STUDIES ON EFFICACY OF DRUMSTICK LEAVES EXTRACT AND ANTIBIOTICS AGAINST ENTERIC PATHOGENS

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ABSTRACT
In the present work we evaluated the antibacterial activity of crude Drumstick (Moringa oleifera) leaves extract in comparison with Standard antibiotics Cholistin, Erythromycin, Ciprofloxin, Methicillin, Ampicillin and Cephalosporin. For the present study following bacterial cultures were used those were Salmonella typhi (5 strains), E.coli (6 strains), Salmonella paratyphi A (4 strains), Salmonella paratyphi B (5 strains), Shigella flexinary (3 strains) and Shigella dysenteriae (4 strains). Drumstick leaves extract showed highest antibacterial activity against Salmonella typhi strain IV (ZOI-16mm), E.coli strain I and VI (ZOI-15mm), Salmonella paratyphi A strain I and IV (ZOI-14mm), Salmonella paratyphi B strain III (ZOI-18mm), Shigella flexinary strain I (ZOI-17mm), Shigella dysenteriae strain I (ZOI-15mm). Salmonella typhi strain V was observed sensitive to antibiotic Ciprofloxin (ZOI-15mm). Salmonella paratyphi B strain IV showed no ZOI with Drumstick leaves extract but this strain was observed sensitive to antibiotic Ampicillin (ZOI-15mm). Shigella flexinary strain II was observed sensitive to antibiotic Ampicillin (ZOI-14mm) and Erythromycin (ZOI-17mm). Shigella dysenteriae strain III was observed sensitive to antibiotic Cholistin (ZOI-16mm) and Cephalosporin (ZOI-15mm). The results of this study showed that some pathogenic enteric bacteria were observed resistant to standard antibiotics but they were observed sensitive to the crude Drumstick leaves extract. The results of the present study also support the medicinal usage of the Drumstick leaves.

KEYWORDS: Drumstick (Moringa oleifera), Antimicrobial activity, Enteric pathogens, Standard antibiotics etc.

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INTRODUCTION

Medicinal plants have been used for centuries as remedies for human diseases because they contain components of therapeutic importance. These plants are economical and renewable sources of pharmacologically-active substances and are recognized to produce certain chemicals that are naturally toxic to bacteria. The increase in antibiotic resistant bacteria is largely due to the extensive use of antibiotics in medicine, in animal care and in agriculture. The difficulty is compounded by the lack of new antibiotics to attack bacteria in different ways to avoid the resistant genes. Decreasing effectiveness and resistance of pathogens to antimicrobial drugs made the search of a new antimicrobial agent an important strategy for the organization of substitute therapies in difficult handling infections.

Despite the use of synthetic drugs, much importance is being given on Phytomedicines because of their ease of access 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 effect of the other components present which not only increase the bioactivity of the drug but at the same time 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.

Medicinal plants are necessary part of human society since the civilization started. Medicinal plants are the boon of nature to treat a number of ailments of human beings. In many parts of the world medicinal plants are used against bacterial, viral and fungal infections. Estimation of plants bearing effectiveness in curing various diseases is growing in recent years. The demand for herbal products is caused by population enhance, poverty, increasing awareness of herbal products, high price of modern medicine and limited access to trained doctors. The nature of medicinal plants and parts vary from one locality to another and their use depends on the local native information and knowledge present over countries. Recent research has paying attention on the natural plant products alternatively for disease control and treatment. Medicinal plants are cheaper, more accessible to the majority of the population in the world. Thus, there is need to encourage the use of medicinal plants as potential sources of new drugs.

There has been as highly increased curiosity for herbal remedies in numerous parts of the world. Since from the beginning of this century, there has been a growing attention in the
study of medicinal plants and their conventional use in different parts of the world. With the chemically synthesized drugs for number of diseases, natural products of plant source has its own significance and has maintained the most vital reserve for developing new drugs to treat a range of diseases. Medicinal plants are part and parcel of human society to fight diseases from the dawn of civilization. Plant extracts or bioactive herbal compounds have been reported scientifically for their biological actions. Phytochemicals may protect human from a host of diseases. They are non-nutritive plant chemicals that have defensive or disease preventive properties.

