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Gc Ms Analysis Of *Polygonum Glabrum* Leaf Petroleum Ether Extract

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ABSTRACT

Polygonum glabarum has medicinal values; methanol leaf extract of this plant was analyzed using Gas Chromatography–Mass Spectrometry, while the mass spectra of the compounds found in the extract was matched with the National Institute of Standards and Technology (NIST) library. Gas chromatography mass spectrometry (GC-MS) analysis revealed the presence of 10 compounds. In GC-MS analysis, some of the phytocomponents screened were 3, 4-Bis (3, 4, 5-trimethoxyphenyl)-1-[2-(4-methoxyphenyl) ethyl] pyrrole-2, 5-dicarboxylic acid (98.57%), (2RS)-1,3,8-trimethyl-4-propyl-5-ethyl-2-(1-hydroxyethyl)–7–methoxy carbonyl ethyl – 6 gmma – methylenecarbonyl -porphine (85.11%), Hexadecanoic acid, methyl ester (72.94%). The compounds were identified by comparing their retention time and peak area with that of literature and by interpretation of mass spectra. Many of them are used in industry for various applications like antioxidant, anti-inflammatory, antimicrobial, cancer and antidiabetes

Keywords: Polygonum glabarum, Pharmacological applications, GC-MS, Phytocompounds.

INTRODUCTION

Medicinal plants are well known alternative sources for the treatment of various ailments since ancient times. Natural products, either pure compounds, or as standardized plant extracts, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. Medicinal plants encompass some organic compounds which are responsible for certain physiological action on the human body and these bioactive substances include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids[1]. Successful determination of biologically active compounds from plant material is largely dependent on the type of solvent used in the extraction procedure. This therefore underscores the need to try as much solvents as possible in screening plant parts for phytochemicals. There is therefore the need to look inwards to search for herbal medicinal plants with the aim of validating the ethno-medicinal use and subsequently the isolation and characterization of compounds which will be added to the potential list of drugs.

***Persicaria glabra* (Willd.) Gomez (= *Polygonum glabra*) (Polygonaceae)**

It is collectively known as smartweeds or pink weeds. The genus was formerly included in the genus *Polygonum*. The genus includes both annuals and perennials. Most have terminal spikes of pink or sometimes white flowers. Most members of the genus are aggressive and/or invasive weeds, though some have been used as cover crops in the field and ornamental plants in the garden. The medicinal properties attributed to the species of *Polygonum* are demulcent and pectoral, astringent and tonic, diuretic, emetic, purgative, febrifuge, vesicant, vulnerary, insecticide and anthelmintic [2]. Besides it also possess antiviral [3] and antibacterial[4, 5] properties. *P.glabarum* contains several compounds of biological interest, including the sesquiterpenes, a broad spectrum of flavanoids and polyphenols[6]. The aim of the present paper is to identify the phytocompounds of this plant and subjecting the petroleum ether extract of the plant leaves to Gas-Chromatography – Mass Spectrum analysis.

Materials and methods

Collection of plants

The fresh plant materials were collected from three different regions like, The Nilgiris, Tamil Nadu State, South India. The collected plant was authenticated by Botanical Survey of India (Southern Circle), Coimbatore and voucher specimens are deposited at Department of Microbiology, RVS College of Arts and Science, Coimbatore, Tamil Nadu State, South India. The collected plant materials were washed under running tap water, air dried and then homogenized to fine powder and stored in air tight bottles

Crude extract preparation

50 gm of fine coarse powder was extracted by Cold maceration method with petroleum ether (24 hours). The extract was evaporated in vaccum under reduced pressure and the crude extract was stored in sterile glass bottles at room temperature until used.

GC-MS Studies

GC- MS study was carried out at SITRA, Coimbatore, Tamilnadu. GC-MS analysis was carried out on a GC Clarus 500 Perkin Elmer system comprising a AOC-20i auto sampler and gas chromatograph interfaced to a mass spectrophotometer (GC-MS) instrument employing the following conditions. Column Elite-5ms fused silica capillary column (30mm x 0.25mm ID X 1µ M df, composed 5% Phenyl, 95% dimethylpolysiloxane), constant flow of 1ml/min and an injectionvolume of 0.5 µ was employed (split ratio of 10:1) injector temperature 250^0C, ion source temperature 280^0C. The oven temperature was programmed from 110^0C (isothermal for 2 min), with an increase of 100 C/min, to

200^{0}C, then 50C/min 280^{0}C, ending with a 9 min isothermal at 280^{0}C. Mass spectra were taken at 70 eV, a scan interval of 0.5 seconds and fragments from 45 to 450Da. Total GC running time was 36 minutes.

