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GC-MS analysis and antibacterial evaluation of *Acalypha indica*

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ABSTRACT

Acalypha indica distributed in the southern part of India particularly in Tamilnadu and it has potential medicinal properties and used as diuretic, anthelmintic and for respiratory problems such as bronchitis, asthma and pneumonia. The present work has been designed to investigate the preliminary phytochemical, antibacterial and GC-MS analysis of methanolic extract of the plant. Phytochemical screening of leaves extract revealed that the presence of alkaloids, tannins, steroids, saponins, flavanoids, glycosides and phenolic compounds. The methanolic extract of leaves is found to be exhibit activity against Escherichia coli, Salmonella typhi, Pseudomonous aeruginosa and Staphylococcus aureus. Various phytochemical compounds are identified by GC-MS analysis.

Key words: *Acalypha indica*, Phyto chemicals, GC-MS, Antibacterial.

INTRODUCTION

Acalypha indica is a common annual herb, found mostly in the backyards of houses and waste places throughout the plains of India. Plants are used as emetic, expectorant, laxative, diuretic bronchitis, pneumonia, asthma and pulmonary tuberculosis. In homeopathy, the plant is used in severe cough associated with bleeding from lungs, haemoptysis and incipient phthisis [1]. The plant is traditionally used as an expectorant against asthma and pneumonia, and also as an emetic and anthelminthic [2] . In recent years secondary plant metabolites have been extensively investigated as a source of medicinal agents [3]. Today natural products derived from plants are being tested for presence of new drugs with new modes of pharmacological action[4]. Artificial drugs have unpleasant side effects, on the other hand, the number of drug resistant micro organisms is increasing, so researches are trying to pay more attention to herbal drugs[13]. The traditional medicinal methods, specially the use of medicinal plants, still play a vital role to cover the basic health needs in the developing countries [14].

Acalypha indica contains acalyphine which is used in the treatment of sore gums [5]. The plant is reported to have a post-coital antifertility effect, anti-venom properties, wound healing effects, antioxidant activities, anti-inflammatory effects, Till now, the investigation of phytocomponents by GC–MS has not been done on *Acalypha indica*. In the present study, the methanolic extract of *Acalypha indica* was evaluated for GC – MS analysis.

MATERIALS AND METHODS

Collection of plant materials

Acalypha indica collected at Thottiam village in Tiruchirappalli District. The collected leaves were washed thoroughly with distilled water for the removal of dust and soil particles. The leaves were shaded and dried.

Preparation of plant extracts

100g of *Acalypha indica* leaves were first defatted using hexane and extracted with 500ml of methanol using Soxhlet apparatus. The extraction was carried out for 12 hours and the extract was thereafter concentrated[8].

Qualitative phytochemical analysis

Test for Alkaloids (Mayer's Test)

The extract of *Acalypha indica* was evaporated to dryness and the residue was heated on a boiling water bath with 2% Hydrochloric acid. After cooling, the mixture was filtered and treated with a few drops of Mayer's reagent. yellow colour was observed. It indicates that the presence of Alkaloids.

Test for Tannins

0.5 ml of extract solution 1 ml of distilled water and 1-2 drops of ferric chloride solution was added. Blue colour was observed for Gallic tannins and green black for catecholic tannins[12].

Test for Terpenoid and Steroid

4 ml of extract was treated with 0.5 ml of acetic anhydride and 0.5 ml of chloroform. Then concentrated solution of sulphuric acid was added slowly and red violet colour was observed for terpenoid and green bluish colour for steroids[10].

Test for Reducing sugars

0.5 ml of extract solution 1 ml of distilled water and 5-8 drops of Fehling's solution was added and heated. The brick red precipitate was formed. Hence reducing sugar was identified.

Test for Glycoside

The plant extract 5ml is mixed with Glacial acetic acid, few drops of Ferric chloride and Concentrated sulphuric acid are added, and observed for reddish brown colouration at the junction of two layers and the bluish green colour in the upper layer was famed. It indicates the presence of Glycosides.