Plants are a wealthy source of secondary metabolites with attractive biological actions. In general, these secondary metabolites are a key source with a range of structural arrangements and properties.\[1\] Natural products from microbial sources have been the principal resource of antibiotics, but with the increasing recognition of herbal medicine as an alternative form of health care, the screening of medicinal plants for active compounds has become very important because these may provide as talented sources of book antibiotic prototypes.\[2\] It has been shown that in vitro screening methods could provide the required preliminary observations essential to select crude plant extracts with potentially useful properties for additional chemical and pharmacological investigations.\[3\]

Drumstick is a growing fast, drought-tolerant, and must be cut back several times to make it branch out more. It will readily sprout again and all the valuable products will remain within safe. It seems to thrive in impossible places and never dies. It can be developed easily from seeds or cuttings, compost or manure are not necessary. It can be densely seeded with high yielding. The light shade of the tree is a considerable help to most vegetables. Flowering can be induced through small watering to have a nearly continuous yield. Different parts of this plant contain a sketch of important minerals, and are a good source of protein, various phenolics, vitamins, β – carotene and amino acids.

The Drumstick plant offers a rich and exceptional combination of zeatin, kaempferom, quercetin and many other phytochemicals. It is very significant for its medicinal value. Numerous parts of the plant such as the roots, seed, bark, leaves, fruit, and immature pods, flowers act as cardiac and circulatory drugs, antipyretic, antiulcer, anti-inflammatory, antiepileptic. Other chief medicinal properties of the plant include antispasmodic, diuretic, antihypertensive, cholesterol lowering, hepatoprotective, antioxidant, antidiabetic,
antibacterial and antifungal activities. Drumstick parts are being employed for the treatment of different ailments in the indigenous system of medicine, particularly in South Asia.

Drumstick (*Moringa oleifera*) is native to the western and sub Himalayan region, India, Pakistan, Asia Minor, Africa and Arabia. The Drumstick tree is cultivated and used as a vegetable (leaves, pods flowers, roasted seeds), for spice (mainly roots), cooking and cosmetics oil (seeds) and as a medicinal plant (all plant organs). Important medicinal properties of the plant include antipyretic, antiepileptic, antiinflammatory, antiulcerative antihypertensive, cholesterol lowering, and antioxidant. In addition, Drumstick seed possesses water purifying powers. Drumstick is a highly valued plant, distributed in many countries of the tropics and subtropics. It has impressive range of medicinal uses with high nutritional value. Different parts of this plant contain a profile of important minerals, and a good source of protein, vitamin, â carotene, amino acids and various phenolics.

**MATERIALS AND METHODS**

**Collection of Plant Material**

Healthy disease free, indigenously grown mature leaves of Drumstick was collected from local area 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* (5 strains), *E.coli* (6 strains), *Salmonella paratyphi A* (4 strains), *Salmonella paratyphi B* (5 strains), *Shigella flexinary* (3 strains) and *Shigella dysenteriae* (4 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°C and subcultured for 24hr. before use.

**Preparation of Leaves Extracts**

Thoroughly washed mature leaves of Drumstick 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°C in airtight bottle until further use.
Antibacterial Activity Assay

Antimicrobial activity of the Drumstick leaves extract was determined by agar well diffusion method on Muller- Hinton agar medium.\(^ {13}\) 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 Drumstick leaves extract was placed in the cups made in inoculated plates. All the plates were incubated for 24hr. at 37\(^0\)C. and after incubation period zone of inhibition was measured in mm. Antimicrobial activity of Standard antibiotics Cholistin, Erythromycein, Ciprofloxin, Methicillin, Ampicillin and Cephalosporin was also observed in comparison with Drumstick leaves extract.

