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GC-MS ANALYSIS OF PHYTOCONSTITUENTS FROM THE ETHANOL EXTRACT OF WHOLE PLANT OF BACOPA MANNIERI

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ABSTRACT:

In India, one of the countries with the most diverse spectrum of medical and cultural traditions in the world, the medicinal plant industry has a long history and is still held in high esteem today. The World Health Organization (WHO) asserts that the best source for a variety of medications and chemicals is medicinal plants. It is thought that medicinal plants are the main natural sources for possibly safe pharmaceuticals that have a key role in human health by acting as herbal remedies. The phytochemical elements of medicinal plants make them effective in the treatment of ailments. Higher plant natural chemicals might offer a fresh source of antibacterial drugs with fresh modes of action.[1] Bacopa monnieri, often known as Brahmi, is a Scrophulariaceae plant that grows naturally in South and Southeast Asia. It is used to relieve anxiety and improve memory. It is also said to be effective in treating cardiac and respiratory conditions as well as neurological conditions including sleeplessness. It was analgesic, and anti-inflammatory properties antipyretic, sedative, anti-lipid, and free radical scavenger oxidative processes also.[2] The purpose of this investigation was to identify the presence of pharmacologically bioactive constituents in the whole plant of Bacopa Monnieri by using Gas Chromatography mass spectrometry technique.

KEYWORDS:

MEDICINAL PLANT, BACOPA MONNIERI, BRAHMI, PHYTOCHEMICAL, CHROMATOGRAPHY.

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Introduction:

Bio-active compounds derived from various natural sources, such as plants, fungi, lichens, etc., have become an integral part of the present-day medicine. They have been widely used as a source of medicine since ancient times in various forms of traditional medical practices. Even now, many health issues are being addressed using natural products or naturally derived bio-active compounds worldwide. Many traditional medicinal systems, including Ayurveda, Unani, Siddha, and Homeopathy depend on plant products or their phytocompounds. Some examples include alka loids, glycosides, polyphenols, resins, saponins, tannins, terpenoids and oils.[3] Notably, natural compounds improve human health and vitality without causing adverse side effects as compared to synthetic drugs. Also, they are relatively cheaper and easily available. Natural compounds exhibit high chemo-diversity with excep tional molecular scaffolds, and thus offer the possibility of synthetic alterations to increase their bioactivity. Therefore, natural resources are highly preferred in devel oping new drug molecules with therapeutic efficiency. Considering this scenario, researchers and pharmaceutical industries are paying more attention to natural prod uct research for innovating novel key drug molecules. Further, several natural prod ucts are beneficial to plants as they encourage growth and development. Importantly, they allow plants to withstand environmental stress and pathogenic attack. Initially, natural bio-active compounds are extracted using various extraction techniques, and their bioactivity is identified using in vitro and in vivo testing. However, the drug molecule has to pass the clinical trials to be used as a functional drug. As with any promising field, pitfalls and drawbacks are inevitable; these include poor bioavail ability and unknown pharmacodynamics/ pharmacokinetics. Overall, natural resources provide unlimited opportunities to discover new drug leads. Thus, understanding the chemistry, pharmacology and healthcare practices of natural bio-active compounds could significantly support the modern drug discovery processes.

MATERIALS AND METHODS

Collection of the Plant: The first step in performing the plant is preparing to sample to preserve the phytochemical of plant part (cell) before the extraction. The whole plant part is collected and kept in a dried polybag. Bacopa monnieri plant part were collected from tahsil Pansemal, district Barwani M.P. India.

Preparation of Plant Extract: Bacopamonnieri plant part were separately cleaned and separately washed with distilled water. After completion of the cleaning and washing activity, the Bacopamonnieri plant parts were collected in a beaker. Bacopa monnieri plant parts were

dried in Laboratory Room. Then Bacopa monnieri plant part are converted into powder form with the help of a homogenized instrument and stored in the separately air-glass bottle till future use. Soxhlet Extractor Method was used in ethanol extract preparation. The extract was filtered with what man paper. The liquid was collected and stored in a glass bottle.