Test for saponins

The plant extract 50ml was diluted with 20 ml of distilled water and it was agitated in a graduated cylinder for 15 minutes. The formation of 1 cm layer of foam showed the presence of saponins.

Test for Flavonoids

1 ml of the plant extract and a few drops of dilute sodium hydroxide was added. An intense yellow colour was produced which become colourless on addition of a few drops of dilute acid indicates the presence of flavonoids[9].

Test for Phenolic compounds

The plant 5ml was dissolved in distilled water. Then few drops 1% lead acetate was added. A bulky white precipitate was formed, which indicates that the presence of phenolic compounds.

RESULTS AND DISCUSSION

Preliminary phytochemical analysis

Qualitative preliminary screenings of extracts were performed initially with different chemical reagents to detect the phytochemical constituents present in methanolic extract. The extract shows the presence of alkaloids, saponins, tannins, flavonids, steroids, terpenoids and phenolic compounds.

GC – MS studies

The methanolic extract of the whole plant of *Acalypha indica* was subjected to GC – MS studies. The various plant phytochemical components found in the plant of *Acalypha indica* methanolic extract are listed in table-1. Interpretation on mass spectrum GC-MS was conducted using the database of (NIST)[12]. The name, molecular weight and structure of the components of the test materials were ascertained in Table 1. Methanolic extract of *Acalypha indica* was subjected to GC-MS study for identification of medicinal properties, According to the results, the Phytocomponents are screened, and most of the medicinal properties are 1H-Pyrrole-2,5-dione,1- ethenyl-, Cysteine, 3,8-Nanodiene-2-one,(E)-, Proline,3,4-didehydro-, 4-Amino-3-methoxypyrazolo[3,4-d] pyrimidine,

Propanenitrile, 3-(5-diethylamino-1- methoxy-3-pentynyloxy)- and Kaempfeorl compounds are observed in *Acalypha indica* plant extracts.

Antimicrobial studies

Methanolic extract of *Acalypha indica.* plant shows antimicrobial activity against the tested organisms in the order of *Escherichia coli (18mm), Salmonella typhi (16mm), Pseudomonous aeruginosa (15mm), Staphylococcus aureus (8mm)*. In case of the Maximal antibacterial activity was observed against *Escherichia coli*. Table - 2.

Figure 1: GC – MS Chromatogram of *Acalypha indica*

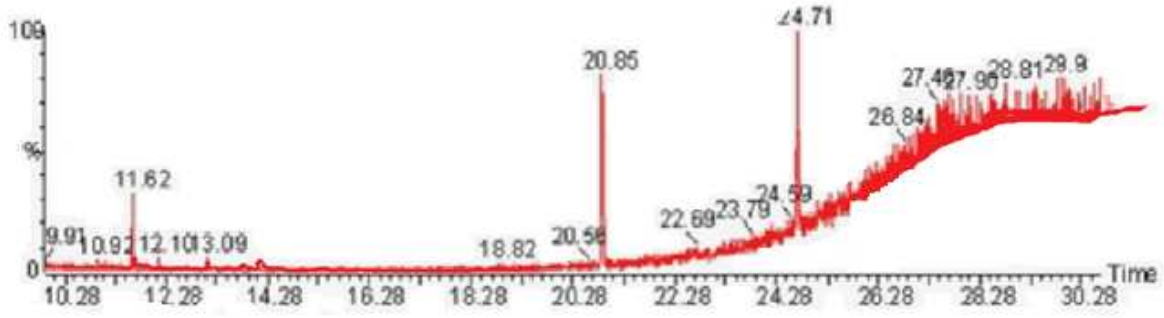

Table 1: Phyto chemical components identified for Sample *Acalypha indica* (GC –MS Study)