STATISTICAL ANALYSIS

The resultant clear zones around the well were measured in mm. The antibacterial activity of crude Drumstick 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.\(^ {14}\)

RESULTS AND DISCUSSION

In the present study significant antibacterial activity is observed by crude Drumstick leaves extract. The antimicrobial activities of Drumstick leaves extract was represented in table 1. Drumstick leaves extract showed highest antibacterial activity against Salmonella typhi strain IV (ZOI- 16mm), E.coli strain I and VI (ZOI- 15mm), Salmonella paratyphi A strain I and IV (ZOI-14mm), Salmonella paratyphi B strain III (ZOI- 18mm), Shigella flexinary strain I (ZOI- 17mm), Shigella dysenteriae strain I (ZOI- 15mm).

Salmonella typhi strain V was observed sensitive to antibiotic Ciprofloxin (ZOI- 13mm), Erythromycein (ZOI- 12mm) and Ampicillin (ZOI- 14mm). Rests of all strains were observed resistant to all tested antibiotics. E.coli strain III showed no ZOI with Drumstick leaves extract while all strains of E.coli were observed resistant to all tested antibiotics. Salmonella paratyphi A strain II showed no ZOI with Drumstick leaves extract but this strain was observed sensitive to antibiotic Ampicillin (ZOI- 15mm) and Ciprofloxin (ZOI- 17mm). Rest of all strains was observed resistant to all tested antibiotics.
Salmonella paratyphi B strain IV showed no ZOI with Drumstick leaves extract but this strain was observed sensitive to antibiotic Ampicillin (ZOI- 15mm). Rest of all strains was observed resistant to all tested antibiotics. Shigella flexinary strain II was observed sensitive to antibiotic Ampicillin (ZOI- 14mm) and Erythromycin (ZOI- 17mm). Rest of all strains was observed resistant to all tested antibiotics. Shigella dysenteriae strain III was observed sensitive to antibiotic Cholostin (ZOI- 16mm) and Cephalosporin (ZOI- 15mm). Rest of all strains was observed resistant to all tested antibiotics.

The results obtained in this study suggest that the crude Drumstick leaves extract can be used as potential source of drugs in the treatment or control of intestinal disorders. Various medicinal plants are valuable and resources for primary health care and complementary healthcare system. Undoubtedly medicinal plants containing substances of medicinal value that has yet to be discovered, though large numbers of plants are constantly being screened for their antimicrobial activity. These plants may prove to be a rich source of compounds with possible antimicrobial activities.

Due to several intricacies of modern antibiotics, there has been a significant shift towards alternative therapy and herbal remedies. Antibiotic screening on natural products obtained from Drumstick used in the Complementary and Alternative Medicine is a major thrust of research and development. Therefore, in a bid to discover new antimicrobials that would be effective against enteric pathogens, the antibacterial profile of the crude Drumstick leaves extract was carried out in comparison with some standard antibiotics.

Table 1: Antimicrobial Activity of Crude Drumstick Leaves Extract.

<table>
<thead>
<tr>
<th>M/O</th>
<th>Strains with ZOI in mm (Mean ± SD)</th>
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<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>Sal. typhi</td>
<td>12 ± 0.17</td>
</tr>
<tr>
<td>E. coli</td>
<td>15 ± 0.72</td>
</tr>
<tr>
<td>Sal. para.A</td>
<td>14 ± 0.43</td>
</tr>
<tr>
<td>Sal. para.B</td>
<td>15 ± 0.62</td>
</tr>
<tr>
<td>Shigella flexinary</td>
<td>17 ± 0.36</td>
</tr>
<tr>
<td>Shigella dysenteriae</td>
<td>15 ± 0.36</td>
</tr>
</tbody>
</table>

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

CONCLUSION

Recently, different reports were published showing the antimicrobial activities of medicinal plants. It is essential to explore those plants scientifically which have been used in traditional
medicine to improve the quality of health care. Medicinal plants are significant 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 [15] which has reported earlier. [16] The present study suggested that, the crude Drumstick 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 Drumstick leaves extract against selected enteric pathogens. Therefore, the Drumstick leaves extract could be seen as a good source for useful drugs.

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**REFERENCES**


