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A COMPARATIVE STUDY ON THE EFFECT OF HERBAL EXTRACTS AND ANTIBIOTICS ON ENTERIC PATHOGENS

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ABSTRACT

In the present study antimicrobial activity of crude Curry (*Murraya Koenigi*) leaves extract observed in comparison with Standard antibiotics Cholistin, Erythromycein, Ciprofloxin, Methicillin, Ampicillin and Cephalosporin. In this study, the antimicrobial efficacy of crude Curry leaves extract was examined and tested against following bacterial cultures those were *Salmonella typhi* (4 strains), *Shigella dysenteriae* (7 strains), *Shigella flexinary* (6 strains), *E.coli* (4 strains), *Enterobactor spp.* (4 strains) and *Salmonella paratyphi B* (7 strains). Antimicrobial analysis was done by using agar well diffusion method against selected enteric pathogens. Curry leaves extract showed highest antimicrobial activity against *Salmonella typhi* strain I (ZOI- 16mm), *Shigella dysenteriae* strain VI (ZOI- 19mm), *Shigella flexinary* strain I (ZOI- 16mm), *E.coli* strain III (ZOI- 18mm), *Enterobactor spp.* strain IV (ZOI- 20mm) and *Salmonella paratyphi B* strain IV (ZOI- 19mm). *Salmonella typhi* strain IV showed no ZOI with Curry leaves extract but this strain was observed sensitive to antibiotic Ciprofloxin (ZOI- 15mm). *Shigella flexinary* strain III showed no ZOI with Curry leaves extract but this strain was observed sensitive to antibiotic Ampicillin (ZOI- 11mm). The results suggested that the crude Curry leaves extract has significant antibacterial activity against tested microorganisms as compared to standard antibiotics. The results of this study showed that some pathogenic enteric bacteria were observed resistant to standard antibiotics but they were sensitive to the studied crude Curry leaves extract. The results of the present study also support the medicinal usage of the Curry leaves.

KEYWORDS: Curry (*Murraya koenigi*), Antimicrobial activity, Enteric pathogens, Standard antibiotics etc.

INTRODUCTION

Scientific curiosity in medicinal plants has burgeoned due to an increased competence of new plant derived drugs, increasing interest in natural products and growing concerns about the side effects of conventional medicine. The use of diverse herbal remedies and preparations are described throughout human history representing the origin of modern medicine. Several conventional drugs derived from plant sources. It is expected that around 80% of the world population uses herbal medicines, mainly as self described products.

Recently, the use of medicinal plants increased considerably. A wide variety of native and minor crops have been utilized for daily expenditure since ancient times. In order to explain such a phenomenon, as well as seek highly effective plants, a number of plant extracts and isolated compounds have been tested for their bioactivity by various *in vitro* model systems. Information on the biological functions and active constituents of each plant species may contribute to the development of food habits and public health in tropical countries.

In addition, it is estimated that the wide use and extension in the consumption of such local agricultural products would increase and stabilize the income of farmers in the rural areas. Some medicinal plants have been used for a broad variety of purposes such as food conservation, pharmaceutical, alternative medicine, and natural therapies for many thousands of years. It is usually considered that compounds produced naturally, rather than synthetically, will be biodegraded more easily and therefore be more environmentally acceptable.

Herbal medicine is also called botanical medicine or phytomedicine, and is defined as the use of whole plant or parts of plants to avoid or treat illness. Herbal medicines appear comparatively safe but there is limited human research or perception data concerning undesirable effect and herbal drug interaction. They are commonly less potent than their pure drug relatives because they contain mixture of numerous chemicals in small quantities. Plants also have considerable prospective for the production of biopharmaceutical proteins and peptides. As the demand for biopharmaceutical is estimated to increase, it would be sensible to ensure that they will be accessible in considerably larger amounts on a cost effective basis.

Presently the cost of biopharmaceuticals limits their accessibility. Plant resulting biopharmaceuticals are cheap to create and store, simple to scale up for mass production and safer than that resulting from animals and microorganisms. Use of a variety of antibiotics

may lead to improvement of drug resistance which is an enormously serious public health problem and much of the difficulty arises from drug misuse. Due to the different problems encountered with the handling of infections and treatment with antibiotics there is a usage for the antimicrobial compounds of natural property.