Results and Discussion

Phytochemicals have been recognized as the basis for traditional herbal medicine practiced in the past and currently en vogue in parts of the world [7]. In the search for phytochemicals that may be of benefit to the pharmaceutical industry, researchers sometimes follow leads provided by local healers in a region [8]. Following such leads, plant parts are usually screened for phytochemicals that may be present. The presence of a phytochemical of interest may lead to its further isolation, purification and characterization. Then it can be used as the basis for a new pharmaceutical product. Successful determination of biologically active compounds from plant material is largely dependent on the type of solvent used in the extraction procedure. This therefore underscores the need to try as much solvents as possible in screening plant parts for phytochemicals.

Figure 1. GC MS analysis of Polygonum glabarum

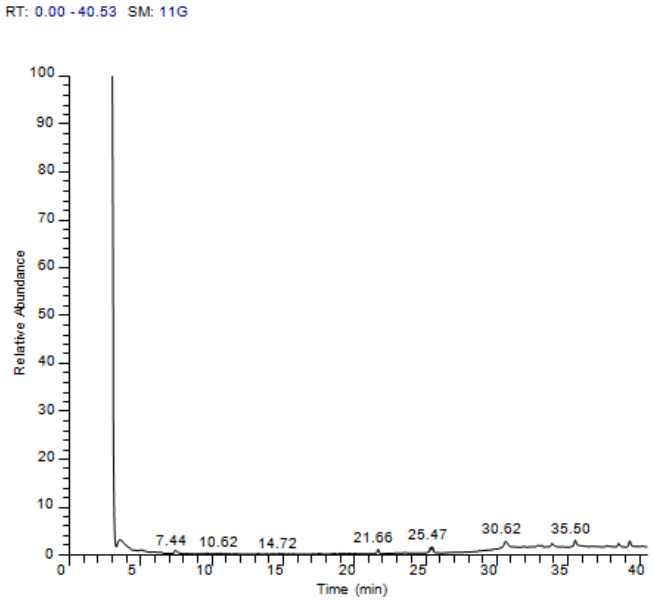

Figure 1. GC MS analysis of Polygonum glabarum

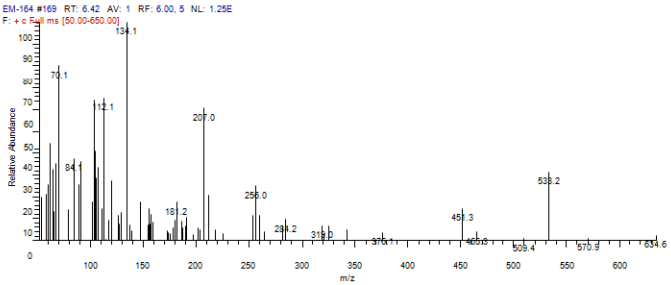

Figure 2: Major Compound I

The chemical constituents of the petroleum ether extract of *Polygonum glabarum* leaves were investigated using Gas chromatography-mass spectrometry. Ten chemical constituents were identified in the leaf petroleum ether extract; they are 3, 4-Bis (3,4,5-trimethoxyphenyl)-1-[2-(4-methoxyphenyl) ethyl] pyrrole-2,5-dicarboxylic acid (98.57 %) (Fig 2), (2RS)-1,3,8-trimethyl-4-propyl-5-ethyl-2-(1-hydroxyethyl)–7–methoxy carbonyl ethyl – 6 gmma – methylenecarbonyl -porphine (85.11%) (Fig 3), Hexadecanoic acid, methyl ester (72.94%) (Fig 4), Cyclohexane, 1, 2, 4, 5 – tetrabromo –1– methyl -4- (1–methylethyl) - (1a, 2a, 4a, 5a -(+)- (71.43%), Dibromoschizandrin (67.76%), Methyl 2-a-Ethylene-5-ethyl-5-emethyl-.delta.-methyl-2-Devinylpyropha e ophorbide A (54.67%), (Acetal doxime) carbonyl (chloro) bis [di (t-butyl) methylphosphane] hydridoosmium (II) (33.49%), 8-Benzoyl – 7 – phenyl – 1, 2, 3, 7 – tetrahydroimidazo [1,2-a]pyridine (30.61%), Hexadecane (29.95%) and 2-(4-Methoxyphenyl) benzoic acid (16.50%) (Table 1 & Fig 1).

