International Journal of Research and Development in Pharmacy and Life Sciences
Available online at http//www.ijrdpl.com
December - January, 2015, Vol. 4, No.1, pp 1328-1333
ISSN (P): 2393-932X, ISSN (E): 2278-0238

Research Article

GC-MS ANALYSIS OF BIOACTIVE COMPOUNDS ON ETHYL ACETATE EXTRACT OF CORDIA MONOICA ROXB. LEAVES

R. Sivakumar*, A. Dhivya

Department of Biotechnology, SNR Sons College (Autonomous), Coimbatore 641 006

***Corresponding Author: Email drsiva2010@gmail.com**

(Received: August 09, 2014**; Accepted:** October 25, 2014**)**

ABSTRACT

Objective: To evaluate the bioactive compounds of ethyl extract of Cordia monoica Roxb. leaves using GCMS analysis.
Methods: The leaves of the plant were extracted with ethyl acetate and analyzed using gas chromatography- mass spectrometry. The mass spectra of the compounds were matched with the National Institute of standards and technology (NIST) library.
Results: The analysis revealed the presence of 20 compounds. Some of the bioactive compounds screened include Phytol acetate, n-hexadecanoic acid, neophytadiene, neopentyl hydroxyl acetate and nonacosane. The compounds were identified by comparing with retention time and peak area and by interpretation of mass spectra.
Conclusion: From the result it can be concluded that the bioactive compounds have many applications like antioxidant, anticancer and anti-inflammatory properties.
Keywords: Nonacosane, Neopentyl hydroxyl acetate, Ethyl acetate.

INTRODUCTION

Plants are fundamental source for all other living organisms. During the evolution process plants represent the first stage and they produce the most important materials such as nutrients, fuel, oxygen, etc. Higher plants also play a dominant role in the maintenance of human health by producing many bioactive compounds. Green plants represent a reservoir of effective chemotherapeutants that are easily biodegradable, systemic and non phytotoxic. (Vyas.GD, 1999, Kaushik et al., 2002; Chaman Lal and Verma, 2006). Human beings have identified more than 7.5 lakhs species of plants on earth. (Ross. M.S.R & Brain, K.R. 1977 and Hosler, D.M & Mikita. M. A.). Still about10% of plants remains unestablished.

Plants are rich source of secondary metabolites with various biological activities. (Defatima etal, 2006). The chemical compounds present in the plant should be analyzed not only for discovery of drugs but also for identifying new phytocompounds for the synthesis of complex substance and to discover the actual remedies. (Milne et al, 1993). Phytochemicals present in herbal medicinal plants, spices, vegetables and fruits have a protective role against many diseases. They also inhibit oxidation process through a variety of mechanism and they act as radical scavengers.

Chromatography is a separation technique in which a mobile phase carrying the mixture is moved through a selective absorbent stationary phase. It is a technique for quality control and standardization of phyto components. (Andrew 2007). Gas chromatography involves the principle of adsorption and partition, is an important tool for separation of volatile compounds. Medicinal plants are directly analysed for their existing compounds by GCMS technique. It is mainly used for the determination of thermochemical constants, for purification of compounds and for qualitative

and quantitative analysis of mixtures. Few reports are available on the pharmacological properties of the plant. The present study has been undertaken to investigate the bioactive compounds present in ethyl acetate extract of Cordia monoica leaves.

MORPHOLOGICAL DESCRIPTION:

Cordia monoica (Family: Borangiacea) commonly known as sand paper saucer-berry or Snot berry (Hyde et al., 2014). Trees grow upto 10 m in height. The branchlets are lenticellate, tomentose. Leaves are simple, alternate, estipulate. Flowers are white in color and polygamous. calyx tube 8 mm, densely tomentose outside, glabrous inside, unevenly 3-4 lobed, lobes 5 mm, triangular, accrescent; corolla funnel shaped, lobes 4-5, longer than the tube, oblong, stamens 4-5; filaments were attached to the mouth of corolla tube, glabrous; anthers 1.5 mm, ovary superior, 4-celled, hairy, ovule one in each cell; stigma clavate. Fruit a drupe, are yellow in color, seed one. (Umberto Quattrocchi, 2000).

