International Journal of Pharmacy and Biological Sciences-IJPBS™ (2019) 9 (3): 344-347
Online ISSN: 2230-7605, Print ISSN: 2321-3272
Research Article | Biological Sciences | Open Access | MCI Approved
UGC Approved Journal

Investigation of Bioactive Compounds on *Volvariella bombycina* Using GC-MS

Senthil Kumar. G*, Karnan. M and Panneerselvam. A
Department of Botany and Microbiology, AVVM Sri Pushpam College (Autonomous)
Poondi - 613503, Thanjavur (Dt), Tamilnadu, India.

Received: 12 Mar 2019 / Accepted: 11 Apr 2019 / Published online: 1 Jul 2019
***Corresponding Author Email:** gsenthil77@ hotmail.com

Abstract

Objective: To evaluate the phytochemical constituents present in *Volvariella bombycina* using GC-MS. **Methods**: Thermo GC. Trace ultra ver: 5.0, ZB 5- MS Capillary standard non - polar columns were used for GC-MS analysis. **Result**: The bioactive compounds present in the mushroom are confirmed by GCMS, about 30 compounds are present in *V. bombycina* the compounds are tabulated and 9 predominent peaks were present among that 1.1. Biphenyl 3-(1,3 buta - dienyl) indol Hexodecanoic acid , Methyl ester , pyrrolo (1,2,a) pyrazine- 14-dione,, hexahydro-3-(2-methyl propyl) and 1 - