extract of *O.sanctum* showed strong activity against *K. pneumonia* but *Staphylococcus aureus* and *Bacillus subtilis* less antibacterial activity[19]. The antimicrobial activity from the different solvent used in the bark

extract of *M. concanensis* were active against some bacterial and fungal human pathogens such as *Pseudomonas sp. Staphylococcus sp, Bacillius sp, Vibrio cholera, E.coli, Lactobacillus brevis, Lactobacillus bulgaricus, Micrococcus lutens, Proteus vulgaris, Aspergillus flavus, A. niger, Candida albicans, A. orgyzae and A. sojae*[20]. The different solvents used for the leaf extracts of *M. concanensis* were actively against different bacterial and fungal strains[14]. The antimicrobial potentiality of some oxalidaceae members used the different concentrations (25, 12.5, 6.25 and 1.56 mg/ml) of 80% ethanol extracts *Oxalis corniculata* were tested by the agar dilution method against bacteria viz, *Bacillus subtilis, Staphylococcus aureus, E. coli* and *Pseudomonas aeruginosa*. Methanolic and ethanolic extracts of *O. corniculata* the antibacterial activity of against *Xanthomonas* and fourteen human pathogenic bacteria. A great infection therapy of the discovery of a potent remedy from plant origin [21] . The antibacterial properties of medicinal plants may be due to the presence of different chemical agents of bioactive compounds[22].The results of that present investigation highlights that the antibacterial potentiality of the extracts of *M. concanensis*. Further studies are required to isolate the types of compounds responsible for the antibacterial effects. This study encourages the use of the extracts demonstrating that traditional medicine can be used as effective modern medicine against pathogenic microorganisms.

CONCLUSION

From the present study, it can be concluded that methanolic extracts of leaves and flowers *M. concanensis* have higher antibacterial activity than the seed extract. It is, therefore, suggested that these extracts can be used in the treatment of an infectious disease caused by those bacteria against which the extracts showed significant activity. Thus the plant can be used as an antibacterial agent and may serve as leads for the pharmaceuticals industries.

ACKNOWLEDGEMENT

We acknowledge, The Head Dept. of Botany, The Principal, Arignar Anna Government Arts College, Namakkal, for providing necessary laboratory facilities to carry out the work.

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