Distribution: India, Kenya, Tanzania, Uganda, Angola, Burundi, Mozambique, Zimbabwe, Swaziland, South Africa. (Nandkarni, 1976 and Umberto Quattrocchi 2000).

Uses: Cordia monoica has a potential role in traditional medicine. The leaves and bark were used to treat leprosy. The leaves were also used in treatment of eye diseases. The leaves are tough and used as sand paper. The wood is tough which were used for construction and as fuel. The pulp of the fruit is edible. ((Umberto Quattrocchi 2000; Ruffo, C.K et al., 2002)

MATERIALS AND METHODS:

Collection of the Plant Material:

Cordia monoica leaves were collected from The Nilgiris, India. It was identified and authenticated at Botanical Survey of India, Coimbatore, India.

Preparation of leaf powder:

Leaves were collected, washed with sterile distilled water and shade dried. The leaves were powdered and stored in an air tight container at room temperature.

GC-MS analysis:

The leaves of Cordia monica sample with bio-activity was selected to perform the gas chromatography-mass spectrometry (GC-MS) analysis. The samples were prepared for GC-MS analysis by following procedure. 50g of powdered sample was dissolved in 50 mL of ethanol. One micro liter of sample was injected into the gas chromatography (GC Thermo, Trace Ultra 5.0, Thermo MS DSQ II). Separation of compound was achieved using ZB 5 MS Column, (30 mtsX0.25 mmX 0.25 micro m). The oven temperature was elevated from 70° C to 260° C at 6° C/min. The carrier gas Helium was passed through at a flow rate of 1.0ml/min. The run time was 3.15 to 43.02 minutes. The Compounds were identified with the help of Wiley and NIST Libraries based on their molecular mass.

RESULT:

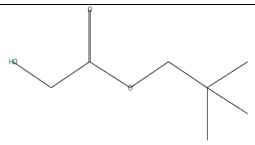
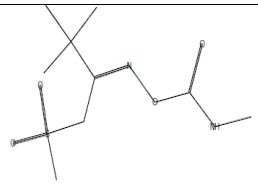
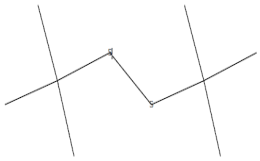
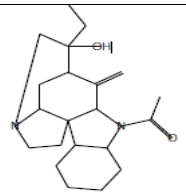
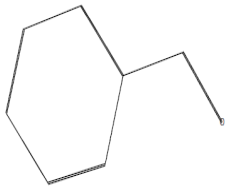
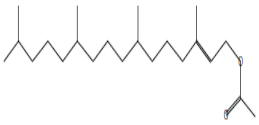
Chemical composition analysis of Cordia monoica leaves (ethyl acetate) by GC-MS:

The main compounds of the ethyl acetate extract of the Cordia monoica were identified by GC-MS. A number of 20 spectral peaks were detected in GC-MS analysis of cordia monoica. These peaks were detected at retention time (RT) 3.21, 22.38, 26.50, 28.05 30.67, 32.36, 34.61, 36.36, 38.50 and 40.09 (Table I). Among these 30 peaks, 20 peaks were identified by mass spectroscopy (MS); these compounds may responsible for antioxidant, anticancer, anti-inflammatory activity of Cordia monoica. The compounds were neopentyl hydroxyl acetate, nonacosane, hexadecanoic acid,phytol acetate and octasilaxane.

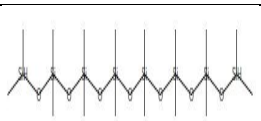
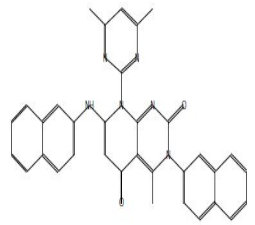
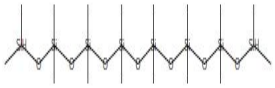
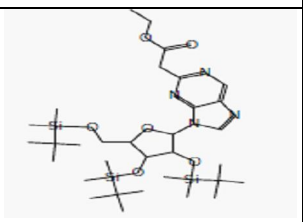
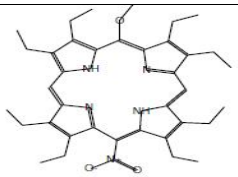
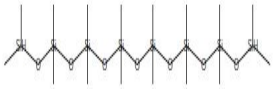
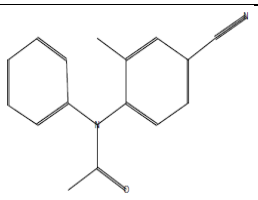
DISCUSSION:

The Ethyl acetate extract of Cordia monoica leaves showed different peaks (Figure-1) and the compounds have been identified by comparing with WILEY and NIST libraries. From the result, it was observed that neopentyl hydroxy acetate is an ester (Ambethkar A. and Ananthalakshmi S, 2014) with highest peak. For instance, Phytol, acetate is a phytol compound with Antimicrobial, anti-inflammatory, anticancer and antidiuretic properties. (Sermakkani. M and Thangapandian V, 2012). Neophytadiene is reported to be an antibacterial (Olena Konovalova1 et al., 2013), antipyretic, analgesic, and anti-inflammatory, antimicrobial, antioxidant (Palic, R, 2002). It is a fatty acid-related compound and plays an important role in competitive inhibition of lipoxygenase or cyclooxygenase in an inflammation reduction, resulting in decreased production of prostaglandins and leukotrienes. (James MJ et al., 2000). Hexadecanoic acid, methyl ester is a fatty acid ester having antioxidant (Jegadeeswari P, 2012), flavor, contd.

Table 1: GC-MS revealed the presence of Phytochemical components in ethyl acetate leaf extract of C*ordia monoica* Roxb.

S. No	RT	Compound Name	Molecular Formula	MW	Peak area	Structural Formulae
1	3.21	Neopentyl hydroxyacetate	C7H14O3	146	98.41	
2	3.72	2-Butanone, 3,3-dimethyl-1-(methylsulfonyl)-, O-[(methylamino)carbonyl]oxime (1) (Thiofanox sulfone)	C9H18N2O4S	250	0.07	
3	4.15	Disulfide, bis(1,1-dimethylethyl) (CAS)	C8H18S2	178	0.05	
4	5.04	Strychane, 1-acetyl-20à-hydroxy-16-methylene-	C21H26N2O2	338	0.01	
5	6.58	Benzaldehyde (CAS)	C7H6O	106	0.05	
6	22.38	Phytol, acetate	C22H42O2	338	0.02	
7	22.38	Neophytadiene	C20H38	278	0.02	
8	23.40	Hexadecanoic acid, methyl ester (CAS)	C17H34O2	270	0.01	

Contd.

9	29.79	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15 -hexadecamethyl-	C16H50O7Si8	578	0.01	
10	30.67	2''-Naphthylamino)-8-(4',6'-dimethyl-2'-pyrimidinyl)-3-phe Nyl-4-methyl-3H,8H-pyrido[2,3-d]pyrimidine-2,5-dione	C34H26N6O2	550	0.05	
11	32.01	1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15 -hexadecamet Hyloctasiloxane #	C16H50O7Si8	578	0.01	
12	32.36	2-ethoxycarbonylmethyl-9(2,3,5-tri-O-(2-methylprop-2-yl) Dimethylsilyloxy-á-D-ribofuranosyl)purine	C32H60N4O6Si3	680	0.05	
13	33.68	1,1,3,3,5,5,7,7,9,9,11,11,13,13-tetradecamethyl-h Eptasiloxane	C14H44O6Si7	504	0.03	
14	34.00	5-methoxy-15-nitro-2,3,7,8,12,13,17,18-octaethylporphyrin	C37H47N5O3	609	0.03	
15	35.35	1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15 -HEXADECAMET HYLOCTASILOXANE #	C16H50O7Si8	578	0.01	
16	36.06	4-Cyano-2-Methyl-N-phenylacetanilide	C16H14N2O	250	0.02	

Contd.

