GC–MS ANALYSIS OF BIOACTIVE COMPOUNDS PRESENT IN ETHANOLIC LEAF EXTRACT *Acalypha indica*

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AUTHOR’S CONTRIBUTION

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Plant extracts protect against toxic chemical-induced injury by increasing the body’s levels of antioxidant molecules, such as glutathione, and enhancing the activity of antioxidant enzymes. *Acalypha indica* distributed in the southern part of India particularly in Tamilnadu has potential medicinal properties and it is used as diuretic, anthelmintic and for respiratory problems such as bronchitis, asthma, and pneumonia. Phytochemical secondary metabolites presences and absences in phytochemical screening by GC-MS revealed of 7 major bioactive compounds. Extracts of *Acalypha indica* may be useful in formulating and synthesizing new antibacterial drugs.

Keywords: *Acalypha indica*; GC-MS; phytochemicals; natural antibiotic properties.

1. INTRODUCTION

The Leaves, roots, tail and blossoms of *Acalypha indica* are utilized in Siddha System of Medicine for its restorative properties. *Acalypha indica* it is a typical yearly spice, found generally in the terraces of houses and waste spots all through the fields of India [1]. Plants are emetic, expectorant, purgative and diuretic; helpful in bronchitis, pneumonia, asthma, and aspiratory tuberculosis. Leaves are purgative and antiparasiticide; ground with regular salt or quicklime or lime juice applied remotely in scabies [2-7]. Leaf glue with lime juice is recommended for ringworm; leaf juice is emetic for youngsters [8]. The plants present in our environmental factors help to clean our current circumstance as well as its plant items are rich wellsprings of cell reinforcements just as contain phytochemicals of therapeutic employments [9]. In India since the antiquated time we are exceptionally rely upon the plant items for avoidance and fix of illnesses [10]. Allopathic drugs are costly as well as have many results [11]. It is set up truth that number of restoratively dynamic phytochemicals are acquired from plants [12]. In the only remaining century, huge advancement in bio-clinical science has vanquished numerous sicknesses anyway malignancy stays questionable particularly from a restorative point of view [13-17]. Malignancy is as yet the most well-known reason for death from sickness after myocardial dead tissue [18]. Tumor or neoplasm is normally characterized as a development of a strange mass of tissue because of uncontrolled cell development, while disease is the term of every dangerous tumor [19]. Numerous logical investigations that zeroed in on the pharmacological movement of bio-dynamic segments from plants as of late increment the premium from academic local area to recognize some novel malignant growths suppressant.
1.1 Natural Antibiotic Properties of Plant Secondary Metabolites

The plant synthetics are delegated essential or optional metabolites [20]. Essential metabolites are broadly conveyed in nature, happening in some structure in basically all living beings. In higher plants such mixes are frequently packed in seeds and vegetative stockpiling organs and are required for physiological advancement in view of their part in essential cell digestion [21-26]. Essential metabolites got from higher plants for business use are high volume-low worth mass synthetic compounds (for example vegetable oils, unsaturated fats, starches and so on) [27]. Nanoparticle type of selenium is a micronutrient with the structure of catalysts, for example, glutathione peroxidases, iodothyronine deiodinases, and thioredoxin reductase, which are associated with cell reinforcement and detoxification digestion, separately [28]. Leaves groups hostile to intermittent and diuretic properties, the leaves are utilized in jaundice, heaps, ailment ulcers and furthermore remotely skin emissions, ring worms, dermatitis. The leaves separate are applied to pastules, creepy crawly chomps. The roots are utilized in chest torment, joint torment and headache and blood looseness of the bowels. The concentrate of the root brought down the glucose level up to 30 % Chopra et al. [14,29]. Dengue infection contains seven proteins and Lassa infection contains four proteins, which are viewed as best for drug planning. Ongoing investigations have demonstrated that these proteins can successfully inactivate the dengue and lassa illnesses in people [30]. *Acalypha indica* phytochemicals are found to have against malignant growth and hostile to bacterial properties. In the specific examination, the coupling effect of five mixes that are available in the *Acalypha indica* with all the eleven proteins through in silico techniques was done.

2. MATERIALS AND METHODS

2.1 Plant Collection

The fresh leaves of *Acalypha indica* were collected from Saliyamangalam, Thanjavur District, Tamil Nadu, India.

2.2 Plant Material

The *Acalypha indica* leaves was dried up under shade, specifically diminish to a decently crude powder, and put away in golden hued sealed shut holders. The crude type of the medication was utilized for the declaration of physicochemical boundaries similar to dampness content, debris esteems, expanding file, frothing record, unfamiliar natural issue, extractive qualities, and fluorescence analysis.

2.3 Phytochemical Studies

Secondary metabolites in the present studies were carried out on the plant sample revealed the presence of medicinally active constituents. Beneficial drugs and to improve the patient health.

