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GC-MS analysis of methanol extracts of *Vernonia cinerea*

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ABSTRACT

In this study, the bioactive compounds of Vernonia cinerea have been evaluvated using GC-MS. The chemical compositions of the whole plant methanol extract of Vernonia cinerea were investigated using Perkin-Elmer Gas Chromatography - Mass Spectroscopy. GC-MS analysis of V. cinerea plant methanol extract revealed the existence of the GC-MS chromatogram of the seven peaks presented .The major compound n-hexadecanoic acid (42-88%) (Retention time16.26) and 1,2 benzenedicarboxylic acid disoocty ester (23.00) (Retention time 24.81) .

Keywords : GC-MS analysis Bioactive compounds *Vernonia cinerea*, Methanol extract.

INTRODCTION

Vernonia cinerea (L.) belonging to the family Asteraceae is an annual plant widely distributed in India, Bangladesh, Sri Lanka and Malay island [1]. It is commonly known as 'little ironweed' in English, 'joanbeer', 'kukshim' in Bengali, 'puvamkurunnel' in Malayalam and 'sahadevi' in Sanskrit and Hindi [2]. The plant is extensively used in indigenous medicine as stomachic and for cold, asthma and bronchitis [3]. The Ayurvedha Pharmacopoeia of India recommends the plant to treat intermittent fever, filariasis, blisters, boils and vaginal discharges. The roots of the plant are used traditionally for the treatment of all types of eruptive boils and the juice is used for quicker healing of accidental wounds, filariasis and toxic viral fevers. The seeds are used in dysuria and to treat colic in the form of decoction [4]. The young leaves of this plant are used for the treatment of tonsillitis [5]. The leaf juice extract is used to treat skin diseases and the leaf extract for treating dysentery in children [6].Besides these, the plant is used in smoking cessation, cough, fever, malaria, urinary calculi, arthritis [7-9]and leprosy [10]. The plant possess antimicrobial [11], antibacterial [12], antioxidant [13], antihelmentic [14], anti-inflammatory, analgesic, antipyretic [15,16], antiflautulent, antispasmodic and antidiuretic properties [17]. Some of the phytochemical compounds present are sterols, flavonoids, sesquiterpene lactones [18] and a terpenoid, 'leupeol acetate' which shows antihyperglycaemic and antiulcer properties.*Vernonia amygdalina* also known as "bitter leaf" is a widely used medicinal plant in Africa for its antihypertensive effects. Leaves from this plant serve as vegetable and culinary herb in soup [19]. In traditional Nigerian homes, extracts of the plant are used as tonic, in the control of tick and treatment of cough, feverish condition, constipation and hypertension [20-22].Economically the family is of considerable importance, it includes sources of food to man but many members are noxious weeds and others are used to a limited extent in medicinal or patented preparations [23].The leaves may be consumed either as a vegetable or aqueous extracts as tonics for the treatment of various illnesses. In the wild, chempanzee have been observed to ingest the leaves when suffering from parasitic infections [24].

MATERIALS AND METHODS

Plant material

Vernonia cinerea was collected from Tamil university, Campus ,Thanjavur District,Tamil Nadu in India and Identified by Prof.Dr.A.Rajendran ,Research Gaide,Dept of Botany, Bharathiar University, Coimbatore.

Preparation of extract

The Sample were dried and Pulverized to powder in a mechanical grinder.Required quantity of the whole plant powder of *Vernonia cinerea* was weighted ,transferred to flaske, treated with the Methanol until the powder was fully immersed,incubated over night and filtered through a Whatmann No.41 filterpaper along with Sodium sulphate was wetted with absolute alcohol.The filtrate is then concentrated to 1ml by bubbling nitrogen gas in to the solution. The extract contains both polar and non-polar components of the material and 2ul sample of the solution was employed in GC-MS for analysis of different compounds.

GC – MS analysis.

The GC – MS analysis was carried out using a Clarus 500 Perkin – elmer (Auto system XL) Gas Chromatograph equipped and coupled to a mass detector Turbo mass gold – Perkin Elmer Turbomass 5.1 spectrometer with an Elite – 1 (100% Dimethyl poly siloxane), 30m x 0.25 mm ID x 1µm of capillary column. The instrument was set to an initial temperature of 110^{o}C, and maintained at this temperature for 2 min. At the end of this period the oven temperature was rose up to 280^{o}C, at the rate of an increase of 5^{o}C/min, and maintained for 9 min. Injection port temperature was ensured as 250^{o}C and Helium flow rate as one ml/min. The ionization voltage was 70eV. The samples were injected in split mode as 10:1. Mass spectral scan range was set at 45-450 (m/z).

Using computer searches on a NIST Ver.2.1 MS data library and comparing the spectrum obtained through GC – MS compounds present in the plants sample were identified.

Identification of phytocompounds

Interpretation on Mass-Spectrum GC-MS was conducted using the dadabase of National institute Standard and Tecnology (NIST)having more 62,000 patterns. The spectrum of the unknown components was compared with the The spectrum of known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained.