17	36.36	Octacosane (CAS)	C28H58	394	0.02	
18	38.50	10-demethylsqualene	C29H48	396	0.03	
19	38.95	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15 -hexadecamethyl-	C16H50O7S i8	578	0.02	
20	40.69	Nonacosane	C29H60	408	0.24	

RT- Retention Time MW – Molecular weight

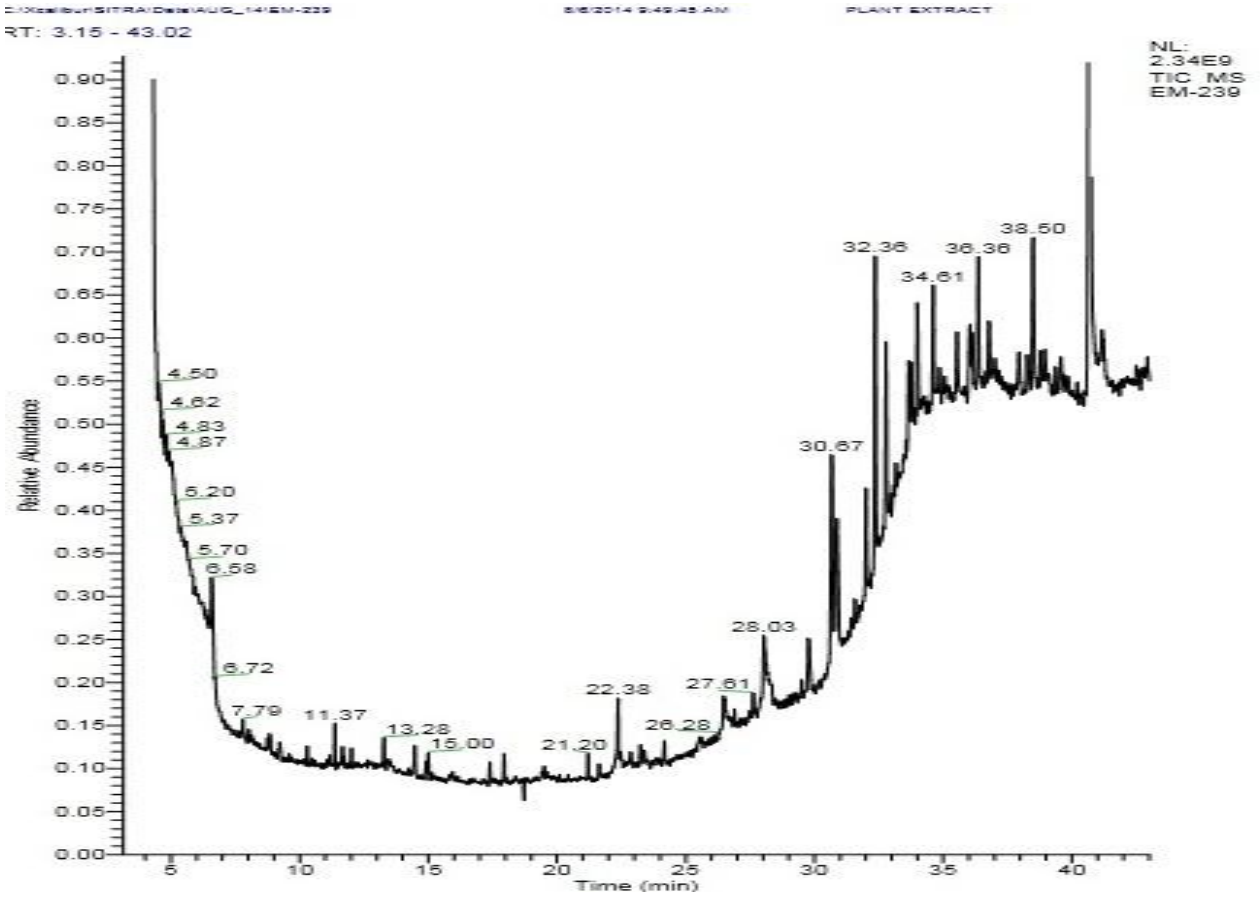


Figure 1: GC-MS profiling on ethyl acetate extract of cordia monoica (roxb) leaves

Hypocholesterolemic, Pesticide, 5-Alpha reductase inhibitor activity. (Sermakkani M, Thangapandian V, 2012, Easwaran L, 2014). Nonacosane is a Straight chain hydrocarbon having antibacterial (Mihailovi V, 2011), Antihypertensive, Vasodilator, Angiotensin AT-II receptor antagonist and Saluretic activity. These phytochemicals are responsible for the pharmacological use of Cordia monoica to treat various diseases.

