INTRODUCTION

Medicinal plants are notable principle of producing valuable bioactive phytoconstituents which are large significance for the health of persons and communities. The medicinal worthiness of the plants are due to the chemical substances that yield a exact physiological action on human body (Uddin et al., 2011; Qaisar, 2012). Bacterial ailments are a main health difficulty because they are capable of enormous death per day worldwide. In India and other countries of the world, biotherapeutic medicines have been utilized since time immemorial to cure many diseases long before the introduction of recent medicine. Herbal drugs are still largely utilized in various parts of the world particularly in areas where people do not have access to recent medicines (Ajibad et al., 2005). Plants are utilized medicinally in various countries and are a source of several effective and powerful medicines. According to World Health Organization, more than 80 percentage of the world’s population relies on traditional drug for their primary healthcare demands. Plants are the gifts of nature utilized to treat number of human ailments (Deepa et al., 2012). Medicinal plants are the highest productive source of novel compounds and medicines of natural origin. Most of the natural products isolated from medicinal plants are the phytoconstituents, which include tannins, alkaloids, steroids, terpenoids, flavonoids, phenylpropanoids (Harvey, 2008) and anthraquinones (Ayo, 2010). The phytochemical is popularly considered an effective approach in the discovery of new anti-infective agents from angiospermic plants (Duraiandiyan et al., 2006). Antibacterial properties of many plants parts, such as leaves, stem, root seeds and fruits have been well documented for some of the medicinal plants for the past two decades (Leven et al., 1979). Antibiotic principles are distributed widely among angiospermic plants. Antimicrobial medicines are used in medicinal practices for treating food-borne ailments (Abramouics, 1990). Couroupita guianensis Aubl. belonging to the family Lecythidaceae, commonly known as cannon ball tree in English. In Tamilnadu, it is called Nagalingam (Tamil) and Shivalingam, Kailaspathi (Hindi) is a large tree of 25-35 m height with large spreading branches bearing a peculiar flower. Couroupita guianensis has been used for treatment of tumours, hypertension, pain and inflammatory process (Sanz et al., 2009). It is also used in the treatment of antibacterial activity (Khan et al., 2003; Kavitha et al., 2011; Regina and Uma Rajan, 2012; Shah et al., 2012). It has stomachache, cold, intestinal gas formation and also used for immunomodulatory activity and larvicidal activity against vector (Anonymous, 1950; Desal et al., 2003; Pradha et al., 2009). Leaves of C. guianensis are widely used as an analgesics medicine by the Brazilian rural population (Mariana et al., 2010). It is used to cure antifungal, antibiotic and analgesic qualities. Juice made from the leaves is used to treat skin disorders and the Shamans of South America have even utilized tree parts for curing malaria. The inside of the fruit and disinfect wounds and young leaves treat toothache (Geetha et al., 2004). Erythroxylum monogynum Roxb. belonging to the family of Erythroxylaceae, commonly called Bastard Sandard, Red Cedar in English and locally known as Sembulichan, Devadara in Tamil. Its medicinal claims have included treats skin diseases, diuretic, diaphoretic and stomach problems (Ayyanar and Ignacimuthu, 2005; Senthilkumar et al., 2006). Leaf juice given orally as a cooling beverages and jaundices and stem bark decoction is used for treatment of hiccups (Ravi Prasad Rao and Sunitha, 2011). The aims of this research were to decide the phytochemical profile and antibacterial potential of C. guianensis and E. monogynum leaf extracts. The screening of these plants was based on the demands of their efficient utilize in traditional medicine for the manage of various ailments in the area. Phytochemical analysis and the testing of antibacterial activity of the extracts were carried out against four bacterial strains.

MATERIALS AND METHODS

The fresh leaves of C. guianensis and E. monogynum were collected in December, 2012 from Shevaroy Hills and Kondalampatti, Salem.
Extractions
The powdered leaves (100 g) of each plant were extracted exhaustively with 500 ml of ethanol, acetone and aqueous, respectively using Soxhlet extractor. Each extract was concentrated in vacuo at 40°C using rotary evaporator.

Phytochemical screening
The phytochemical screening of the extracts of the leaves of C. guianensis and E. monogynum was carried out using standard procedure to identify the constituents as described by Harborne (1984), Sofowara (1993), Kokate et al., (1995) and Evans (1996). The phytochemicals tested were tannins, saponins, flavonoids, alkaloids, terpenoids, phytosterols, anthoquinones, cardiac glycosides and carbohydrates.

Test microorganisms
Four bacterial strains were used in this study: Escherichia coli, Pseudomonas putida, Staphylococcus aureus and Klebsiella pneumoniae. The pathogenic microorganisms were obtained from the Biomedical Engineering Research Foundation, Salem, Tamilnadu, India. All the test bacterial strains were maintained on nutrient agar media at 4°C and sub cultured for 24 h before use.

