INTRODUCTION
There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action due to an alarming increase in the incidence of new and reemerging infectious diseases and development of resistance to the antibiotics in current clinical use. The screening of plant extracts has been of great interest to scientists in the search for new drugs for greater effective treatment of several diseases. Therefore, plant extracts and phytochemicals with known antimicrobial properties can be of great significance in therapeutic treatments.

The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds. Many plant leaves have antimicrobial principles such as tannins, essential oils and other aromatic compounds. In addition, many biological activities and antibacterial effects have been reported for plant tannins and flavonoids. Plants have an almost limitless ability to synthesize aromatic substances, most of which are phenols or their oxygen-substituted derivatives. These compounds protect the plant from microbial infection and deterioration. Some of these phytochemicals can significantly reduce the risk of cancer due to polyphenol antioxidant and anti-inflammatory effects. Some preclinical studies suggest that phytochemicals can prevent colorectal cancer and other cancers.

The Indian plant Murraya koenigii belong to family Rutaceae, commonly called curry leaf in English and locally known as Karivepu. The species is native of India and found everywhere in India. It commonly occurs in foothills of Himalaya, Assam, Skim, Kerala, Tamil Naida, Andra Pradesh, Maharastra. The leaves are pinnate, with 11-21cm broad, and flower are small white and fragrant. On phytochemical investigation researcher claimed that leave of Murraya koenigii found to contain alkaloids, volatile oil, Glycololine, Xanthotoxine and sesquiterpione. The leaf has been found to show antioxidant activity, hypoglycemic activity, antibacterial activity, anti-dysenter and also act as a hepatoprotective.

MATERIALS AND METHODS

Plant materials
The Murraya koenigii leaf collected during June-July of 2010 in and around Arakkonam, Tamilnadu were authenticated by Department of Botany. The voucher specimens were kept in the Department of Botany in C. Abdul Hakeem College, Melvisharam, Vellore, Tamilnadu, India.

Extraction procedure
All the laboratory works are done in Microlabs, Institute of Research and Technology, Arcot, Tamil Nadu, India. The plants washed with fresh water and dried under shade at room temperature, cut into small pieces and powdered in a mixer grinder. The roots were powdered and stored in sterile containers for further use. Then this powdered samples (100g/100ml) in hot water, ethanol, methanol, chloroform, Ethyl acetate, Petroleum ether, hexane and acetone extracts. The results confirmed the presence of antibacterial activity of Murraya koenigii extract against various human pathogenic bacteria. Presences of phytochemical and antimicrobial activity are confirmed.

Test organisms
The bacterial spp. used for the test were Staphylococcus aureus (S. aureus), Bacillus cereus (B. cereus), Micrococcus luteus (M. luteus), Escherichia coli (E. coli), Pseudomonas aeruginosa (P. aeruginosa), Klebsiella pneumonia (K. pneumonia) The fungus spp. used for the test were Aspergillus niger (A.niger), Candida albicans (C.albicans), Candida tropicalis (C. tropicalis), Candida kefyr and

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Cryptococcus neoformans. All the stock cultures were obtained from Microlab, Institute of Research and Technology, Vellore, Tamilnadu, India.

**Culture media and inoculum preparation**
Nutrient agar/broth (Himedia, India.) were used as the media for the culturing of bacterial strains. Loops full of all the bacterial cultures were inoculated in the nutrient broth and incubated at 37°C for 72 hrs and Potato dextrose agar /and potato dextrose broth (Himedia, India)were used as the media for the culturing of fungal strains. Loops full of all the fungus cultures were inoculated in the potato dextrose broth (PDA) and incubated at room temperature for 72 hrs.

**Preliminary phytochemical screening**
All the extracts were subjected to preliminary phytochemical qualitative screening for the presence or absence of various primary or secondary metabolites.

**Antibacterial activity**
The extracts obtained above were screened for their antibacterial activity in comparison with standard antibiotic Ciprofloxacin (100 µg/mL) in-vitro by well diffusion method26,27. Lawn culture was prepared using the test organism on Muller Hinton Agar (MHA). The inoculated plates were kept aside for a few minutes. Using well cutter, four wells were made in those plates at required distance. In each step of well cutting, the well cutter was thoroughly wiped with alcohol. Using sterilized micropipettes 30µl of different solvents with selected *Murraya koenigii* leaf extract was added in to the well. The plates were incubated at 37°C for overnight. The activity of the leaf extract was determined by measuring the diameters of zone of inhibition. For each bacterial strain, controls were maintained where pure solvents without extracts were used.

**Antifungal activity**
The extracts were also screened for their antifungal activity in comparison with standard antibiotic Ketoconazole (10 µg/mL) in-vitro by well diffusion method 26,27. Lawn culture was prepared using the test organism on Sabouraud’s Dextrose agar (SDA). The inoculated plates were kept aside for a few minutes. Using well cutter, four wells were made in those plates at required distance. Using sterilized micropipettes 30µl of different solvents with selected *Murraya koenigii* leaf extract was added in to the well. The plates with yeast like fungi were incubated at 37°C for overnight. The plates with mold were incubated at room temperature for 48 hrs. The activity of the root extract was determined by measuring the diameters of zone of inhibition. For each fungal strain, controls were maintained where pure solvents were used instead of (*Murraya koenigii*) extracts.