Results obtained showed that the petroleum ether leaf extract of *Polygonum glabarum* has many biological active chemical compounds 3, 4-Bis (3, 4, 5-trimethoxyphenyl)-1-[2-(4-methoxyphenyl) ethyl] pyrrole-2,5-dicarboxylic acid (98.57%) as the highest in the leaf. These relatively diverse chemical constituents may be responsible for the medicinal properties of *Polygonum glabarum* leaves. Fatty acids such as Lauric, palmitic, linolenic, linoleic, oleic, stearic and myristic acids are known to have potential antibacterial and antifungal agents [9,10].

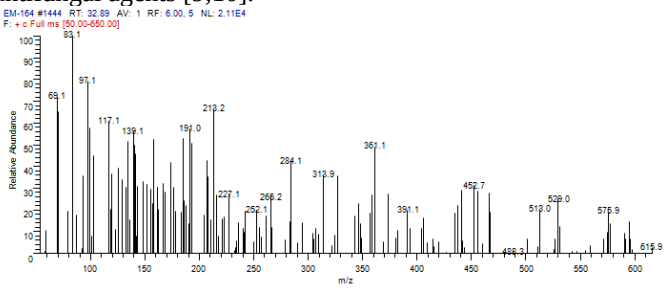

Figure 3: Major Compound II

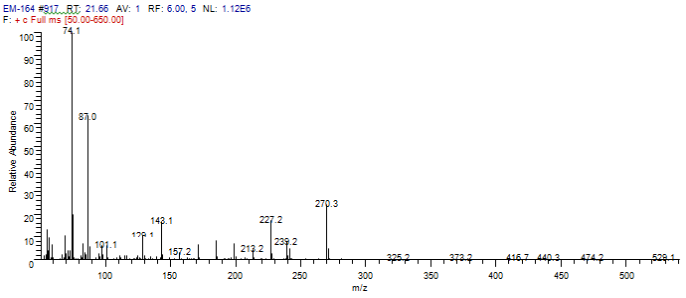

Figure 4: Major Compound III

Table 1. GC MS analysis of Polygonum glabarum

S.No.	Compound Name	Probability
1	3, 4-Bis (3,4,5-trimethoxyphenyl)-1-[2-(4-methoxyphenyl) ethyl] pyrrole-2,5-dicarboxylic acid	98.57
2	(2RS)-1,3,8-trimethyl-4-propyl-5-ethyl-2-(1-hydroxyethyl)–7–methoxy carbonyl ethyl – 6 gmma – methylenecarbonyl -porphine	85.11

3	Hexadecanoic acid, methyl ester	72.94
4	Cyclohexane, 1, 2, 4, 5 – tetrabromo –1– methyl -4- (1–methylethyl) - (1a, 2a, 4a, 5a -(+)-	71.43
5	Dibromoschizandrin	67.76
6	Methyl 2-a-Ethylene-5-ethyl-5-emethyl-.delta.-methyl-2-Devinylpyrophae ophorbide A	54.67
7	(Acetal doxime) carbonyl (chloro) bis [di (t-butyl) methylphosphane] hydridoosmium (II)	33.49
8	8-Benzoyl – 7 – phenyl – 1, 2, 3, 7 – tetrahydroimidazo [1,2-a]pyridine	30.61
9	Hexadecane	29.95
10	2-(4-Methoxyphenyl) benzoic acid	16.50

Table 2:

SI	RSI	Compound Name	Probability	Molecular Formula	Molecular Weight	Area %
832	925	3,4-Bis(3,4,5-trimethoxyphenyl)-1-[2-(4-methoxyphenyl	98.57	C33H35NO11 C32H39NO6	621	2.23
598	665	)e thyl]pyrrole-2,5-dicarboxylic acid	0.98		533	2.23
534	594	henylamine N,N',N'',N'''-Tetramethyl-2,11,20,29-tetraza[3,3,3,3]par	0.16	C36H44N4	532	2.23
532	592	yclophane N,N',N'',N'''-Tetramethyl-2,11,20,29-tetraza[3,3,3,3]met	0.14	C36H44N4	532	2.23
524	851	yclophane Hexacarbonyl-{3-[N-(p-tolylsulfonyl)-N-2'-propenyl]a	0.11	C23H21Co2N	603	2.23
450	731	}-cyclohept-1-yne]-dicobalt 4-(4,5-Dimethoxy-2-iodophenyl)-5-(2-iodophenyl)isoxa	0.01	2O8S C17H13I2N	533	2.23
367	408	le 9,9,10,10,,11,11,12,12,13,13,14,14,15,15,16,16,16-Hept	0.00	O3C16H17F17	564	2.23
351	395	adecafluorohexadecane-1,2-diol 3-Cyano-2-ethoxy-4-phenyl-6-(4-benzylpiperidino)-1,7	0.00	O2C32H28ClN	533	2.23
347	427	-antyridine 1,1,5,5-Tetrachloro-3,3,7,7-tetrphenyl-1,5-divanado-3,7-	0.00	5OC24H20Cl4	668	2.23
336	374	iphospha-2,4,6,8-tetraazacyclooctane 2-[(2-Bromophenyl)methyl]-2,3-bis(2-bromophenyl)pro	0.00	N4P2V2 C22H16Br3N	531	2.23
		onitrile				

Table 3:

SI	RSI	Compound Name	Probability	Molecular Formula	Molecular Weight	Area %
543	634	(2RS)-1,3,8-trimethyl-4-propyl-5-ethyl-2-(1-hydroxy ethyl)	85.11	C36H42N4 O4	594	2.88
469	535	-7-methoxycarbonylethyl-6,.gmma.-methylenecarbon yl-po rphine	11.32	C36H42N4	594	2.88
414	516	oxycarbonylethyl-6,ç-methylenecarbonyl-porphine 1,3,8-trimethyl-4-butyl-5-methyl-2(1-hydroxyethyl)-7	2.19	O4C36H42N4	594	2.88
330	468	hoxycarbonyl-6,ç-methylenecarbonyl-porphine 1,9-Dibenzyl	0.20	O4 C33H44N2	596	2.88
310	348	2(S),8(S)-Bis[((tert-butoxycarbonyl)amino]non-4-ene dioa te	0.09	O8 C26H50	362	2.88
310	348	Cyclohexane, 1,1'-dodecylidenebis[4-methyl- (CAS)	0.09	C26H50	362	2.88
309	368	METHYL 5-ETHYL-2-(1-HYDROXY ETHYL)-5-DEMETHYL-.DELTA.-METHYL-2-DE VIN YLPYRO PHAEOPHORBIDE A AND HOMOLOGUES	0.09	C38H46N4 O4 C30H54	622 414	2.88
305	349	(CAS) Benzene, [3-(2-cyclohexylethyl)-6-cyclopentylhexyl]-	0.07	C25H40	340	2.88
304	343	(CAS) Benzene, [3-(2-cyclohexylethyl)-6-cyclopentylhexyl]-	0.07	C25H40	340	2.88

Table 4:

SI	RSI	Compound Name	Probability	Molecular Formula	Molecular Weight	Area %
891	908	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31
882	910	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31
882	890	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31
881	892	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31
878	892	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31

872	914	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31
866	873	Hexadecanoic acid, methyl ester	72.94	C17H34O2	270	5.31
864	899	Pentadecanoic acid, 14-methyl-, methyl ester (CAS)	21.46	C17H34O2	270	5.31
861	864	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31
854	876	Hexadecanoic acid, methyl ester (CAS)	72.94	C17H34O2	270	5.31

Therefore, GC-MS method is a direct and fast analytical approach for identification of active biomolecules and only few grams of plant material is required. The importance of the study is due to the biological activity of some of these compounds. The present study, which reveals the presence of components in *Polygonum glabarum* suggest that the contribution of these compounds on the pharmacological activity should be evaluated. Further, our study undoubtedly confirms that the leaves of *Polygonum glabarum* contain higher relative percentage of the above mentioned active compounds that has potential antibacterial and antifungal principle for clinical application.

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