Pharmacognostical, phytochemical and heavy metal studies on an ethno medicinal plant-*Corallocarpus epigaeus* (rottl. &wild.) Clarke.

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ABSTRACT
Leaf, stem and tuber powder of *Corallocarpus epigaeus* were investigated for its pharmacognostical, phytochemical and heavy metal properties. Analytical value (loss on drying, total ash, acid insoluble ash, water soluble ash), solubility percentage, fluorescent analysis, extractive value using different solvents (petroleum ether, benzene, chloroform, acetone, ethanol, methanol and water), qualitative phytochemical analysis for detection of alkaloids, glycosides, flavonoids, tannins, phenols, proteins, amino acids, saponins and terpenoids. HPTLC studies of glycosides, flavonoids, phenolic compounds and heavy metal analysis for the accumulation of lead, copper and cadmium were studied. Analytical value, extractive value and solubility percentage exhibited marked difference between the leaf, stem and tuber powder of *C. epigaeus*. Fluorescent analysis does not differ among the selected plant parts under normal and UV light. Qualitative analysis of acetone and water extracts revealed the presence of secondary metabolites like alkaloids, glycosides, flavonoids, terpenoids, tannins, phenol, fats and fatty acids. HPTLC studies also confirmed the presence of glycosides, flavonoids and phenolic compounds. Heavy metals present in the plant parts are lower than the permissible level.

Key words: *Corallocarpus epigaeus*, pharmacognostical, Heavy metal studies.

INTRODUCTION
*Corallocarpus epigaeus* belonging to Cucurbitaceae family is a prostrate climbing perennial plant. The synonym of this plant is *Bryonia epigaea*. It is commonly called as Indian Bryonia and in tamil it is called as Kollakovai or Akasagarooda. It is found in Africa, Asia and temperate regions of the world. In India, it is distributed in Andrapradesh, Gujarat, Karnataka, Punjab, Rajasthan and Tamilnadu. This plant belonging to a rare category and is used by tribals of Rajasthan to cure various ailments related to digestive tracts like indigestion, constipation, abdominal pain, dysentery and typhoid. It is also used to cure skin diseases like wounds, tumors, boils, sunburns, cuts and injury. Root of this plant contains a bitter glycoside; Bryonine is used as alterative and is specially used in syphilis, chronic dysentery, chronic mucus enteritis and rheumatism. It is a siddha remedy for chronic eczema. The tuber of this plant has antirespiratory, antitumor and antimalarial properties. It is used for external application in conjunctivitis and chronic venereal complaints. Tuber boiled with coconut oil is used to cure leprosy. This plant is highly medicinal and there are few references found available in this plant regarding pharmacognosy and heavy metals. Therefore, the present study is focused on the pharmacognostical and heavy metal content of this plant.

MATERIALS AND METHODS
The fresh leaves, stem and tuber of *C. epigaeus* were collected from Pasumalai hills of Theni district, Tamilnadu, India (Plate 1 & 2). The collected plant parts were washed thoroughly with water, shade dried powdered and stored in an airtight container for further studies. The powder was successively extracted with different solvents like petroleum ether, benzene, chloroform, acetone, ethanol, methanol and water in a soxhlet apparatus.

Physicochemical analysis: Leaf, stem and tuber powder were subjected to physicochemical studies for determining the ash value, extractive value, solubility percentage and fluorescence analysis by the methods prescribed by Kokate.

Qualitative phytochemical studies: Leaf, stem and tuber powder were extracted with different solvents and subjected to screened for various secondary metabolites like alkaloids, glycosides, flavonoids, tannins, phenol, fats and fatty acids. HPTLC Studies: Acetone and water extracts of leaf, stem and tuber powder were used for HPTLC studies to detect glycosides, flavonoids and phenolic compounds using CAMAG LINOMAT 5 instrument. Ethyl acetate-ethanol-water (8:2:12), Ethyl acetate-butanone-formic
acid-water (5:3:1:1) and Toluene-acetate-formic acid (4.5:4.5:1) were used as mobile phases for glycoside, flavonoid and Phenolic compounds respectively. The spray reagents for glycosides, flavonoids and phenolic compounds are Liebermann Burchard, 1% ethanolic aluminium chloride and fast green B salt reagent respectively. The standard references like Stevioside for glycoside, Rutin for flavonoids and phenolic compounds for Quercetine were used for this study.