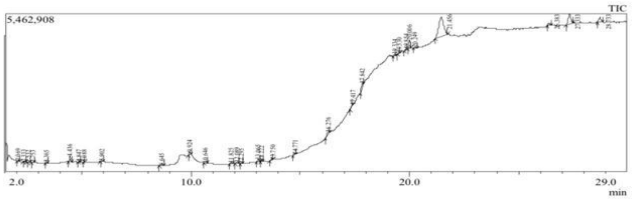
FIGURE: BACOPA MONNIERI LEAF

FIGURE: SOXHLET EXTRACTOR

GC-MS Analysis : GC-MS is a unique analysis technique used for identification and quantification which is limited to analytes that are not only volatile and thermally labile but can also withstand the harsh partitioning conditions of the gas chromatography.[] The gas chromatography device has an injection port from where the process is initiated by injecting the sample to that port.After that ,evaporation and separation of the components take place one by one and finally this equipment identifies the components present in the corresponding sample .A Specific spectral pick is produced for each component which is recorded on a paper chart electronically. The analysis of unidentified constituents of GC-MS plays major role in plant origin. The crude methanol (5 µl) extract containing different compounds of BacopaMonnieri was subjected for (GC-MS) analysis. Instruments and chromatographic circumstances GC-MS examination was carried out on a GC clarus 500 Perkin Elmer system containing a AOC-20i auto analyst and gas chromatograph interfaced to a mass spectrometer (GCMS) instrument retaining the subsequent conditions; column Elite-1 attached silica capillary column (30 ×0.25 mm × ID x 1µm of capillary column, composed of (100% Dimethyl poly siloxane), operational in electron impact mode at 70 eV; helium (99.99%) was used as transporter gas at a persistent flow of 1ml/minute and an injection capacity of 0.5 EI was employed (split ratio of 10:1) inject or temperature 250°C; ion-source temperature280°C. The oven temperature was programmed from 110°C (isothermal for 2min), with an increase of 10°C/minutes, to200°C/minutes, then.5°C/minutes to 280°C/min, finish with a 9 minutes isothermal at 280°C. Mass spectra were occupied at 70 eV; a scan intermission of 0.5 seconds and fragments from 45 to 450Da. The eluted constituent is identified in the mass detector. The spectrum of the unidentified constituent is matched with the spectrum of the recognized constituents stored in library and concludes the name and molecular weight.[4]

Sample Information

Analyzed by	:
Analyzed	: 11/06/2022 19:23:30
Sample Name	: B.-01 (E) B.M.
Sample ID	: B.-01 (E) B.M.
Vial #	: 3
Injection Volume	: 1.00
Data File	: E:\Sample extraction\B.-01 (E) B.M..qgd
Org Data File	: E:\Sample extraction\B.-01 (E) B.M..qgd
Method File	: E:\Hydrocarbons\Method\Hydrocarbons_Method.qgm
Org Method File	: E:\Hydrocarbons\Method\Hydrocarbons_Method.qgm
Tuning File	: E:\Tuning\Tuning_19052022.qgt
Modified by	:
Modified	: 12/06/2022 10:02:50



Quantitative Result Table

ID#	Name	R.Time	m/z	Area	Height
1	-	2.069	TIC	42394	15112
2	-	2.333	TIC	69086	16205
3	-	2.532	TIC	11033	5519
4	-	2.753	TIC	80608	25523
5	-	3.366	TIC	138027	29823
6	-	4.436	TIC	1065287	206245
7	-	4.847	TIC	36282	9090
8	-	-	TIC	---	---
9	-	5.902	TIC	696474	48808
10	-	8.645	TIC	71135	11056
11	-	9.925	TIC	4002860	264864
12	-	10.647	TIC	116779	19810
13	-	11.825	TIC	217779	44794
14	-	12.089	TIC	266840	47333
15	-	12.296	TIC	42460	10715
16	-	13.065	TIC	523725	90689
17	-	13.222	TIC	222337	41438
18	-	13.688	TIC	300698	26647
19	-	14.708	TIC	72127	14995
20	-	16.276	TIC	708043	76737
21	-	-	TIC	---	---

ID#	Name	R.Time	m/z	Area	Height
22	-	17.833	TIC	602348	124056
23	-	19.334	TIC	403919	67614
24	-	19.521	TIC	267592	46271
25	-	19.854	TIC	496867	78974
26	-	20.006	TIC	2460638	370775
27	-	20.271	TIC	519616	49783
28	-	21.456	TIC	14295653	754015
29	-	26.383	TIC	1253194	117339
30	-	27.333	TIC	3610937	380661
31	-	28.734	TIC	1994146	210966

