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RESEARCH ARTICLE

GC-MS ANALYSIS OF ROOT ACETONE EXTRACTS OF *SPATHOLOBUS PURPUREUS* –A HIGH ETHNO-VETERINARY MEDICINAL VALUE PLANT

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ABSTRACT

Spatholobus purpureus Benth.ex Baker, a medicinally important plant belongs to the family Fabaceae. Traditionally roots are used in the treatment of Haemoresic septicemia in animals. In the present study, the bioactive compounds of *Spatholobus purpureus* root have been evaluated using GC-MS. The chemical compositions of the acetone extract of *S. purpureus* were investigated using Perkin-Elmer Gas Chromatography - Mass Spectroscopy. GC-MS analysis of *S. purpureus* acetone extract revealed the existence of the GC-MS chromatogram of the seventeen peaks presented. The major chemical constituents are like 2-Pentanone, 4-Hydroxy-4-Methyl, Diphenylmethane, Heptacosane, Tetratetracontane, Octacosane (51.44%), , Di-N-Octyl Phthalate, 6H-Benzofuro(3,2-C)(1) Benzopyran,3,9-Dimethoxy, Tritetracontane (16.52%), 6A,12A-Dihydro-6H-(1,3) Dioxolo (5,6) Benzofuro(3,2-C) Chromen-3-Ol, Oxalic acid (6.17%), Decyl 2-Ethyl Hexyl Ester,Pyridine2-Methyl-3-(Trimethylsilyloxy)-4,5-Bis ((Trimethysilyloxy) Methyl (4.31%), Octadecane,3-Ethyl-5-(2-Ethylbutyl), Di-N-Decylsulfone and Cyclotrisiloxane Hexamethyl (4.47%).

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INTRODUCTION

Spatholobus purpureus Benth. ex Baker is a perennial climber belongs to the family Fabaceae. Traditionally *S. purpureus* commonly called as "Naswel" in south India (Joshi, 2000). Different parts of this plant possesses very high medicinal value and used in Ayurveda, Siddha and other traditional systems of medicine for curing various ailments (Murugandandam, 2000). The plant has been assigned to have antidiarrhoeal (Chopra, 1956), antihaemorrhagic (Nadkarni, 1976), antipyretic (Ghosh, 1985), anthelmintic and diuretic (Mitra et al., 1998 and Sathianarayanan, 2011) antinociceptive (Krishnamoorthy et al., 2000), stomachic (Murugandandam, 2000), analgesic and antidiabetic (Madhava Chetty, 2008 and Ashok Raj, 2010), antiviral and cytotoxic (Selvam, 2009), anti-inflammatory (Tharkar, 2010), hypolipidemic (Shruthi, 2010), antioxidant (Lakshman Kumar, 2011) and antiulcer (Madhu, 2011) activities. It is also used in febrifuge and dog bite (Shruthi, 2010 and Agarwal, 1986), toothache (Nadkarni, 1976), skin diseases (Nadkarni, 1976; Varier, 1997; Krishnamurthi, 1981; Kothari, 2000; Kothari; 2000 and Khare, 2001), psoriasis (Sathianarayanan, 2011), seminal weakness and flatulence (Joshi, 2000), leprosy, burns, enlargement of spleen, boils andpiles (Khare, 2007). Moreover, a few drops of its sap in milk prevent curdling and enhance its shelf life, without the need to refrigerate owing to its preservative nature (Ashok Raj, 2010). The reported constituents in roots are alkaloids, terpenes, (Ramachandra, 1993), Tryptanthrin (George, 1996), Indole and flavonoids (Murugandandam, 2000). Active compounds present in the *S. purpureus* root extract by GC-MS analysis was reported (Ramalakshmi, 2012). Past studies revealed that so far there is no study pertaining phytochemical constituents of the roots of *S. purpureus*. Therefore the present study was carried out to determine the phytochemical constituents from *S. purpureus* roots by GC-MS using acetone extract.

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MATERIALS AND METHODS

Plant material

Spatholobus purpureus was collected from Uttamsagar forest area of Satpuda hills, Betul district, Madhya Pradesh, India . The plant specimen was identified with the help of flora and stored in herbarium, Department of Botany, Bharatiya Mahavidyalaya, Amravati (Voucher Specimen No. 510/BMV/189).

Preparation of root powder

The roots were collected and washed in running tap water in order to remove the surface adhered dust particles. Then they were shade dried and pulverized to powder in a mechanical grinder. The powdered obtained were sieved in a cotton muslin cloth (hole size of 0.2mm) to get a fine powder. The fine powder of root was stored in a plastic container at 4^{o}C until further use.

Preparation of leaf extract

1gm of the root powder of *Spatholobus purpureus* was weighted, transferred to flask, treated with the acetone until the powder was fully immersed and incubated overnight. The extracts were then filtered through Whatmann filter paper No.41 along with 2gm sodium sulfate to remove the sediments and traces of water in the filtrate. Before filtering, the filter paper along with sodium sulphate was wetted 95% acetone. 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.