RESULTS AND DISCUSSION

The studies on the active principles in the whole plant *Vernonia cinerea* Methanolic extract by GC-MS analysis clearly showed the presence of nine compounds.The active principles with their retention time (RT).molecular formula, molecular weight (MW),and concentration (peak area%)are presented in Table-1.The GC-MS chromatogram of the seven peak of the compounds detected was shown in Figure-1.The compounds identified by the mass spectroscopy were presented. The total numbers of compounds indentified in methanol extracts were, the GC- MS. retention time (RT) and percentage peak of the individual compounds. The results revealed that n-hexadecanoic acid (42-88%) 1,2 benzenedicarboxylic acid, diisoocty ester (23.00) and squalence (11.31%) was found as the 3 major component in the methanol extract., the six minor compounds such as caryophyllene oxide (2.31%) Guaiol (1.75% 3,7,11,15 Tetramethyl -2- hexadecen -1-01(2.87) decanoic acid, ethyl ester (2.10%) 9,12 Octadecanoic and(z-z)-(9.38) and octadecanoic and (4.,41%).

Vadivel,2011 [25] reported the ethanolic extract of Mussaenda frondosa has been subjected to GC-MS analysis. Twenty chemical constituents have been identified. The major chemical constituents are (-)-Quinic acid(32.87%),4-(IE)-3-Hydroxy-1-Propenyl)-2-methoxy phenol(8.30%), Naphthalene,decahydro-2-methoxy-(7.20%),1,2,3-Benzenetriol(7.70%).

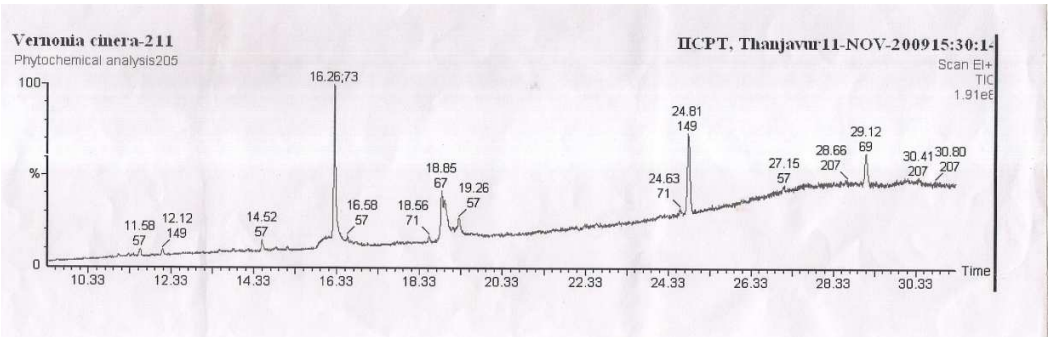
The bioactive compounds of *Polygonum glabrum* have been evaluated usingGC-MS. The chemical compositions of the whole plant ethanol extract of *P. glabrum* wereinvestigated using Perkin-Elmer Gas Chromatography-Mass Spectrometry, while the massspectra of the compounds found in the extract was matched with the National Institute of Standards and Technology (NIST) library. GC-MS analysis of *P. glabrum* whole plant ethanolextract revealed the existence of the ether compound –Propane 1,1-diethoxy- (64.86%),alkane compound -2-Heptane, 5-ethyl-2,4-

dimethyl- (13.51%), sulphur compound –Tiophene-2-Carboxamide, N-(2-furfuryl)- (8.!!%), alcoholic compound -1,14-Tetradecanediol (5.41%), and plasticizer compounds -1,2-Benzenedicarboxylic acid, isodecyloctyl ester5.41%) and 1,2,3-Benzenetriol (2.79%). The results of this study offer a base of using *P.glabrum* as herbal alternative for the synthesis of antimicrobial agents [26] (Ezhilan and Neelamegam.,2011)

Table 1 Phyto- components identified in the *Vernonia cinerea*

No.	RT	Name of the compound	Molecular Formula	MW	Peak Area%
1	11.58	Caryophyllene pxide	$C_{15}H_{24}O$	220	2.31
2	12.12	Guaiol	$C_{15}H_{26}O$	222	1.75
3	14.52	3,7,11,15-tetramethyl-2-hexadecen-1-o1	$C_{20}H_{40}O$	296	2.87
4	16.26	n-Hexadecadienoic acid	$C_{16}H_{32}O_2$	256	42.88
5	16.58	Hexadecadienoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	2.10
6	18.85	9,12-Octadecadienoic acid (z,z)-	$C_{18}H_{32}O_2$	280	9.38
7	19.26	Octadecanoic acid	$C_{18}H_{34}O_2$	284	4.41
8	24.81	1,2-Benzenedicarboxyilc acid, disooctyl ester	$C_{24}H_{38}O_4$	390	23.00
9	29.12	squalene	$C_{30}H_{50}$	410	11.31

Fig 1 GC - MS analysis of *Vernonia cinerea*



CONCLUSION

In the present study twenty chemical constituents have been identified from Methanolic extract of the whole plant of *Vernonia cinerea* by Gas Chromatogram Mass spectrometry (GC-MS) analysis.The presence of various bioactive compounds justifies the use of whole plant various ailments by traditional practitioners.

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