Antibacterial tests
Antibacterial activity of extracts was determined by agar well diffusion method (Bauer et al., 1966; Chew et al., 2011). The agar well diffusion method was employed for the determination of antibacterial potentialities. The antibacterial activities exhibited by the extracts of the leaves of the C. guianensis and E. monogynum may be due to the presence of the secondary metabolites revealed in their phytochemical analysis. The secondary metabolites obtain pharmacological properties, accountable for the utilize of plants in traditional biotherapeutic medicine to cure ailments caused by pathogenic microorganisms (Wang et al., 2009; Olajuyigbe and Afolayan, 2012). The finding of this research conforms with the result procured by Olajuyigbe and Afolayan (2012) that phenolic compounds including the flavonoids, and tannins and alkaloids reveal a extensive measure of antimicrobial, including antifungal and antibacterial potentialities. The advantageous medicinal results of plant materials familiarly effect from the secondary metabolites present in the plant although it is regularly not attributed to a particular compound but a combination of the metabolites (Janaikaraman et al., 2012). The result suggests that this plants is containing phytoconstituents such as tannins, saponins, flavonoids, alkaloids, terpenoids, phytosterols, cardiac glycosides and carbohydrates as secondary metabolites which can be utilized in several pharmacological utilities. The results of antibacterial activities of ethanol, acetone and aqueous extracts of the leaves of C. guianensis are summarized in Table 2. All the extracts demonstrated wide spectrum of activity. When the three extracts were compared with each other and with that of standard antibiotic Ampicillin, the ethanol leaf extract showed the highest potentialities compared to that of the acetone and aqueous extracts. The extract obtained using ethanol showed highest effective against E. coli (13.60 mm), P. putida (10.20 mm) and K. pneumoniae (9.40 mm) and minimal inhibition zone was noted against S. aureus (8.52 mm). The study made on acetone extract accounted highest activity against P. putida (12.80 mm), E. coli (10.45 mm) and S. aureus (10.0 mm) and minimum inhibition zone was noted against E. coli (10.45 mm).

Table 1. Phytochemical analysis of extracts of the leaves of C. guianensis and E. monogynum

<table>
<thead>
<tr>
<th>Secondary metabolites</th>
<th>Couroupita guianensis</th>
<th>Erythroxylum monogynum</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CGAE</td>
<td>CGME</td>
</tr>
<tr>
<td>Tannins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Phytosterols</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Anthoquinones</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

CGAE = Acetone extract of Couroupita guianensis, CGME = Methanol extract of Couroupita guianensis, EMAE = Acetone extract of Erythroxylum monogynum, EMME = Methanol extract of Erythroxylum monogynum, + = Positive, - = Negative.

Table 2. Antibacterial activity of the various leaf extracts of Couroupita guianensis and Erythroxylum monogynum by agar well diffusion method

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Part used</th>
<th>Plant extract</th>
<th>Zone of inhibition (in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. guianensis</td>
<td>Leaves</td>
<td>Ethanol</td>
<td>13.60±0.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acetone</td>
<td>10.45±0.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aqueous</td>
<td>12.28±0.60</td>
</tr>
<tr>
<td>E. monogynum</td>
<td>Leaves</td>
<td>Ethanol</td>
<td>13.80±0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acetone</td>
<td>10.15±0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aqueous</td>
<td>14.66±0.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ampicillin 10μg/ml</td>
<td>21.37±0.19</td>
</tr>
</tbody>
</table>

Data given are mean of triplicates ± Standard Error. - indicates no activity, concentration used 50 μg/ml.
against *K. pneumoniae* (8.70 mm). Aqueous extract showed highest activity against *E. coli* (12.28 mm) and *P. putida* (9.13 mm) and the minimal activity against *S. aureus* (8.70 mm). No activity was recorded against *K. pneumoniae* (Fig.1).

The results of the present study on the antibacterial potential of the leaf extracts of *E. monogynum* showed considerable antibacterial activities. All the extracts exhibited a large spectrum of activity. When the three extracts were compared with each other and with that of standard antibiotic Ampicillin, the aqueous leaf extract showed the highest activity compared to that of the ethanol and acetone extract. The inhibitory zone for aqueous extracts of the leaf showed maximum antibacterial activity against *E. coli* (13.80 mm), *P. putida* (11.70 mm) and *S. aureus* (10.28 mm), while decrease in potential against *K. pneumoniae* (9.20 mm). The leaf extracts of acetone showed maximum activity against *K. pneumoniae* (12.0 mm) and *E. coli* (10.15mm). Further, it showed minimal activity against *S. aureus* (8.30 mm). No activity was observed against *P. putida* (Fig.2).

**Figure 1. Graphical representation of antibacterial activity of various leaf extracts of Couroupita guianensis against test microorganisms**

The results of the present study revealed that antibacterial potentialities of acetone, ethanol and aqueous extracts varied in usefulness which may be attributed to the presence of tannins and saponins. The presence of phenolic compounds in the plants indicates the antibacterial activities. In the present study, the author also notable the antibacterial activity, which agrees with the findings of Divya et al., (2011). The phytochemicals are recognized to have antibacterial activities (Gupta et al., 2010).

**Conclusion**

The presentation of the antibacterial potential of the leaf extracts of *C. guianensis* and *E. monogynum* against pathogenic microorganisms is confirmation that the extracts are potential source of antibiotics with a wide spectrum of properties. Results of this research confirm the utilize of the plants in traditional biomedicine to cure ailments caused by the pathogenic bacterial species. Further study will be required to bioassay indicated isolation to isolate, identify and characterize the structure of the biologically active compound accountable for pharmacological properties.

**Acknowledgments**

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**REFERENCES**


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