EVALUATION OF PHYTOCHEMICAL CONSTITUENTS AND ANTIBACTERIAL ACTIVITY OF CARICA PAPAYA AND HIBISCUS ROSA SINENSIS AGAINST PSEUDOMONAS AERUGINOSA AND AEROMONAS HYDROPHILA

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Received 22-09-2014
Accepted 07-09-2017

ABSTRACT

A study was conducted to investigate the phytochemical constituents and antibacterial activity of Carica papaya and Hibiscus rosa sinensis leaf extracts, using three different solvents (Distilled water, ethanol and butanol) through soxhlet extraction. Phytochemical screening of the dried leaves of papaya (Carica papaya) and China rose (Hibiscus rosa sinensis) revealed the presence of bioactive tannins, flavonoids, and saponins, which have been linked to their antibacterial properties. Antibacterial activity of the aqueous and ethanolic extracts of plant materials were tested by disk diffusion method against Pseudomonas aeruginosa and Aeromonas hydrophila. In both plants alkaloids, flavonoids, phenols and saponins were present in enormous amount. Total alkaloids (70.0-59.7 mg/g leaves), total phenols (36.2-40.2 µg g⁻¹fw), total saponins (53.8-65.7 µg g⁻¹fw), among all solvents used, Ethanolic extract of Carica papaya and Hibiscus rosa sinensis contained more alkaloids, phenols and saponins and showed comparatively more antibacterial activity with zone of inhibition (6.0-9.0 mm), than other solvents.

Keywords: Phytochemical, Antibacterial, Phenols, Alkaloids, Saponin

INTRODUCTION

This enables herbal medicines to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects. The range of pathogenic bacteria is wide and so is the variety of diseases caused by them. Despite the existence of potent antimicrobial agents, resistant or multi-resistant strains are continuously emerging, imposing the need for a continuous search and development of new drugs (Machado et al., 2003).

Anti implant’s activity of hibiscus flowers root ethanol extract. The anti hypertensive properties of petroleum ether, hydro alcohol, and chloroform of hibiscus flower extract (Siddiqui et al., 2006).

It has been used to treat digestive problems and intestinal worms as well as warts, sinusitis, eczema, coetaneous tubercules and hardness of the skin. Green fruits are used to treat high blood pressure, roundworm infection, dyspepsia, constipation, amenorrhea, skin disease, general debility and genito-urinary disorders. Mucilage prepared from the Hibiscus rosa-sinensis root has been used in the treatment of coughts (Duke and Ayensu 1985; Chopra et al., 1986).

Carica papaya is an evergreen shrub or small tree that grows best in full sun to light shade. The plant likes lots of water and fertilizer in warm weather. It has been used locally in the treatment of urinary tract infections (Aliyu, 2006).

Pseudomonas aeruginosa is a Gram-negative, aerobic, rod-shaped bacterium with unipolar motility. An opportunistic human pathogen, P. aeruginosa is also an opportunistic pathogen of plants. P. aeruginosa is the type species of the genus Pseudomonas.

Pseudomonas aeruginosa is increasingly recognized as an emerging opportunistic pathogen of clinical relevance. One of the most worrying characteristics of P. aeruginosa is its low antibiotic susceptibility. Aeromonas hydrophila Members of the genus Aeromonas are facultatively anaerobic, oxidase positive, gram-negative bacteria whose natural habitat is in the aquatic environment. Some species are pathogenic for animals and humans (Martin-Carnahan and Joseph 2005). The mesophilic aeromonads have been commonly isolated from patients with gastroenteritis although their role in disease causation remains unclear. They are also associated with sepsis and wounds, and with eye, respiratory tract, and other systemic infections. The study was conducted with the aim to analyse the phytochemical constituents and antibacterial activity of leaf extract of Carica papaya and Hibiscus Rosa sinensis against Pseudomonas aeruginosa and Aeromonas hydrophila.

MATERIALS AND METHODS

Collection of test organisms: The pathogenic bacterial strains, Pseudomonas aeruginosa (MCCB0034) and Aeromonas hydrophila (MCCBR0006) were obtained from the "Microbial Culture Collection Bank", Department of Microbiology and Fermentation Technology, Sam Higginbottom University of Agriculture, Technology And Sciences, Allahabad.

Phytochemical screening: of alkaloids (Mayer's and Wagner's reagent) flavonoids (10% lead acetate solution) saponins (Distilled water) tannins (Lead acetate) steroids (Chloroform, Conc. H₂SO₄) amino acids (Ninhydrin reagent) was carried.

Quantitative analysis of extracts: for total alkaloids (Dayanand et al., 1998) total phenols (Malick and Singh., 1980), total saponins (Brunner et al., 1984) was carried out. This was followed by Screening of Antibacterial activity of extracts (Agarry et al., 2005)
RESULT AND DISCUSSION

Qualitative analysis of extracts: The screening of Carica papaya leaf extract showed the presence of Flavonoids, saponins, Alkaloids, Steroids in all three extracts while Tannins, Glycosides, shows negative result in distilled water and positive result in Flavonoids, Saponins, Alkaloids, and Steroids.