S. No	RT	Name of the Compound	Molecular Formula	Molecular Weight	Peak Area%
1	11.62	Proline,3,4-didehydro-,	$C_5H_7NO_2$	113	18.54
2	13.09	Cysteine	$C_3H_7NO_2S$	121.16	3.1
3	18.82	1H-Pyrrole-2,5-dione,1- ethenyl-	$C_6H_7NO_2$	123	9.67
4	20.85	4-Amino-3-methoxypyrazolo[3,4- d]pyrimidine,	$C_6H_7N_5O$	165	22.95
5	23.79	Propanenitrile,3-(5-diethylamino-1- methoxy-3-pentynyloxy)-	$C_{13}H_{22}N_2O$	223	12.5
6	24.71	Kaempfeorl	$C_{15}H_{10}O_6$	286.23	33.0
7	27.90	3,8-Nanodiene-2-one,(E)-	$C_9H_{14}O$	138	20.6

Table 2. Antibacterial activity of *Acalypha indica* methanolic extract against bacterial pathogens

Compound	Weight of the compound (µg /ml)	*Escherichia coli*	*Salmonella typhi*	*Pseudomonous aeruginosa*	*Staphylococcus aureus*
Standard *Erythromycin*	30	28	20	23	21
Acalypha indica	50	18	16	15	8

CONCLUSION

Spectroscopic analysis from GC –MS studies (Fig:1) show that the major components are the Cysteine (peak area 25%), Propanenitrile,3-(5-diethylamino-1- methoxy-3-pentynyloxy)- (peak area 100%). Than it was against that the methanolic extract of the plant of *Acalypha indica* was effective against both gram positive, gram negative bacteria . Therefore it can be concluded that antimicrobial activity of *Acalypha indica* against bacteria shows its medicinal value and supports the widespread use of the plant as local remedy for a variety of ailments ranging from ulcers to bronchitis.

Analysis of the data in Table 2 shows that the *Acalypha indica* have fairly good antibacterial activity which is however less than that of the activity of the standard *Erythromycin.[11]*

REFERENCES

[1] Ghani A. Medicinal plants of Bangladesh. Chemical constituents and uses. 2nd ed. The Asiatic Society of Bangladesh, Dhaka, **2003**, 63 – 438.

[2] Nameirakpam Nirjanta Devi, John Prabakaran J, Femina Wahab. *Asian Pacific Journal of Tropica Biomedicine* **2012**. S1280-S1284
[3] Okoli RI, Turay AA, Mensah JK and Aigbe AO., Nigeria, www.Sciencepub. Net.**2009**.
[4] Charles A Leo Stanly A, Joseph M, Alex Ramani V. *Asian J. Plant .Sci.Rec*.,**2011**, 1(4): 25 – 32.
[5] Zahir Hussain A and Aruna Ignatiust.,. *Asian Journal of Chemistry* Vol.22,No.5,**2010**, 3591-3595
[6] Gothandam KM, Aishwarya A, Karthikeyan S., *Journal of Phytology* **2010**, 2, 01 – 06.
[7] Duyilemi O.P and Lawal I.O. *Asian. J. Food Ag-Ind.* **2009**, *Special Issue*, S75-S79
[8] Rachana Mishra and D.L. Verma. *Nature Science*, **2009**: 7(6) ISSN 1545 - 0740
[9] Thamaraiselvi, Lalitha P and Jayanthi P., *Asian Journal of Science and research*, **2012**,2(2):115-122.
[10] Siddiqui A and Ali M., Practical pharmaceutical chemistry. First edition, CBS Publishers and distributors, New Delhi, **1997**, 126 – 131.
[11] Elavarasan R and Senthil Kumar R. *Int.J.Pharma.Sci. and Res*. **2012**, 3, 1516 – 1519.
[12] Sathyaprabha .G et al. *Journal of Pharmacy Research* **2010**,3 (12), 2970 -2973.
[13] Anitha Rani A, Mary Josephine Punitha S and Sangeetha G. *Adv.Appl.Sci.Res*., **2013**, 4(2): 15–18.
[14] Parastoo Karimi Alavijeh, Parisa Karimi Alavijeh and Devindra Sharma. *Asian J Plant Sci. Res*., **2012**, 2(4): 496 – 502.