Heavy metal studies: The samples were digested in microwave digestion system using 10ml of HNO₃ (69%) for 10 min, 1ml of HClO₄ (70%) for 5 min and 5ml of H₂O₂ (30%) for 10 min at 250W power setting. The digested samples were analyzed for metals like lead, chromium, cadmium and copper in double beam Atomic Absorption Spectrometer (Perkin Elmer Model Analyst 800). Standards used for all the heavy metals are manufactured by SRL, India.

**RESULTS AND DISCUSSION**

Pharmacognostical studies comprise the analytical value, extractive value, solubility percentage and fluorescent analysis. A detailed study of *C. epigaeus* exhibited marked difference between leaf, stem and tuber powder. The loss on drying is higher in leaf than stem and tuber.
The total ash content is higher in tuber powder and the solubility percentage is higher in water than alcohol (Table 1). Fluorescent analysis of leaf, stem and tuber Powder, treated with different solvents does not show any marked difference (Table 2). The extractive value of water is higher than other solvents. These values will be helpful to identify the sample of genuine drug (Table 3). A systematic study of a crude drug embraces, thorough consideration of primary and secondary metabolites derived as a result of plant metabolism. The secondary metabolites are usually responsible for the medicinal properties of the drugs. Water and acetone extracts showed the presence of most of the secondary metabolites like alkaloids, flavonoids, proteins, phenols, glycosides, and tannins. Fixed oils and terpenoids were absent in all the extracts studied. Petroleum ether and benzene extracts does not give any positive results. These studies revealed that by using this diagnostic features, one can identify this plant for further investigation. Similar results were obtained in the root and rhizome of this plant by Nisha shri et al., (2010)\(^5\). With the advent of new analytical tools and sophisticated instrument technology, it is possible to suggest a practical quality assurance of a profile for a crude drug\(^9\). Physical evaluation of a crude drug could be of both qualitative and quantitative nature. Physical standards are to be determined for drugs, wherever possible\(^6\). HPTLC studies confirmed the presence of glycoside, flavonoid and phenols. Appearance of violet brown colour indicates the presence of glycoside, yellow and blue colour and reddish brown colour zone indicates the presence of flavonoid and phenolics respectively (Plate 2, 3&4). In the earlier report, Glycosides and phenolic compounds were absent in \(C. epigaeus\)\(^8\). In contrast, the present HPTLC studies on leaf, stem and tuber powder extracts of \(C. epigaeus\) confirmed the presence of five types of Glycosides, three types of Flavonoids and one type of Phenolic compound. Medicinal plants are also known to contain trace metals which play a vital role as structural and functional components of metalloproteins, for the formation of bioactive constituents and enzymes in living cells. However, there is an inherent risk associated with many of these medicinal plants due to the presence of heavy metals. The accumulation of heavy metals can have middle term and long term health risks\(^11\). WHO recommends that medicinal plants which form raw

<table>
<thead>
<tr>
<th>Method of extraction</th>
<th>Solvent used</th>
<th>yield ( in percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Leaf</td>
</tr>
<tr>
<td>Soxhlet extraction</td>
<td>Petroleum Ether</td>
<td>5.8%</td>
</tr>
<tr>
<td></td>
<td>Benzene</td>
<td>4.2%</td>
</tr>
<tr>
<td></td>
<td>Chloroform</td>
<td>4.2%</td>
</tr>
<tr>
<td></td>
<td>Acetone</td>
<td>6.4%</td>
</tr>
<tr>
<td></td>
<td>Ethanol</td>
<td>6.2%</td>
</tr>
<tr>
<td></td>
<td>Methanol</td>
<td>6.8%</td>
</tr>
<tr>
<td></td>
<td>Water</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

Plate 2
Chromatogram of Glycosides using HPTLC

Plate 3
Chromatogram of Glycosides using HPTLC
Table 4: Variation in metal contamination pattern in soil and different parts of C. epigaeus

<table>
<thead>
<tr>
<th>Name of the metals</th>
<th>Leaf</th>
<th>Stem</th>
<th>Tuber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>0.1</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Copper</td>
<td>1.0</td>
<td>0.65</td>
<td>0.25</td>
</tr>
<tr>
<td>Chromium</td>
<td>7.41</td>
<td>3.18</td>
<td>2.12</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

CONCLUSION
Pharmacognostical studies reported that the plant constituents are mostly water soluble and contains most of the secondary metabolites that are responsible for curing various ailments. Heavy metal studies also revealed that the plant is safe for oral consumption. Further quantitative phytochemical and pharmacological studies are undergoing to explore the medicinal efficacy of this plant.

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REFERENCES
