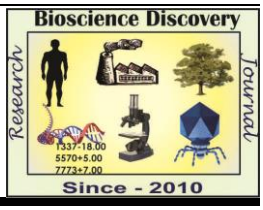
Bioscience Discovery, 9(3):360-364, July - 2018

Print & Online, Open Access, Research Journal Available on http://jbsd.in
ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)
Research Article



GC-MS analysis of rhizome of *Gloriosa superba*

M. Anitha

PG and Research Department of Botany, Sri Parasakthi College for Women, Courtallam-627 802

Article Info

Received: 16-02-2018,
Revised: 22-04-2018,
Accepted: 29-05-2018

Keywords:
Gloriosa, GC-MS, Bioactive compounds, Colchiceine.

Abstract

Gloriosa superba belongs to the family Liliaceae. It is commonly known as Glory lily. The present investigation was carried out to determine the possible bioactive components of rhizome of *Gloriosa superba* using GC-MS analysis. Twenty five compounds were identified. The prevailing compounds in the ethanol extract of rhizome of *Gloriosa superb* were5-Hydroxymethylfurfural(8.49%), Benzoicacid, 2-hydroxy-6-methoxy (15.93%), Benzene,1,4-bis (1,1-dimethylethyl)-(2.65%), n-Hexadeconicacid (22.77%), Oleic acid Octadecanoic acid (11.34%), Octadecanoic acid (9.56%), Stigmasterol (6.68), Colchiceine (5.09%)

INTRODUCTION

Since ancient times, people have been exploring the nature particularly medicinal plants in search of new drugs. .Medicinal plants are used by 80% of the world population for their basic health needs. India is the birth place of renewed system of indigenous medicines such as Siddha, Ayurveda and Unani. Traditional systems of medicines are prepared from a single plant or combinations of more than one plant. The remedies for all diseases could be present in nature but most of potentially valuable treasures in medicinal plants as bioactive compounds are unexplored and underutilized. A healthy new generation could be formed due to the systematic use of these valuable medicinal compounds and plants (Balaji and Kilimozhi, 2014)·These efficacy upon the current knowledge about taxonomic features of plant species, plant parts and biological property of medicinal plants which in turn depends upon the occurrence of primary and secondary metabolites. In recent years, there has been a gradual revival of interest in the use of medicinal plants in developing countries because herbal medicines have been reported safe and without any adverse side effect especially when compared with synthetic drugs. Thus a search for new drugs with better and cheaper substitutes from plant origin is a natural choice. The medicinal values of these plants lie in some chemical substance that produces a definite physiological action on human body. *Gloriosa superba* (Liliaceae) is one of the herbaceous medicinal climber which is a striking tuberous plant with brilliant wavy edged yellow and red flowers that appears from November to March every year (Devi and Femina, 2012). The tuberous root stocks of *Gloriosa superba* boiled with Sesamum oil reduces arthritis pain in joints [Elizabeth *et al*., 2013]. The high medicinal value of this plant could be due to the presence of many secondary metabolites which act as bioactive compounds against diseases (Janani and Singaravadivel, 2014). Present study intended to analyze these active compounds in rhizome of *Gloriosa superba* responsible for its medicinal properties .Different parts of *Gloriosa superba* have wide variety of uses especially in traditional system of medicine. This plant has gained the importance in medicine in recent years for the production of colchicine in large scale

MATERIALS AND METHODS

The rhizomes of *G.superba* were collected from Dharapuram, Coimbatore District, TamilNadu.The specimen were identified and authenticated. It was deposited in the Herbarium of PG and Research Department of Botany, SriParasakthi College for Women Courtallam (Autonomous) Tamilnadu for further use.

PLANT SAMPLE EXTRACTION The rhizomes were cleaned, shade dried and pulverized to powder in a mechanical grinder. Required quantity of powder was weighed and transferred to Stopperdflask, and treated with ethanol until the powder is fully immersed. The flask was shaken every hour for the first 6 hours and then it was kept aside and again shaken after 24 hours. This process was repeated for 3 days and then the extract was filtered. The extract was collected and evaporated to dryness by using a vacuum distillation unit. The final residue thus obtained was then subjected to GC-MS analysis.

GC-MS ANALYSIS

GC-MS analysis of these extracts were performed using a Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a Elite-I, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf, composed of 100% Di methyl poly siloxane). For GC-MS detection, an electron ionization system with ionizing energy of 70 eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/min and an injection volume of 2µl was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C. The oven temperature was programmed from 110°C (isothermal for 2 min.), with an increase of 10°C/min, to 200°C, then 5°C/min to 280°C, ending with a 9min isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5seconds and fragments from 45 to 450 Da. Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass.

IDENTIFICATION OF COMPOUNDS

Interpretation on mass spectrum GC-MS was conducted using the database of national Institute Standard and technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The Name, Molecular weight and structure of the components of the test materials were ascertained.