Table 1: Qualitative Analysis of phytochemical constituents of the Papaya (Carica papaya) and China rose (Hibiscus rosa sinensis) leaves

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Papaya (Carica papaya) leaves</th>
<th>China rose (Hibiscus rosa sinensis) leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D.W.</td>
<td>Ethanol</td>
</tr>
<tr>
<td>Tannins</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glycosides</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Steroids</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Estimation of total Alkaloids (mg/gm) leaves of Hibiscus rosasinensis.

The alkaloids were quantified and tabulated in table 2 showed significant increase in alkaloids content was recorded in treatments T1 distilled water (25.7 mg/gm) followed by T3 Butanol (41.7 mg/gm) T2 ethanol (25.7 mg/gm). All the treatments were found statistically significant. However, ethanolic extract was found superior over all the treatments.

Estimation of total Phenols (µg g⁻¹fw) leaves of Carica papaya and Hibiscus rosa sinensis.

The phenols were quantified and tabulated in table 2 showed significant increase in phenolic content was recorded in T3 Butanol (12.1µg g⁻¹fw) followed by T1 distilled water (16.5µg g⁻¹fw). All the treatments were found statistically significant treatments. The phenols were quantified and tabulated in table 2 showed significant increase in phenolic content was recorded in T3 Butanol (36.8µg g⁻¹fw) followed by T1 distilled water (15.0µg g⁻¹fw). All the treatments were found statistically significant.T2 is a best result (40.1µg g⁻¹fw). The presence of phenolics compounds in the leaves of Hibiscus rosa sinensis and Carica papaya indicate that these plants are antibacterial agents. Phenolic compound as electron donors are readily oxidized to form phenol to ion or quinine, an electron accepter. This give rise to practical uses prorogated phenol is used as cleaning agent (Salah et al, 1995).

Estimation of total saponin (µg g⁻¹fw) leaves of Carica papaya and Hibiscus rosa sinensis. The saponin were quantified and tabulated in table 2. Showed significant increase in phenolic content was recorded in T3 Butanol (33.9µg g⁻¹fw) followed by T1 distilled water (9.6µg g⁻¹fw). All the treatments were found statistically significant. T2 is a best result (53.8µg g⁻¹fw). The saponin were quantified and tabulated in table 2. Showed significant increase in phenolic content was recorded in T3 Butanol (31.7 µg g⁻¹fw) followed by T1 distilled water (21.3 µg g⁻¹fw). All the treatments were found statistically significant.T2 is a best result (65.7 µg g⁻¹fw).

Table 3: Effect of Carica papaya and Hibiscus rosa sinensis Extract on Zones of inhibition of Hibiscus rosa sinensis against the P. aeruginosa and A. hydrophilla (mm)

<table>
<thead>
<tr>
<th>Solvents</th>
<th>Zone of inhibition (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Carica papaya</td>
</tr>
<tr>
<td>Control</td>
<td>0.0</td>
</tr>
<tr>
<td>D.W. Extracts</td>
<td>4.0</td>
</tr>
<tr>
<td>Ethanol Extracts</td>
<td>6.0</td>
</tr>
<tr>
<td>Butanol Extracts</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Antibacterial activity of extracts:

The antibacterial activity of all the plant extracts of Carica papaya against the P. aeruginosa and A. hydrophilla shown in table 3. It was found that maximum antibacterial activity was shown by ethanol with (6.000 mm) of inhibition zone followed by butanol with (5.000 mm) and distilled water with (4.000 mm). Thus Ethanolic extract was best among all the treatments.

Zones of inhibition of Hibiscus rosa sinensis against the P. aeruginosa and A. hydrophilla (mm): (Igbinosa et al., 2009; Stray, 1998).

CONCLUSION

It is concluded from this study that the leaves of Carica papaya and Hibiscus rosa sinensis have antibacterial properties against Pseudomonas aeruginosa and Aeromonas hydrophila. The present study suggests that among all solvents used, the Ethanolic extract of Carica papaya and Hibiscus rosa sinensis contained more alkaloids, phenols and saponins and showed comparatively more antibacterial activity than other solvents. The antibacterial activity analysis of Carica papaya and Hibiscus rosa sinensis extracts against the choosen organisms the inhibition zone diameter produced, ethanolic extract shows best result. For both microorganism Hibiscus rosa sinensis have more inhibition zone of Carica papaya. The result depicted the use of these plants in treating antibacterial infection and shows that Carica papaya and Hibiscus rosa sinensis could be exploited for new potent antibacterial agents.

REFERENCES