**RESULTS**
The results of antibacterial activity are given in the Table 1, which clearly show that all the extracts have shown antibacterial activity equivalent to that of standard against the entire tested organisms. Ethanol, methanol, Ethyl acetate, acetone, chloroform, Petroleum ether hexane and hotwater extracts have shown better activity against all the six microorganisms. Ethanol extract was more effective against *A. niger*, *C. tropicalis* and *C. albicans*. Methanol extract was more effective against *C. albicans* and *A. niger*. Ethyl acetate extract was more effective against *C. albicans*, *A. niger* and *C. kefyr*. Acetone extract was more effective against *C. albicans*, *C. tropicalis* and *C. kefyr*. Chloroform extract was more effective against *A. niger* and *C. albicans*. Petroleum ether extract was more effective against *C. tropicalis* and *C. kefyr*. Hexane extract was more effective against *C. albicans*, *C. kefyr*, *A. niger* and *C. tropicalis*. Hot water extract was more effective against *A. niger* and *C. tropicalis*. The presence of various phytochemicals was shown in Table 3.

**DISCUSSION**
Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the in vitro antibacterial activity assay30. The Therapeutic value of medicinal plants lies in the various chemical constituents in it. The bioactivity of plant extracts is attributed to phytochemical constituents. For instance, plant rich in tannins have antibacterial potential due to their character that allows them to react with proteins to form stable water soluble compounds thereby killing the bacteria by directly damaging its cell membrane31. Flavonoids are a major group of phenolic compounds reported for their antimicrobial33 and spasmolytic34 properties. Alkaloids isolated from plant are commonly found to have antimicrobial properties35. Extract of the seeds of vitex agnus-castus was reported to possess antimicrobial activity which was associated with its alkaloids, saponins, tannins, flavonoids and glycosides contents36. The antibacterial activity of the leaf extract of *Murraya koenigii* as recorded in present study may therefore be attributed to the presence of above phytochemicals i.e. Alkaloids, Carbohydrates, Saponins, Glycosides, Proteins & aminocoids, Phytotherol, Phenol, Flavinoids, Terpinoids, in Petroleum ether extracts and Alkaloids, Saponins, Glycosides, Proteins & aminocoids, Phytotherol, Phenol, Flavinoids, Terpinoids, in Ethanol extracts and Alkaloids, Saponins, Glycosides, Proteins & aminocoids, Phytotherol, Phenol, Flavinoids, Terpinoids, in Methanol extracts and Alkaloids, Saponins, Glycosides, Proteins & aminocoids, Phytotherol, Flavinoids, Terpinoids, in Tannins in Ethyl acetate extracts and Alkaloids, Carbohydrates, Saponins, Proteins & aminocoids, Phytotherol, Phenol, Flavinoids, Terpinoids, in Tannins in Petroleum ether extracts, in Glycosides, Phytotherol, Phenol, Flavinoids, Terpinoids, in Chloroform extracts and Alkaloids, Proteins & aminocoids, Phytotherol, Phenol, Flavinoids, Terpinoids, in Petroleum ether extracts and Glycosides, Phytotherol, Phenol, Flavinoids, Terpinoids, in Hexane extracts and Saponins, Proteins & aminocoids, Phytotherol, Flavinoids in Aqaus extracts.

It is concluded that the plant extract possess microbial activity against tested organisms. The zone of inhibition varied suggesting the varying degree of efficacy and different phytoconstituents of herb on the target organism. The antimicrobial activity of the plants may be due to the presence of various active principles in their leaf. Further studies are needed to isolate and characterize the bioactive principles to develop new antimicrobial drugs.

**ACKNOWLEDGMENT**
The authors take pleasure in expressing their grateful thanks to Microlabs, Institute of Research and Technology, Vellore & Arcot, Tamilnadu, India for channelizing required facilities.