RESULT AND DISCUSSION

The peaks of unknown compounds from GC MS spectrum were compared with the database of known components stored in the NIST library (Ravindra and Mahendra, 2009) (Gaithersburg, United States) and tabulated with the compound name, molecular formula and molecular weight (Figure1 and Table 1) **[**Paul John Peter *et al*., 2012]. Twenty five compounds were detected in ethanol extract of rhizome of *Gloriosa superb*a. The results revealed that5-Hydroxymethylfurfural (8.49%), Benzoic acid, 2-hydroxy-6-methoxy (15.93%), Benzene,1,4-bis (1,1-dimethylethyl) - (2.65%), n-Hexadeconicacid (22.77%), Oleicacid (11.34%). Octadecanoic acid (9.56%), Stigmasterol (6.68), Colchiceine (5.09%) were found as the major compounds in the ethanol extract of rhizome of *Gloriosa superba*.Table 2 shows the major phytocompounds and their biological activities obtained through GC-MS study of *Gloriosa superba.*. Among the identified phytochemicals, 9, 12-Octadecadienoic acid (Z-Z) has the property of anti-inflammatory as reported by earlier workers**[**Lalitharani S**,**2009**]**.GC-MS analysis is the first step towards understanding the nature of active principles in this medicinal plant and this type of study will be helpful for further detailed study. Further investigation into the pharmacological importance of *Gloriosa superba* and their diversity and detailed Phytochemistry may add new knowledge to the information in the traditional medicinal systems **(**Elizabeth *et al*., 2013; Rehana and Nagarajan, 2012).

REFERENCES

Balaji K and Kilimozhi D. 2014 . GC-MS analysis of various extracts of *Clerodendrum phlomidis*leaf. *Int. J. Pharm and Pharma Sci.*, **6**(1): 226-232.

Devi NN and Femina W. 2012. GC-MS analysis of *Gloriosa superba* medicinal plant of Tamilnadu. *J Pharm Res.*, **5**(1):343-345.

Elizabeth T, Aneesh TP, Della GT and Anandan R. 2013.GC-MS analysis of phytochemical compounds present in the rhizomes of *nervilia aragoana*. *Asian. J. Pharm and clin Res.*, **6**(3):68-74.

Janani SR and Singaravadivel K. 2014. Screening of Phytochemical and GC-MS Analysis

Table No. 1: Compounds identified in the rhizome of *Gloriosa superba*

NO	RT	NAME OF THE COMPOUND	MOLECULAR FORMULA	MOLECULAR WEIGHT	PEAK AREA %
1.	5.14	5- Hydroxymethylfurfural	$C_6H_6O_3$	126	8.49
2.	5.64	Salicyl alcohol	$C_7H_8O_2$	124	2.35
3.	5.98	Salicylic acid	$C_7H_6O_3$	138	0.74
4.	6.28	2,4-Dimethyl-3-pentanol acetate	$C_9H_{18}O_2$	158	1.13
5.	7.06	2,4Hexadienedioic acid	$C_6H_6O_4$	142	1.37
6.	8.63	Benzaldehyde,3-ethoxy-	$C_9H_{10}O_2$	150	1.23
7	9.06	Benzoic cid,2-hydroxy-6-methoxy	$C_8H_8O_4$	168	15.93
8	10.43	Spiro(4,5)dec-6-en-8-one,1,7-dimethyl-4-(1-methylethyl)-	$C_{15}H_{24}O$	220	0.23
9	10.66	1-Isobutyl-7,7-dimethyl-octahydro-isobenzofuran-3a-ol	$C_{14}H_{26}O_2$	226	1.14
10	11.10	Isocalamendiol	$C_{15}H_{26}O_2$	238	0.58
11.	11.38	Ledene oxide-(II)	$C_{15}H_{24}O$	220	0.23
12	11.45	E-15-Heptadecenoic acid	$C_{17}H_{32}O_2$	268	0.05
13	12.20	Benzene,1,4-bis(1,1-dimethylethyl)-	$C_{14}H_{22}$	190	2.65
14	13.26	Trans-Z- Bisabolene epoxide	$C_{15}H_{24}O$	220	0.00
15	14.21	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	22.77
16	15.96	9,12-Octadecadienoic acid(Z-Z)	$C_{18}H_{32}O_2$	280	0.43
17	16.72	Oleic acid	$C_{18}H_{34}O_2$	282	11.34
18	17.02	Octadecanoic acid	$C_{18}H_{36}O_2$	284	9.56
19	17.13	-Cholestan-3-ol,2- methylene	$C_{28}H_{48}O$	400	0.27
20	18.88	Linolenic acid, methyl ester	$C_{19}H_{32}O_2$	292	1.50
21	19.93	Eicosanic acid	$C_{20}H_{40}O_2$	312	1.00
22	24.93	8,11,14-Eicosatrienoic acid,methyl ester	$C_{21}H_{36}O_2$	320	0.00
23	33.58	Campesterol	$C_{28}H_{48}O$	400	2.10
24	34.26	Stigmasterol	$C_{29}H_{48}O$	412	6.68
25	34.77	Colchiceine	$C_{12}H_{23}NO_6$	385	5.09