GC –MS analysis

2µl of the acetone extract of *S. purpureus* was employed for GC-MS for analysis of different compounds.

Instruments and chromatographic conditions

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 spectrometer (GC-MS) instrument employing the following conditions: columnElite-1 fused silica capillary column (30 ×0. 25 mm × ID x 1 µm of capillary column, composed of 100% Dimethyl poly siloxane), operating in electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1ml/min and an injection volume of 0.5 EI was employed (split ratio of 10:1) inject or temperature 250°C; ion-source temperature280°C. The oven temper ature was programmed from 110°C (isothermal for 2mi n), with an increase of 10°C/min, to200°C/min, then 5°C /min to 280°C/min, ending with a 9 min isothermal a t 280°C.Mass spectra were taken at 70 eV; a scan inte rval of 0.5 s and fragments from 45 to 450Da.

Identification of phytocompounds

Identification of phytocompounds and 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 using computer searches on a NIST Ver.2.1 MS data library. The name, molecular weight and structure of the components of the test materials were ascertained.

RESULTS AND DISCUSSION

The studies to determine the possible chemical components from the root of *S. purpureus* was carried out by GC-MS.The acetone extract analysis clearly revealed seventeen peaks indicating the presence of seventeen phytochemical compounds. The GC-MS chromatogram of the seventeen peak of the compounds detected was shown in Figure-1.

The seventeen phytoconstituents were characterized and identified on comparison of the mass spectra of the constituents with the NIST library. The active principles with their retention time (RT), molecular formula, molecular weight (MW),and concentration (peak area%)are presented in Table-1.

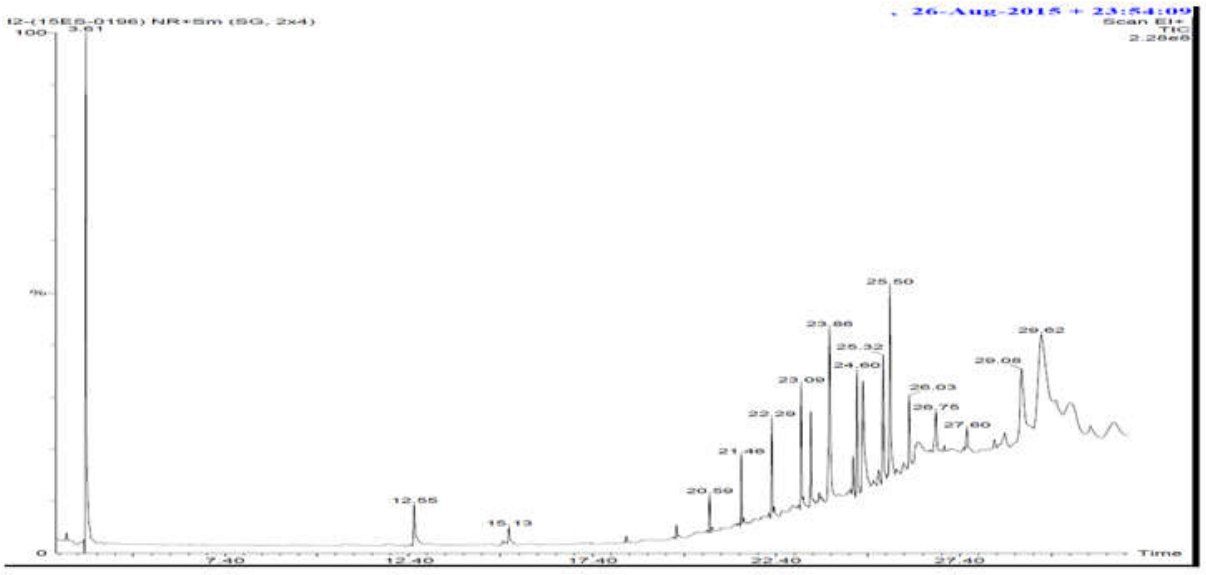
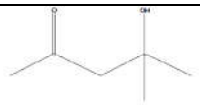
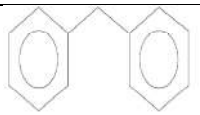
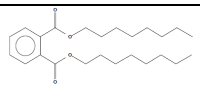
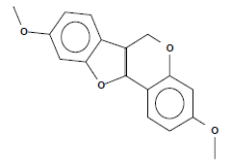
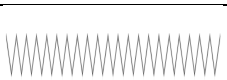
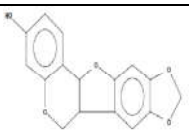
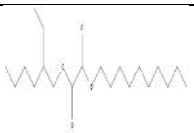
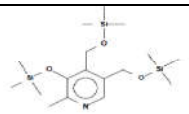
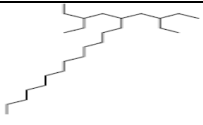
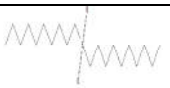
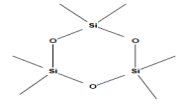
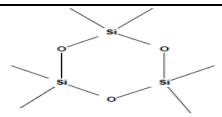


