Kong. Res. J. 5(1): 42-45, 2018
Publisher: Kongunadu Arts and Science College, Coimbatore.

DOI:10.26524/krj251

RESEARCH ARTICLE

GC-MS ANALYSIS OF BIO-ACTIVE COMPOUNDS FROM THE ETHANOLIC EXTRACT OF *BALIOSPERMUM MONTANUM* (WILD.) MUELL. ARG.

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ABSTRACT

Baliospermum montanum (Wild.) Muell. Arg*., (*Euphorbiaceae) is a well known medicinal plant which is used in treatment of various diseases. The present study was focussed on the separation and investigation of the phytochemical compounds from ethanolic extract by GC-MS technique. The mass spectra of the compounds found in the extract were matched with the National Institute of Standards and Technology (NIST) library. The ethanolic extract revealed the presence of 30 bioactive compounds. The major and minor phytochemical compounds are 2,15-Dithia[3](9,10)anthracenol[3](2,6)pyridinophane,1,2,3,4-tetrahydro showed the highest peak 9.32% followed by phytol-9.08%, Neophytadiene-7.38%, 8,11-Octadecadienoic acid, methyl ester (CAS)-7.06%, 4-ethyl-6-[2-(methoxycarb onyl)ethenyl]-7-[2-(methoxycarbonyl)ethyl]1,3,5,8-tetramethyl-2-vinylporphyrin-6.72%, 2-pentafluorophenylpropanal-6.43%, 4,4'-Isopropylidene-bis-(2-cyclo hexyl phenol)-5.91% etc.. Further pharmacological studies are needed to find out the medicinal aspect of these compounds.

Keywords: *Baliospermum montanum,* euphorbiaceae, ethanol extract, Phytocompounds.

1. INTRODUCTION

A plant has been an important source of medicine with qualities for thousands of years. Phytochemical compounds of medicinal plants is desirable not only for the discovery of therapeutic agents, but also because such information may be of great value in discovering new sources of economic phytocompounds for the synthesis of complex chemical constituents substances and for discovering the actual significance of folkloric medicine (1). *Baliospermum montanum* with synonym *B. axillare* , *B. polyandrum, Croton polyandrus* belongs to the family euphorbiaceae with common names as in, English name - Red physic nut, Wild castor, Wild croton, Hindi name - Danti, Hakum, Hakun, Malayalam name - Dantika, Katalavanakku, Nagadanti, Tamil name - Kattamaraku, Niradimutta, Euphorbiacea family includes 280 genera with 730 species with largest genus Euphorbia (2). The plant is monoecious,s tout under shrub with numerous branches. *B. montanum* is widely distributed throughout the sub Himalayan tracts from khasi hills to Kashmir. It is a shade loving plant grows well in humid climate. It is easily available in Bengal, Bihar, Madhya Pradesh and peninsular India. Phytochemical compounds of *B. montanum* have high medicinal importance in the treatment of diseases like hemorrhoids, calculi, abdominal pain, itching, leprosy, burning sensation, inflammation, abdominal disorders, bleeding disorders and worm infestation, tumors etc. It is also used as blood purifier. However this study is to find out the phytochemical and the bioactive compounds which are present in the whole plant body of *B.monatanum* by GC-MS technique.

2. MATERIALS AND METHODS

2.1. Plant collected and preparation extraction

The Fresh plant collected in *B. montanum* was washed 1 to 2 times with water followed by distilled water and shade dried. All the dried parts were pulverized by mechanical grinder to get the powder which passed through 100 mesh sieve and then stored in an air tight container. 50 g of plant powder extracted with 300 mL of ethanol using the soxhlet extractor for 10 to 12 hours. The ethanolic extract was concentrated under reduced pressures at low temperature (40-50°C) for crude residues. The concentrated residue was stored in the refrigerator at 4ºC and it was used for further studies.

2.2. GC-MS Analysis

GC-MS analysis of the extract was performed using a Thermo Gc - Trace Ultra VER: 5.0, Thermo MS DSQ II employing the following conditions : column Elite -DB 35 - MS Capillary standard non - polar column , Helium (He) was used as a carrier gas at a constant flow of 1.0 ml /min and an injection volume of 1micro litre was employed, the oven temperature was programmed from 70^0C raised to 260^0C at 6^0C/min. Total running time was 37.49 Min. 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

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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.