Despite the use of synthetic drugs, much importance is being given on herbal medicines because of their ready accessibility and minimal side effects. Crude drugs in many cases are found to be more effective than the pure drugs, the reason being due to the synergistic action of the other components present which not only increase the biological activity of the drug but simultaneously lowers the toxic effect. Till now, the conventional herbal drugs remain the major source of health care for more than two thirds of the world's population. A range of bioactive compounds that are present in different parts of a plant has spurred an improved interest in developing an alternate remedy.

The progress of multiple antibiotic resistance organisms has constituted a worldwide problem as far as treatment of some infectious diseases is concerned. Infectious disease still remains a significant cause of morbidity and mortality in man, especially in developing countries. Microorganisms have developed resistance to several antibiotics and this has produced immense clinical problem in the management of infectious diseases.[1] Development in resistance of microorganisms due to indiscriminate use of antimicrobial drugs forced scientists to search for new antimicrobial substances from various sources including medicinal plants.[2]

An additional motivating factor for the renewed interest in past 20 years has been the fast rate of plant species extinction. Curry (*Murraya koenigi*), a member of the family Rutaceae, is a deciduous to semi-evergreen aromatic tree found throughout India. Traditionally, it is used as an analgesic, febrifuge, stomachic, carminative and for the treatment of dysentery and skin eruptions.[3, 4] Curry leaf is commonly used as spice due to aromatic nature of leaves. Carbazole alkaloids, the major constituents of the plants are known to possess cytotoxic, antioxidative, antimutagenic and anti-inflammatory activities.[5, 6]

It is interesting to note that crude organic extracts of leaves of *Murraya koenigii* have been screened for some pharmacological activities and found to possess anti-diabetic, cholesterol reducing property, anti diarrhea-activity, cytotoxic activity, antioxidant property, antiulcer activity, antimicrobial and antibacterial potential.

The leaves are rich in mono-terpenoids and ses-quiterpenoids which exhibited antifungal activities. [7] Minor furano-coumarins are also reported from seeds. [8] In the present investigation, an attempt has been made to investigate antimicrobial screening of crude Curry leaves extract in comparison with standard antibiotics. Plants have been used empirically long before the concept and recognition of etiological infectious agents had been developed. Indian Medicinal plants and their products are used to manage diverse diseases such as bronchitis, pneumonia, ulcers, liver diseases and diarrhea. Hence additional studies pertaining to the use of plants as therapeutic agents should be emphasized; particularly those related to the control of antibiotic resistant microbes. The objective of this study is to evaluate and compare the potential of the crude Curry leaves extract on selected enteric pathogenic bacterial strains against the standard antibiotics.

MATERIALS AND METHODS

Collection of Plant Material

Healthy disease free, indigenously grown mature leaves of Curry was purchased from local market of Solapur (M.S.). The identification of plant material was confirmed by a Botanist in the Dept. of Botany, Walchand College of Arts and Science, Solapur (M.S.).

Test Pathogens

Various strains of Enteric pathogenic bacterial cultures were used in this study. Those were *Salmonella typhi* (4 strains), *Shigella dysenteriae* (7 strains), *Shigella flexinary* (6 strains), *E.coli* (4 strains), *Enterobactor spp.* (4 strains) and *Salmonella paratyphi B* (7 strains). The pure pathogenic bacterial strains were collected from Dept. of Microbiology, V.M. Govt. Medical College, Solapur (M.S.) and Ashwini Sahakari Rugnalaya NYT. And research centre, Solapur (M.S.). The cultures were isolated and identified by using standard biochemical tests. The cultures were maintained on nutrient agar slants at 4^0C and sub cultured for 24hr. before use.

Preparation of Leaves Extracts

Thoroughly washed mature leaves of Curry plants were shade dried and then powdered with the help of electric blender. Twenty five gram powder was put into boiling water and allowed to settle for 2hr. After settling the extract was collected and preserved at 5^0C in airtight bottle until further use.

Antibacterial Activity Assay

Antimicrobial activity of the Curry leaves extract was determined by agar well diffusion method on Muller- Hinton agar medium. [9] Cups are made on Muller- Hinton agar plates using cork borer and inoculum containing 10^6 CFU/ml of pathogenic bacteria were spread on the solid plate with the help of sterile glass rod. Then 100ul of crude curry leaves extract was placed in the cups made in inoculated plates. All the plates were incubated for 24hr. at 37^0C.and after incubation period zone of inhibition was measured in mm. Antimicrobial activity of Standard antibiotics Cholistin, Erythromycein, Ciprofloxin, Methicillin, Ampicillin and Cephalosporin were also observed in comparison with Curry leaves extract.

STATISTICAL ANALYSIS

The resultant clear zones around the well were measured in mm. The antibacterial activity of crude Curry leaves extract was indicated by clear zones of growth inhibition. Three replicates were maintained for each treatment. Each value represents mean of three different observations ± S.D. The data were subjected to statistical analysis as per the method of Gomez and Gomez.[10]

RESULTS AND DISCUSSION

In the present study significant antibacterial activity is observed by crude Curry leaves extract. The antimicrobial activities of Curry leaves extract was represented in table 1. Curry leaves extract showed highest antimicrobial activity against *Salmonella typhi* strain I (ZOI- 16mm), *Shigella dysenteriae* strain VI (ZOI- 19mm), *Shigella flexinary* strain I (ZOI- 16mm), *E.coli* strain III (ZOI- 18mm), *Enterobactor spp.* strain IV (ZOI- 20mm) and *Salmonella paratyphi B* strain IV (ZOI- 19mm).

Salmonella typhi strain IV showed no ZOI with Curry leaves extract but this strain was observed sensitive to antibiotic Ciprofloxin (ZOI- 15mm). Rests of all strains were observed resistant to all tested antibiotics. *Shigella dysenteriae* strain II and strain V showed no ZOI with Curry leaves extract i.e. resistant to Curry leaves extract. Rests of all strains of *Shigella dysenteriae* were also observed resistant to all tested antibiotics. *Shigella flexinary* strain III showed no ZOI with Curry leaves extract but this strain was observed sensitive to antibiotic Ampicillin (ZOI- 11mm). Rests of all strains were observed resistant to all tested antibiotics. *E.coli* strain II showed no ZOI with Curry leaves extract i.e. resistant to Curry leaves extract. Rests of all strains of *E.coli* were also observed resistant to all tested antibiotics. *Enterobactor spp.* strain II and III showed no ZOI with Curry leaves extract i.e. resistant to

Curry leaves extract. Rests of all strains of *Enterobactor spp.* were also observed resistant to all tested antibiotics. *Salmonella paratyphi B* strain I and VII showed no ZOI with Curry leaves extract but strains I was observed sensitive to antibiotics Ciprofloxin (ZOI- 14mm), Ampicillin (ZOI- 16mm) and strain VII sensitive to antibiotics Ciprofloxin (ZOI- 13mm), Ampicillin (ZOI- 15mm).

Systematic screening of literature available on Curry (*Murraya koenigii*) depicted the fact that it is a popular remedy among the various ethnic groups Vaidyas, Hakims and Ayurvedic practitioners for cure of variety of ailments. Following the traditional and folk claims, very little efforts have been made by the researchers to explore the therapeutic potential of this plant.

Table 1: Antimicrobial Activity of Crude Curry Leaves Extract.

M/O	Strains with ZOI in mm (Mean ± SD)						
	I	II	III	IV	V	VI	VII
Sal.typhi	16 ± 0.75	12 ± 0.62	14 ± 0.34	00®	-	-	-
Shigella dysenteriae	14 ± 0.70	00®	15 ± 0.62	18 ± 0.85	00®	19 ± 0.26	18 ± 0.65
Shigella flexinary	16 ± 0.30	15 ± 0.79	00®	14 ± 0.34	15 ± 0.10	00®	-
E.coli	14 ± 0.26	00®	18 ± 0.34	16 ± 0.25	-	-	-
Enterobactor spp.	18 ± 0.65	00®	00®	20 ± 0.79	-	-	-
Sal.para.B	00®	16 ± 0.30	17 ± 0.48	19 ± 0.26	15 ± 0.52	17 ± 0.62	00®

(®- Resistant Strain, - = No Strains).

CONCLUSION

The continuous spread of multidrug-resistant pathogens has become a serious hazard to public health and a major concern for infection control to the practitioners worldwide. However, overuse of antibiotics has become the major factor for the emergence and dissemination of multi-drug resistant strains of several groups of microorganisms including enteropathogens. Still a large segment of population in the world relies upon traditional system of medicine. Therefore there is an urgent need for improved management and investigation of those plants which will be effective against multidrug-resistant pathogens. The present study suggested that, the crude Curry leaves extract has a great potential as antimicrobial agent against selected enteric pathogens in comparison with selected standard antibiotics and can be used as an alternative medicine in the treatment of enteric disorders. The antimicrobial activity assays showed promising evidence for the antimicrobial activity of

Curry leaves extract against selected enteric pathogens. Therefore, the Curry leaves extract could be seen as a good source for useful drugs.

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