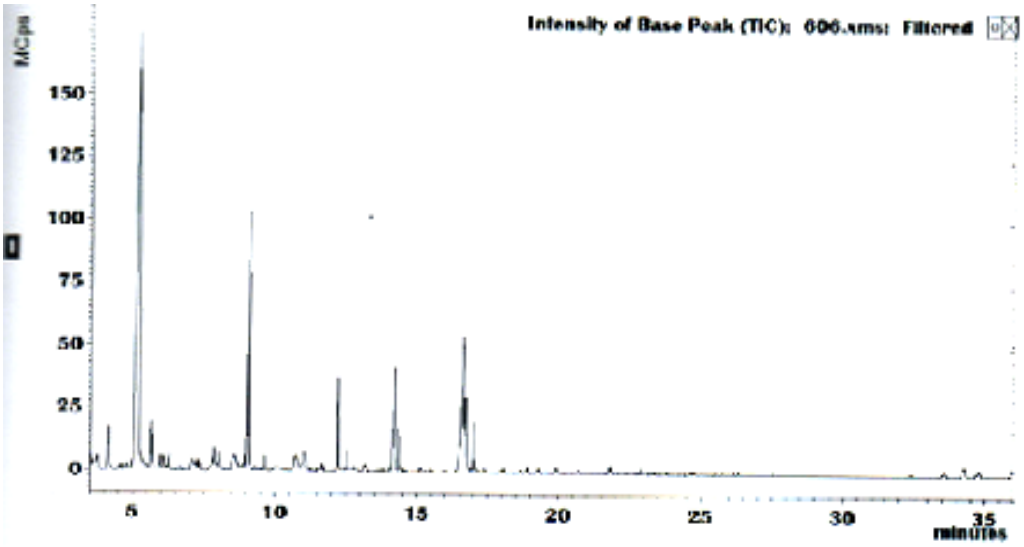


Fig. 1: GC MS analysis – chromatogram of the rhizome ethanol extract of *Gloriosa superba*

Table 2: compounds identified in the rhizome of *gloriosa superba* and biological activity of detected components in the rhizome of ethanol extract of *Gloriosa superba*

NO	NAME OF THE COMPOUND	BIOLOGICAL ACTIVITY
1.	5- Hydroxymethylfurfural	Antimicrobial
2	Salicyl alcohol	Analgesic
3	Salicylic acid	Antibacterial
4	2,4-Dimethyl-3-pentanol acetate	Larvicidal
5	2,4Hexadienedioic acid	Antimicrobial
6	Benzaldehyde,3-ethoxy-	Antifungal
7	Benzoic cid,2-hydroxy-6-methoxy	Antioxidant
8	Spiro(4,5)dec-6-en-8-one,1,7-dimethyl-4-(1-methylethyl)-	Antifungal
9	1-Isobutyl-7,7-dimethyl-octahydro-isobenzofuran-3a-ol	Antifungal
10	Isocalamendiol	Antitumor
11	Ledene oxide-(II)	Antibacterial
12	E-15-Heptadecenoic acid	Antibacterial
13	Benzene,1,4-bis(1,1-dimethylethyl)-	Antimicrobial
14	Trans-Z- Bisabolene epoxide	Cytotoxic
15	n-Hexadecanoic acid	Antioxidant
16	9,12-Octadecadienoic acid(Z-Z)	Anti-inflammatory
17	Oleic acid	Antimicrobial
18	Octadecanoic acid	Anti-inflammatory
19	Cholestan-3-ol,2- methylene-	Anticancer
20	Linolenic acid, methyl ester	Anticancer
21	Eicosanic acid	Antimicrobial
22	8,11,14-Eicosatrienoic acid,methyl ester	Antifungal
23	Campesterol	Hepatoprotective
24	Stigmasterol	Acaricidal
25	Colchiceine	Cytotoxic

of some bioactive constituents of Asparagus racemosus. *Int. J. Pharm Tech Res.,* **6**(2):428-432.

Lalitharani S, Mohan VR, Rejini GS and Kalidass, C. 2009. *Journal of Herbal Medicinal and Toxicology.*, **3:** 159-160.

Ravindra A and Mahendra KR. 2009. Review: Current advances in *Gloriosa superba* L. *Biodiversitas*., **10** :210-214.

Rehana B and Nagarajan N. 2012. Phytochemical screening for active compounds in *Gloriosa superba* leaves and tubers. *J Pharm Phytochem Res*., **4**:17-20.

Sermakkani M and Thangapandian V. 2012. GC-MS analysis of *Cassia italica* leaf methanol extract. *Asian. J. Pharm and Clin Res*., **5**(2): 90-94.

Paul John Peter M, Yesu Raj J, PrabhuSicis VP, Saravanan J and Sakthivel S. 2012. GC-MS Analysis of bioactive components on the Leaves extract of *Stylosanthes fruticosa*- A potential folklore medicinal plant. *Asian. J. Plant Sci and Res*., **2**(3):243-253.

How to cite this article

M. Anitha, 2018. GC-MS analysis of rhizome of *Gloriosa superba*. *Bioscience Discovery*, **9**(3):360-364.