2.4 Preparation of Extracts

The powdered plant samples of leaves (100 g) were used for successive solvent extraction (500 ml) with increasing order of polarities like ethanol, methanol, water, chloroform. At that point it is kept in an orbital shaker at 190-220rpm for 48 hours. The supernatant was collected, filtered through Whatman No.1 filter
paper and the extract were concentrated by a Rotary flask evaporator at a specific temperature was used based on the solvent system. Each time previous to extract through the next solvent the remains was dried thoroughly to remove the solvent used. The acquired dried concentrate was then precisely gauged, put away in little vials at -20°C and utilized for the accompanying examinations.

2.5 Phytochemical Screening

The preliminary phytochemical evaluation was carried out by using standard procedure [31,32].

2.6 Gas Chromatography-Mass Spectrometry (GC-MS) Analysis

Clarus 500 Perkin-Elmer (Auto System XL) Gas Chromatograph equipped and coupled to a mass detector Turbo mass gold – Perking Elmer Turbomas 5.2 spectrometer with an Elite-1 (100% Dimethyl ply siloxane), 300 m x 0.25 mm x 1 μm df capillary column was used for GCMS analysis. Initially, the instrument was set to temperature of 110°C, and then maintained at the same temperature for 2 min. At the end of this period, the oven temperature was raised up to 280°C, at the rate of an increase of 5°C per minute and maintained for 9 min. The temperature of the injection port was ensured as 250°C and the flow rate of Helium as 1 ml/min. The ionization voltage was 70 eV. The samples were injected gradually in split mode as 10:1. The range of mass spectrum was set at 45-450 (mhz). The chemical constituents were identified by GC-MS. The discontinuity examples of mass spectra were contrasted and those put away in the spectrometer information base utilizing National Institute of Standards and Technology Mass Spectral information base (NIST-MS). The percentage of each
component was calculated from relative peak area of each component in the chromatogram.

2.7 Identification of Compounds

Translation of mass range of GC-MS was directed utilizing the information base of National Institute Standard and Technology (NIST) having in excess of 62,000 examples. The unknown component's spectrum was compared with the spectrum of the known components stored in the NIST library. The structure, name and sub-atomic load of the parts of the test materials was learned.

3. RESULTS AND DISCUSSION

The plants and its derivatives may considered as good sources of natural phytochemicals for medicinal uses such as against cancer, diabetic mellitus, cardiovascular diseases, aging and other diseases related to radical mechanisms. Plant-derived phytochemical therapy may be helpful for various free radical mediated diseases. Determination of the natural phytochemicals and antimicrobial compounds will help to develop new drugs.

3.1 Preliminary Phytochemical Screening

India is most likely the greatest creator of restorative flavors on the planet. These days allopathic framework utilization was diminished because of results, antagonistic responses, so now daily's natural medications use was expanded because of less results and tolerance acknowledgment in these manner home grown medications use was expanded. In the current examination, the endeavor is made to the phytochemical examination of the oil ether and ethyl acetic acid derivation concentrates of Acalypha indica leaves and performed antibacterial, antifungal and anthelmintic exercises [3,4].

Table 1. Qualitative analysis of phytochemicals analysis Acalypha indica leaves extract

<table>
<thead>
<tr>
<th>S. No</th>
<th>Analysed Phytochemicals factor</th>
<th>Ethanol</th>
<th>Methanol</th>
<th>Chloroform</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tannin</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td>Phlobatannins</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>Saponin</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Flavonoids</td>
<td>++</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Steroids</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>6.</td>
<td>Terpenoids</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7.</td>
<td>Triterpenoids</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>Alkaloids</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9.</td>
<td>Carbohydrate</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>10.</td>
<td>Protein</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>11.</td>
<td>Anthraquinone</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>12.</td>
<td>Polyphenol</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>13.</td>
<td>Glycoside</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Indications: “+” means positive activity, “-” means negative activity*

Fig. 4. GC-MS chromatogram of Acalypha indica leaves extract
Table 2. GCMS analysis - bioactive compounds Acalypha indica Ethanolic leaves extract