**REFERENCES**


Table 1: Inhibition zone diameter of Extracts against Bacteria

<table>
<thead>
<tr>
<th>Organism</th>
<th>Ethanol</th>
<th>Methanol</th>
<th>Ethyl Acetate</th>
<th>Acetone</th>
<th>Chloroform</th>
<th>Petroleum ether</th>
<th>Hexane</th>
<th>Hot water</th>
<th>Ciprofloxacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>12.27±0.25</td>
<td>10.07±0.12</td>
<td>15.17±0.29</td>
<td>16.20±0.20</td>
<td>10.0±0.10</td>
<td>6.0±0.0</td>
<td>10.0±0.12</td>
<td>12.20±0.20</td>
<td>20.20±0.20</td>
</tr>
<tr>
<td>Micrococcus luteus</td>
<td>25.90±0.10</td>
<td>10.03±0.25</td>
<td>16.83±0.29</td>
<td>20.17±0.15</td>
<td>8.03±0.06</td>
<td>8.0±0.0</td>
<td>-</td>
<td>10.03±0.06</td>
<td>21.17±0.29</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>10.20±0.20</td>
<td>8.16±0.10</td>
<td>10.77±0.25</td>
<td>10.13±0.11</td>
<td>8.03±0.06</td>
<td>-</td>
<td>-</td>
<td>10.07±0.12</td>
<td>22.17±0.29</td>
</tr>
<tr>
<td>Bacillus cereus</td>
<td>13.20±0.20</td>
<td>16.13±0.23</td>
<td>11.17±0.15</td>
<td>16.17±0.15</td>
<td>11.17±0.15</td>
<td>14.20±0.20</td>
<td>11.10±0.10</td>
<td>-</td>
<td>23.07±0.12</td>
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<tr>
<td>Klebsiella pneumoniae</td>
<td>12.17±0.15</td>
<td>10.01±0.20</td>
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<td>11.17±0.15</td>
<td>10.03±0.06</td>
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<td>11.17±0.15</td>
<td>20.10±0.10</td>
<td>15.03±0.06</td>
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<tr>
<td>Staphylococcus aureus</td>
<td>22.10±0.17</td>
<td>15.07±0.16</td>
<td>15.0±0.20</td>
<td>12.13±0.23</td>
<td>12.13±0.23</td>
<td>12.07±0.12</td>
<td>10.10±0.10</td>
<td>28.17±0.29</td>
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</tr>
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</table>

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Table 2: Inhibition Zone Diameter of Extracts against Fungus
Antifungus activity of different extracts of Murraya koenigii (L) of against Different organisms (Mean±SEM) (mm).

<table>
<thead>
<tr>
<th>Organism</th>
<th>Ethanol</th>
<th>Methanol</th>
<th>Ethyl Acetate</th>
<th>Acetone</th>
<th>Chloroform</th>
<th>Petroleum ether</th>
<th>Hexane</th>
<th>Hot water</th>
<th>Ketoconazole</th>
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<tbody>
<tr>
<td>Aspergillus niger</td>
<td>12.17±0.15</td>
<td>11.17±0.15</td>
<td>9.07±0.12</td>
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<td>8.07±0.12</td>
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<td>10.17±0.15</td>
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<tr>
<td>Candida albicans</td>
<td>11.07±0.12</td>
<td>12.13±0.23</td>
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<td>Candida tropicalis</td>
<td>12.17±0.15</td>
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<td>8.07±0.12</td>
<td>8.07±0.12</td>
<td>9.07±0.12</td>
<td>10.10±0.17</td>
<td>15.30±0.26</td>
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<tr>
<td>Cryptococcus neoformans</td>
<td>10.07±0.12</td>
<td>8.07±0.12</td>
<td>8.23±0.06</td>
<td>8.07±0.12</td>
<td>8.0±0.00</td>
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<td>14.10±0.17</td>
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<tr>
<td>Candida kefyr</td>
<td>10.0±0.00</td>
<td>8.07±0.12</td>
<td>9.07±0.12</td>
<td>8.07±0.12</td>
<td>9.17±0.15</td>
<td>9.20±0.20</td>
<td>8.03±0.06</td>
<td>17.30±0.26</td>
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Table 3: Preliminary phytochemical analysis of Murraya koenigii (L).

<table>
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<tr>
<th>S.NO</th>
<th>Phytochemicals</th>
<th>Test performed</th>
<th>Ethanol extracts</th>
<th>Methanol extract</th>
<th>Ethyl acetate</th>
<th>Acetone extracts</th>
<th>Chloroform</th>
<th>Petroleum ether</th>
<th>Hexane</th>
<th>Aquas extract</th>
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<tr>
<td>1</td>
<td>Alkaloids</td>
<td>Dragendorff’s test</td>
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<td>+</td>
<td>+</td>
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<tr>
<td>2</td>
<td>Carbohydrates</td>
<td>molish test</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>3</td>
<td>Saponins</td>
<td>Chloroform and H₂SO₄ test</td>
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<td>+</td>
<td>+</td>
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<td>-</td>
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<tr>
<td>4</td>
<td>Glycosides</td>
<td>molish test</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Proteins &amp; aminosacids</td>
<td>Milon’s Test</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
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<tr>
<td>6</td>
<td>Phytosterol</td>
<td>Libermann-Burchard’s Test</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>7</td>
<td>Phenolic compounds</td>
<td>Ferric chloride test and Lead acetate test</td>
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<td>+</td>
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<tr>
<td>8</td>
<td>Flavonoids</td>
<td>Shinoda test</td>
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<tr>
<td>9</td>
<td>Terpinoids</td>
<td>Noller’s test</td>
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<td>10</td>
<td>Tannins</td>
<td>Neutral FeCl₃</td>
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<td>+</td>
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(+): Positive  (-): Negative

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