CONCLUSION:

This investigation has given preliminary information to determine the chemical composition of Cordia monoica using GC-MS. The presence of these bioactive compounds in cordia monoica leaves lends credence to its use by the human community. It also holds for the production of novel drugs with isolation of specific compounds.

REFERENCES:

1. Ambethkar A, Ananthalakshmi S. (2014) Int. J. Pharm. Life Sci., 5 (3):3389-3393.
2. Andrew Marston, (2007). Phytochemistry, 68: 2785-2797.
3. Chaman Lal, Verma LR. (2006) Indian Journal of Traditional Knowledge; 5(1): 79- 82.
4. De-Fatima A, Modolo LV, Conegero LS, Pilli RA, Ferreira CV, Kohn LK, de-Carvalho JE. (2006). Curr. Med. Chem., 13: 3371-3384.
5. Easwaran L., Ramani V. L.. (2014) Int. J.Res. Dev.Pharm. L. Sci., 3(5), pp. 1180-1188.
6. Hosler, D. M., M. A. Mikita. (1987). Journal of Chemical Education, 64(4): 328-332.
7. Hyde, M.A., Wursten, B.T., Ballings, P. and Coates Palgrave, M. (2014). Flora of Zimbabwe: Species information: Cordia monoica.
8. James MJ, Gibson RA, Cleland LG, (2000). Amer. J. Clinical Nutrition; 71:343S-348S.
9. Jegadeeswari P., Nishanthini A., Muthukumaraswamy S. and Mohan VR, (2012). J. Curr. Chem. Pharm. Sci.; 2:226-236
10. Kaushik JC, Arya Sanjay, Tripathi NN, Arya S, (2002). Indian Journal of Forestry, 25: 359-361.
11. Lakshmi S. Pillai and Bindu R. Nair, (2013). IJPSR, Vol. 4(5): 1930-1933.
12. Mihailovi V, Vukovi N, NiforoviN, SolujiS, Mladenovi M, MaškoviP et al., (2011). J Med Plant Res; 5(7): 1164-1174.
13. Nadkarni AK, Dr. K. M, Nadkarni's: "Indian Materia Medica. With ayurvedic, unani- tibbi, siddha, allopathic, homeopathic, naturopathic & home remedie", Popular Prakashan, Bombay,Ed 3rd Vol. 1 & 2, (1976).
14. Olena Konovalova1, Evgenia Gergel , Vitaliy Herhel (2013), The Pharma Innovation – Journal, 2(6): 7-12
15. Palic, R., G. Stojanovic, S. Alagic, M. Nikolic and Z. Lepojevic, (2002). Prilep. Flavour Fragr. J., 17, 323-326.
16. Easwaran L., Ramani V. L., "Phytochemical examination and gc-ms studies of the medicinal plant - Naraveliazeylanica", Int. J. Res. Dev.Pharm. L. Sci., 2014, 3(5), pp. 1180-1188.
17. Ross. M.S.R & Brain, K.R. (1977). An Introduction to Phytopharmacy. Pitman Medical, Kent, p.84.
18. Ruffo, C.K., Birnie, A. and Tengnas, B. "Edible Wild Plants of Tanzania", Regional Land Management Unit, Nairobi, 204-205 , (2002).
19. Sermakkani M, Thangapandian V. (2012). Asian J Pharm Clin Res, 2012; 5 (2): 90-94.
20. Umberto Quattrocchi: "CRC World Dictionary of medicinal and poisonous plants: A-C". CRC Press, 1124. (2000).
21. Vyas GD, (1999). Journal of Indian Botanical Society, 78: 177-178.

How to cite your article:
Shivakumar R., Dhivya A., "GC-MS analysis of bioactive compounds on ethyl acetate extract of cordia monoica roxb. leaves", Int. J. Res. Dev. Pharm. L. Sci., 2015, 4(1), pp. 1328-1333.