3. RESULTS

The Gas Chromatography-Mass Spectrometry indicates the presence of 30 phytochemicals compound which is represented in table, the active compounds with their retention time (RT), Molecular formula and Molecular weight (MW) in the ethanol extract of rhizomes of *B. montanum* are presented in (Figure 1) and Table 1. The major phytochemical constituents were 2,15-Dithia [3] (9,10) anthracenol [3] (2,6) pyridinophane,1,2,3,4-tetrahydro showed the highest peak of 9.32% followed by phytol-9.08%, Neophytadiene-7.38%, 8,11-Octadecadienoic acid, methyl ester(CAS)-7.06%, 4-ethyl-6-[2-(methoxycarb onyl)ethenyl]-7-[2-(methoxycarbonyl)ethyl]1,3,5,8-tetramethyl-2-vinylporphyrin-6.72%, 2-pentafluoro phenyl propanal- 6.43%, 4,4'-Isopropylidene - bis- (2-Cyclo Hexyl Phenol) -5.91% Hexadecanoic acid, methyl ester (CAS) -5.78%, bis (4-methoxy-1-naphthyl) sulphoxide - 4.44%, 2à,3à – Diacetoxy - 22, 23-i sopropylidenedioxy -24- methyl- 25-hydroxy-5. alpha,- cholestan- 6 -one- 3.46%, 1- [2,4,6-tris (trimethylsiloxy) phenyl] -3- [3-methoxy-4 (trimethylsiloxy) phenyl]-2-propen-1-one-2.58%, 3-Cyano-3-(3',4'-dimethoxyphenyl)-3-phenyl propionyl chloride-1.77% along with other minor constituents were also present in the ethanol extract of whole plant of *B. montanum.*

Table 1. Compounds present in the ethanolic extract of Baliospermum montanum (Wild.) Muell. Arg.

S. NO	RT	Compound Name	Probability	Molecular Formula	Molecular Weight	Area %
1.	6.75	2,2,7-trimethyl-11-methoxycarbonylethyl-3-oxa-7, 11-diazas piro[5.6]dodecane	12.41	$C_{16}H_{30}N_2O_3$	298	1.00
2.	10.55	6á-Methoxy-22,23-methano-3à5-cyclo-26, 27-dinor-5à-ergost -24(28)-ene	82.33	$C_{28}H_{44}O$	396	1.70
3.	15.36	3-Cyano-3-(3',4'-dimethoxyphenyl)-3-phenylpropionyl chloride	10.13	$C_{18}H_{16}C_lNO_3$	329	1.77
4.	18.61	Neophytadiene	53.40	$C_{20}H_{38}$	278	7.38
5.	19.24	3-Cyano-2-methyl-4-(4-chlorophenyl)-6-[2-bis(methylthio)ethenyl]pyridine	74.92	$C_{17}H_{15}C_lN_2S_2$	346	1.63
6.	19.91	bis(4-methoxy-1-naphthyl)sulphoxide	8.73	$C_{22}H_{18}O_3S$	362	4.44
7.	21.35	4,4'-ISOPROPYLIDENE-BIS-(2-CYCLOHEXYLPHENOL)	45.70	$C_{27}H_{36}O_2$	392	1.39
8.	21.66	Hexadecanoic acid, methyl ester (CAS)	72.54	$C_{17}H_{34}O_2$	270	5.78
9.	21.99	2-pentafluorophenylpropanal	33.76	$C_9H_5F_5O$	224	6.43
10.	22.79	Methyl 1,3-dihydro-2H-isobenzofuran-4-carboxylate	10.34	$C_{10}H_{10}O_3$	178	2.29
11.	23.52	(all E)-8-Bromo-2,7-dimethyl-2,4,6-octatrienal	32.43	$C_{10}H_{13}BrO$	228	1.06
12.	23.83	(4aR*,12cR*)-5-Ethoxycarbonyl-4a,5,6,7,12,12c-hexahydro-4H-5,7a-diazabenzo[5,6]cyclohepta[def]fluorene	31.17	$C_{21}H_{22}N_2O_2$	334	1.12
13.	25.15	Phytol	43.15	$C_{20}H_{40}O$	296	9.08
14.	25.46	8,11-Octadecadienoic acid, methyl ester (CAS)	8.71	$C_{19}H_{34}O_2$	294	7.06
15.	25.89	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	21.72	$C_{19}H_{32}O_2$	292	5.00
16.	26.64	Dimethyl 2,12-dibromodecacyclo[9.9.0.0(1,8).0(2,12).0(6,10).0(11,18) 0(13,17).0(16,20)] icosane-syn-4,syn-9-dicarboxylate	17.38	$C_{24}H_{26}Br_2O_4$	536	0.95
17.	28.05	2à,3á,4à,6á,11,19-hexahydroxy-9,11-secocholest-(22E,24S)-24-methylen-9-one (Euryspongiol A3)	14.58	$C_{28}H_{48}O_7$	496	1.56
18.	28.41	4-(2-Nitrophenyl)-6-methoxypyridino[3,2-	23.24	$C_{19}H_{11}N_3O_5$	361	0.96