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Compound name</th>
<th>Retention time</th>
<th>Peak area (%)</th>
<th>Molecular formula</th>
<th>Molecular weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proline, 3,4-didehydro-, Cysteine</td>
<td>11.62</td>
<td>18.54</td>
<td>C5H7NO2</td>
<td>113</td>
</tr>
<tr>
<td>2</td>
<td>1H-Pyrrole-2,5-dione, 1-ethenyl-dione</td>
<td>13.09</td>
<td>3.1</td>
<td>C3H7NO2S</td>
<td>121.16</td>
</tr>
<tr>
<td>3</td>
<td>4-Amino-3-methoxyypyrazolo[3,4-d]pyrimidine,</td>
<td>18.82</td>
<td>9.67</td>
<td>C6H7NO2</td>
<td>123</td>
</tr>
<tr>
<td>4</td>
<td>Propanenitrile, 3-(5-diethylamino-1-methoxy-3-pentynyloxy)-kaempferol</td>
<td>20.85</td>
<td>22.95</td>
<td>C6H7N5O</td>
<td>165</td>
</tr>
<tr>
<td>5</td>
<td>Propanenitrile, 3-(5-diethylamino-1-methoxy-3-pentynyloxy)-kaempferol</td>
<td>23.79</td>
<td>12.05</td>
<td>C13H22N2O</td>
<td>223</td>
</tr>
<tr>
<td>6</td>
<td>3,8-Nanodiene-2-one,(E)-</td>
<td>24.71</td>
<td>33.0</td>
<td>C15H10O6</td>
<td>286.23</td>
</tr>
<tr>
<td>7</td>
<td>3,8-Nanodiene-2-one,(E)-</td>
<td>27.90</td>
<td>20.06</td>
<td>C9H14O</td>
<td>138</td>
</tr>
</tbody>
</table>

Every constituent plays an important role and deficiency of any one constituent may lead to abnormal developments in the body [25]. The saponin compounds contained in the leaf extract of these Anting-antings are compounds in the form of glycosides. The mechanism of saponin compounds as anthelmintics is that it has the potential to kill worms because it works by inhibiting the acetylcholinesterase enzyme and irritating the mucous membranes, so that the worms will experience muscle paralysis and lead to death [33-35]. While the mechanism of action possessed by tannins is by disrupting the worm's negative ion body charge into positive ions (protonization), which then attract positive worm body proteins in the gastrointestinal tract, thus disrupting the metabolism and homeostasis of the worm's body.

Acalypha indica is a typical yearly spice, found generally in the patios of houses and waste spots all through the fields of India. Plants are emetic, expectorant, purgative and diuretic; helpful in bronchitis, pneumonia, asthma and aspiratory tuberculosis. Leaves are diuretic and antiparasiticid; ground with regular salt or quicklime or lime juice applied remotely in scabies. Leaf glue with lime juice recommended for ringworm [36]. Leaf juice is emetic for youngsters. A decoction of the leaves is given in ear infection. Powder of the dry leaves is given to kids to expell worms; likewise given as decoction with little garlic [34]. In homeopathy, the plant is utilized in serious hack related with seeping from lungs, haemoptysis Ethanolic concentrate of Acalypha indica was exposed to GC-MS concentrate for recognizable proof of therapeutic properties, According to the outcomes, the Phytocomponents are screened, and a large portion of the restorative properties are 1H-Pyrrole-2,5-dione, 1-ethenyl, 3,8-Nanodiene-2-one,(E)-, Proline, 3,4-didehydro-, 4-Amino-3-methoxyopyrazolo [3,4-d]pyrimidine, Propanenitrile, 3-(5-diethylamino-1-methoxy-3-pentynyloxy)- mixes.

4. SUMMARY AND CONCLUSION

As there are Acalypha indica recharged interests in home grown based meds to thwart the symptoms of manufactured medications, the journey to discover new and one of a kind sub-atomic structures of plant starting point as significant constituents of some characteristic items, and those of present day drugs as methods for fighting headstrong infections is likewise on the increment. Acalypha indica leaves are a rich wellspring of phytochemicals and potential antimicrobial movement that can be significant in irresistible infection avoidance and wellbeing safeguarding. The impact of A. indica separate was seen in both cell lines and it is clear that the concentrate can prompted apoptosis and cell passing [37]. The plausible instrument in causing the phone demise or apoptosis is by interfacing with the phone film proteins and making the phone release its phone pathways driving or setting off the cell demise pathways. The specific system of activity must be concentrated in subtleties, so we could comprehend the specific instrument of activity, as this is could be better wellspring of treatment in treating or controlling the Psoriasis sickness or skin related illnesses. Spectroscopic examination from GC – MS considers (Fig. 1) show that the significant segments are the Cysteine (top zone 25%), Propanenitrile, 3-(5-diethylamino-1-methoxy-3-pentynyloxy)- (top territory 100%). Than it was against that the ethanolic concentrate of the plant of Acalypha indica was successful against both gram positive, gram negative microorganisms. Subsequently it very well may be reasoned that
antimicrobial movement of *Acalypha indica* against microscopic organisms shows its restorative worth and supports the far reaching utilization of the plant as neighborhood solution for an assortment of infirmities going from ulcers to bronchitis. various significant natural exercises including cancer prevention agent, antidiabetic and antimicrobial exercises. The extraction procedure and the dissolvable ought to be painstakingly picked by the ideal bioactivity.

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**COMPETING INTERESTS**

Author has declared that no competing interests exist.

**REFERENCES**


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