Short Communication

Antibacterial effects of Averrhoa Bilimbi L. Fruit Extracts

Chinju Merin Abraham
Department of Botany, Catholicate College, Pathanamthitta, 689 645, Kerala, India
chinjujoby@gmail.com

Available online at: www.isca.in, www.isca.me
Received 4th July 2016, revised 22nd July 2016, accepted 8th August 2016

Abstract

A. bilimbi methanol, chloroform and petroleum ether fruit extracts were tested against selected panel of bacteria. Different concentrations of the extract (50mg, 100mg, and 150mg) in each solvent were loaded on 0.4mm sterile discs. The tested gram positive bacteria were more sensitive to the extract when compared to the gram negative bacteria tested. It is well evident that A. bilimbi fruit extract showed applaudable inhibitory activity against the tested pathogens. Further research in this direction is recommended.

Keywords: Averrhoa Bilimbi, Antimicrobial, Gram Positive Bacteria, Gram Negative Bacteria.

Introduction

Averrhoa bilimbi L. (Family: Oxalidaceae) is a small sized plant which is medicinally used as a curative for many diseases from time immemorial. Various medicinal attributes of the plant against diabetes, bacterial and fungal diseases, inflammation, cancer, nutraceutical and anti-scrotal activities are well documented1,2. The use bilimbi for the treatment of various types of fevers, healing blisters and pimples, anal disorders, boils, arthritis, intestinal disorders, cough and cold, hypertension and as a soft drink by traditional healers under folk medicine was recorded from almost parts of the world3. However, antibacterial studies with Gram Positive and Gram negative bacteria are rather meager and hence the present study.

Materials and Methods

Plant material: Fresh bilimbi fruits were collected from Central Travancore region and the collected fruits were washed under running tap water followed by distilled water, dried and powdered.


Bacterial Strains: Gram positive (Staphylococcus aureus and Bacillus subtilis) and Gram negative bacteria (Klebsiella pneumonia and Serratia marcescens) were used which are opportunist pathogens.

Preparation of Plant Extract: Powdered fruit samples were extracted by soxhlet extraction method with solvents such as Petroleum ether, Chloroform and Methanol. Excess of the solvent was evaporated and the concentrated extracts were used for further studies4.

Disc-diffusion method: Different concentrations of the extract (50mg, 100mg, and 150mg) in each solvent were loaded on 0.4mm sterile discs5. The loaded discs were placed on the surface of solid agar medium allowed to diffuse. The plates were then incubated overnight at 31°C in an incubator. After 24 hours of incubation, zone of inhibition was measured. Diameter of inhibition was measured and graded as ‘+’, if there was zone below 11mm, ‘++’ if the zone ranged from 11-20mm and ‘+++’ it was above 20mm.

Results and Discussion

At all concentrations used, the chloroform extract of A. bilimbi has strong effect against Staphylococcus and Bacillus. 150mg of Chloroform extract of A. bilimbi fruit extract was comparatively showed more inhibition against Bacillus than Staphylococcus (Figure-1). 150 mg of methanol extract was comparatively more effective against the Bacillus than Staphylococcus (Table-1).

The antibacterial activity of the Chloroform and Methanol extracts of the fruits of A. bilimbi against gram negative bacteria are also given in Table-1. Different concentration of methanol extract was comparatively more effective against Klebsiella than Serratia (Figure-2).

Different concentrations of chloroform extract were comparatively more effective against Serratia than Klebsiella. Petroleum ether extract shows no inhibitory action against both of the tested gram negative and positive bacteria. In short, the chloroform extract of A. bilimbi fruit were highly effective against both traits of bacteria.
Discussion: The use of plants as medicine by humans has coevolved with the history of man\(^6\). The use of various plants for a plethora of ailments were passed down through oral tradition. Even the modern allopathic medicine has its roots in traditional medicine, and numerous promising researches are progressing in this direction\(^7\).

The present study has witnessed the antibacterial potential of A. bilimbi fruit extracts. The present results are also at par with the available reports by various researchers. The antimicrobial activity of bark extract of A. bilimbi was already reported with commendable effects\(^8\). Similar antimicrobial observations with fruit extracts of bilimbi were also recorded by many workers\(^9\).

### Table-1

<table>
<thead>
<tr>
<th>Type of extract</th>
<th>Concentration (mg)</th>
<th>Bacterial species</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gram positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacillus</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>50</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>+++</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>50</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>++</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>50</td>
<td>-</td>
</tr>
</tbody>
</table>

**Figure-1**

A. bilimbi fruit chloroform extract against Staphylococcus

**Figure-2**

A. bilimbi fruit methanol extract against Klebsiella
The presence of surplus phytochemicals is the reason for the antibacterial effects exhibited by the extracts. The diversity of phytochemicals among A. bilimbi was well established. The diverse spectrum of metabolites like aldehyde, sugar, protein, cardiac glycoside, flavanoid, alkaloid, phenol, tannin and coumarin was reported from A. bilimbi.

The obtained results are significant as drug resistant pathogens are emerging globally with a myriad of clinical manifestations. Plant metabolites are strong candidate to combat the emerging issues of drug resistance. Numerous studies are progressing in all parts in this direction.

Conclusion

The presence of bioactive compounds among bilimbi makes it a potent herb for future research to combat drug resistance since it has commendable antimicrobial properties. However, more detailed investigations including clinical trials are essential.

References