		g]quinoline-5,10-dione				
19.	29.02	3',4'-Dihydro-Stephasubine	79.40	$C_{36}H_{36}N_2O_6$	592	1.08
20.	29.33	6,7-Isopropylidenedioxy-1,15-dihydroxy-8,15-seco-maoerystals A	12.63	$C_{23}H_{36}O_5$	392	1.02
21.	30.47	2,15-Dithia[3](9,10)anthraceno[3](2,6)pyridinophane, 1,2,3,4-tetrahydro	9.64	$C_{23}H_{23}NS_2$	377	9.32
22.	31.88	4-ethyl-6-[2-(methoxycarbonyl)ethenyl]-7-[2-(methoxycarbonyl)ethyl]1,3,5,8-tetramethyl-2-vinylporphyrin	28.85	$C_{36}H_{38}N_4O_4$	590	6.72
23.	33.10	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (CAS)	6.94	$C_{24}H_{38}O_4$	390	2.35
24.	33.93	{[Thorium-(pentamethylcyclopentadienyl)]-tris[(trimethylsilylamino)-1',2'-ethylideneamino]}	97.44	$C_{25}H_{54}N_4Si_3Th$	726	2.12
25.	34.73	3-(4-Chlorobenzoyl)-6-methoxy-9-N-methyl-4-[2'-(4-chlorobenzoyl)ethyl]carbazole	25.57	$C_{30}H_{23}Cl_2N_3$	515	0.92
26.	36.11	(E)-1,6-Dibromo-3,4-bis[(triisopropylsilyl)ethynyl]hex-3-en-1,5-diyne	73.36	$C_{28}H_{42}Br_2Si_2$	592	1.39
27.	36.48	N-[3'-Cyano-6'-(3''-methyl-5''-oxo-1''-phenyl-2''-pyrazolin 4''-yl)-4'-phenylpyridin-2'-yl]benzamide	24.30	$C_{29}H_{21}N_5O_2$	471	2.54
28.	37.85	1-[2,4,6-tris(trimethylsiloxy)phenyl]-3-[3-methoxy-4-(trimethylsiloxy)phenyl]-2-propen-1-one	98.47	$C_{28}H_{46}O_6Si_4$	590	2.58
29.	39.09	2à,3à-Diacetoxy-22,23-isopropylidenedioxy-24-methyl-25-hydroxy-5.alpha,-cholestan-6-one	58.59	$C_{35}H_{56}O_8$	604	3.46
30	39.90	4,4'-ISOPROPYLIDENE-BIS-(2-CYCLOHEXYLPHENOL)	40.08	$C_{27}H_{36}O_2$	392	5.91

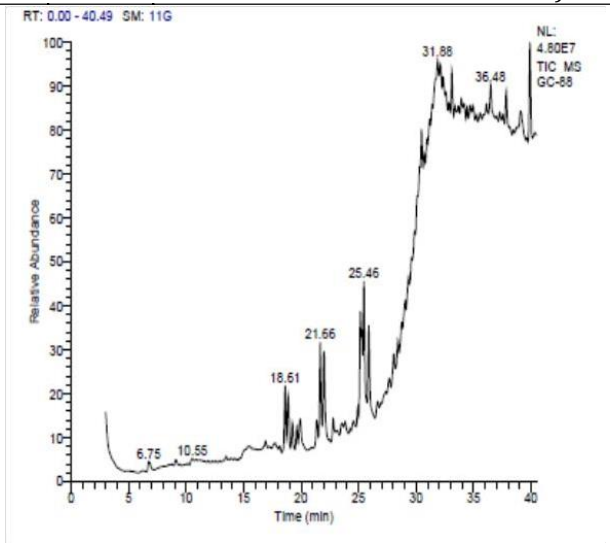

Fig. 1. GC-MS chromatogram of the ethanolic extract of *B. montanum*.

4. DISCUSSION

The phytochemical constituents refer to chemicals produced by medicinal plants which are important to health. The major phytocompounds isolated from *B.montanum* ethanol extract were 2,15-Dithia [3] (9,10) anthracenol [3] (2,6)pyridinophane,1,2,3,4-tetrahydro showed the highest peak 9.32% followed by phytol-9.08%, Neophytadiene-7.38%, 8,11-Octadecadienoic acid, methyl ester (CAS)-7.06%,etc.. The identified compounds possess many biological and pharmacological properties. The chromatogram showed in fig 1. Previous report on the phytochemical analysis of ethanolic extract of *B. montanum* also revealed the presence of alkaloids, flavonoids, tannins, phenols, saponins, steroids, terpenoids and resins (Starlin *et al*., 2012).The phytochemical constituent rich ethanolic extract of *B.montanum* was subjected to Gas Chromatography-Mass spectrometry (GC-MS) analysis. The result revealed the presence of 30 compounds. Earlier studies on phytochemical investigation of *B.montanum* ethanolic extract by GC-MS indicated the presence of thirty compounds (4). Similar work was reported for chemical composition analysis of essential oil of *Curcuma amada* by Vishnupriya *et al*., (5). The phytochemical characterization of the extracts, the isolation of responsible bioactive

compounds and their biological activity are necessary for future studies**.**

5. CONCLUSION

Present evaluations 30 bioactive phytochemical compounds have been identified from ethanolic extract of *B.montanum* by Gas Chromatogram-Mass spectrometry (GC-MS) analysis. Presence to the different bioactive compounds in *B.montanum* proved that the pharmaceutical drug importance. Further studies will require finding out its bioactivity, pharmacological activities.

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