Fig. 1. GC-MS chromatogram of *Spatholobus purpureus* I2-(15ES-0196)

The results showed out of seventeen compounds ten and twelve were major and minor constituents respectively. The ten major compounds include Tritetracontane (51.44%), 6H-Benzofuro(3,2-C)(1)Benzopyran, 3,9-Dimethoxy (16.52%),

Table 1. Phytocomponents identified in *Spatholobus purpureus* (15ES-0196)

Sr. No.	Retention Time	Peak area (%)	Compound analyzed	Molecular formula	Molecular weight	Common Name	Probable Structural formula	Activity reported
1	3.604	16.070	2-Pentanone,4-Hydroxy-4-Methyl	$C_6H_{12}O_2$	116	Diacetone alcohol		Anti-oxidant
2	12.547	2.333	Diphenylmethane	$C_{13}H_{12}$	168	Ditane		Antibacterial, Antibacterial, Estrogenic, Anti-BVDV
3	20.590	1.353	Heptacosane	$C_{27}H_{56}$	380	Alkane		Antibacterial
4	21.456	2.308	Tetratetracontane	$C_{44}H_{90}$	618	Alkane		Antibacterial, Antidiabetic, Cytotoxic
5	22.286	2.971	Tetratetracontane	$C_{44}H_{90}$	618	Alkane		Antibacterial, Antidiabetic, Cytotoxic
6	23.086	3.807	Octacosane	$C_{28}H_{58}$	394	Pthalic acid		Antimicrobial, Antioxidant
7	23.347	3.446	Di-N-Octyl Phthalate	$C_{24}H_{38}O_4$	390	Alkane		Estrogenic, Mutagenic
8	23.857	9.603	Heptacosane	$C_{27}H_{56}$	380	Alkane		Antibacterial
9	24.497	1.374	6H-Benzofuro(3,2-C)(1)Benzopyran, 3,9-Dimethoxy	$C_{17}H_{14}O_4$	282	Benzopyran		Antioxidant Coronary vasodilator
10	24.602	4.657	Tritetracontane	$C_{43}H_{88}$	604	Alkane		Antibacterial, Antihelmintic, Antiulcer, diuretic, Anti-HIV
11	24.762	8.317	6A, 12A-Dihydro-6H-(1,3) Dioxolo(5,6)Benzofuro(3,2-C)Chromen-3-Ol	$C_{16}H_{12}O_5$	284	Chromen		Hepatoprotective, Stimulating
12	25.317	5.551	Oxalic acid, Decyl 2-Ethyhexyl ester	$C_{20}H_{38}O_4$	342	Adipic acid		Anti-cancer, Anti-cardiovascular, Anti-hypercholesterol
13	25.502	7.748	Pyridine, 2-Methyl 3,4,5- Bis Methyl	$C_{17}H_{35}O_3NSi_3$	385	Propanoic acid		Antidiabetic, Antimicrobial
14	26.028	2.634	Octadecane,3-Ethyl-5-(2-Ethylbutyl)-	$C_{26}H_{54}$	366	Propyl ester		Antigonistic, Antifungal, Antimicrobial, Anthelmintic
15	26.753	1.613	Di-N-Decylsulfone	$C_{20}H_{42}O_2S$	346	Ester		Antigonistic, Antifungal, Antimicrobial, Anthelmintic
16	29.074	6.837	Cyclotrisiloxane, Hexamethyl-	$C_6H_{18}O_3Si_3$	222	Phenol		Antimicrobial, Hemolytic
17	29.629	19.379	Cyclotrisiloxane, Hexamethyl-	$C_6H_{18}O_3Si_3$	222	Alkane		Antimicrobial, Hemolytic

Eptacosane (16.17%), Di-N-Octyl Phthalate (4.47%), Octacosane (4.31%), Tetratetracontane (3.13%), Heptacosane (2.80%), Diphenylmethane (1.38%) and2-Pentanone,4-Hydroxy-4-Methyl (1.16%). GC-MS analysis root shows seventeen peaks. The presence of several constituents in the acetone root extract of *S. purpureus* justifies the use of the root for various ailments by traditional practitioners.

Conclusion

It was concluded that acetone extract of roots of *Spatholobus purpureus* possess various potent bioactive compounds and is recommended as a plant of phytopharmaceutical importance. Further studies are needed to explore the potential compounds responsible for the biological activity from *S. purpureus* for application in drug delivery, nutritional or pharmaceutical fields.

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