BACOPA MONNIERI			
S.No	**Mol. Formula / Mol. Weight [g / mol]**	**Purified extracts**	**R.Time**
1	Formula:CH2Cl2 CAS:75-09-2 MolWeight:84	Methylene chloride	2.069
2	Formula:C3H9NO2 CAS:534-03-2 MolWeight:91	2-Amino-1,3-propanediol	2.333
3	Formula:C14H22O4Si CAS:55590-92-6 MolWeight:268	Ethyl homovanillate, TMS derivative	2.532
4	Formula:C6H10O3 CAS:6628-79-1 MolWeight:130	Pentanoic acid, 3-methyl-4-oxo	2.753
5	Formula:C5H10O CAS:6921-35-3 MolWeight:86	Oxetane, 3,3-dimethyl	3.366
6	F ormula:C6H14O2 CAS:105-57-7 MolWeight:118 R	Ethane, 1,1-diethoxy	4.436
7	Formula:C14H12N4O3 CAS:0-00-0 MolWeight:284 R	N-(2,4-Dimethylphenyl)-7-nitro-2,1,3-benzoxadiazol-4-amine	4.854
8	Formula:C17H14N2O4 CAS:0-00-0 MolWeight:310	5-(2H-1,3-Benzodioxol-5-yl)-3-(2-hydroxyphenyl)-4,5-dihydro pyrazole-1-carbaldehyde	5.083
9	Formula:C4H8O2S CAS:31043-74-0 MolWeight:120	Dimethylsulfoxonium formylmethylide	5.896
10	Formula:C2H6OS CAS:67-68-5 MolWeight:78	2,5-Methylene-d,l-rhamnitol	8.646
11	Formula:C17H26N2O CAS:84057-95-4 MolWeight:274	Ethyl hydrogen succinateopivacaine	11.833
12	Formula:C6H8O4 CAS:28564-83-2 MolWeight:144 RetIndex:1269	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl	12.083
13	Formula:C8H14O4 CAS:123-25-1 MolWeight:174	Butanedioic acid, diethyl ester	12.292
14	Formula:C8H13NO CAS:862587-68-6 MolWeight:139	Cyclotropine	13.063
15	Formula:C10H8 CAS:91-20-3 MolWeight:128	Naphthalene	13.229
16	Formula:C4H6O5 CAS:6915-15-7 MolWeight:134	Malic Acid	13.729
17	Formula:C17H35Cl3O2Si CAS:0-00-0 MolWeight:404	Silane, dimethyl(2,2,2-trichloroethoxy)tridecyloxy	14.750
18	Formula:C5H9NO CAS:872-50-4 MolWeight:99	2-Pyrrolidinone, 1-methyl	9.917
19	Formula:C11H21N CAS:108144-20-3 MolWeight:167	Cyclohexanamine, N-3-butenyl-N-methyl	10.646
20	Formula:C12H22O11 CAS:57-50-1 MolWeight:342	Sucrose	16.271
21	Formula:C13H20 CAS:0-00-0 MolWeight:176	(+)-3-Carene, 2-.alpha.-isopropenyl	17.396
22	Formula:C15H24 CAS:6753-98-6 MolWeight:204	Humulene	17.833
23	Formula:C20H42O2S CAS:111530-37-1 MolWeight:346	Di-n-decylsulfone	19.333
24	Formula:C26H52O2 CAS:0-00-0 MolWeight:396	i-Propyl tricosanoate	19.521
25	Formula:C20H22ClNO3 CAS:25304-04-5 MolWeight:359	2-[4-Cyclohexylbutanoylamino]-3-chloro-1,4-naphthoquinone	19.854
26	Formula:C13H10O CAS:119-61-9 MolWeight:182	Benzophenone	20.000
27	Formula:C15H24O CAS:19888-34-7 MolWeight:220	(1R,3E,7E,11R)-1,5,5,8-Tetramethyl-12-oxabicyclo[9.1.0]dodec a-3,7-diene	20.250
28	Formula:C15H16O2 CAS:80-05-7 MolWeight:228	Phenol, 4,4'-(1-methylethylidene)bis	21.458
29	Formula:C21H42O2 CAS:1120-28-1 MolWeight:326	Eicosanoic acid, methyl ester	26.375
30	Formula:C27H54O2 CAS:5802-82-4 MolWeight:410	Hexacosanoic acid, methyl ester	27.333
31	Formula:C18H36O2 CAS:628-97-7 MolWeight:284	Hexadecanoic acid, ethyl ester	28.729

CONCLUSION:

By using Gas Chromatography-Mass Spectrometry (GC-MS) analysis, 31 components from the plant extract of B. monnieri in ethanol were discovered in the current study. As a result, GC-MS examination is the principal stage in deciding the idea of the dynamic parts in this restorative plant, and this sort of exploration will helpful for grow new drugs.Our present investigation was focused on the topic that showed the presence of such components in the Bacopa monnieri plant which may have high therapeutic values and can play a indispensible role in the treatment of human ailment.

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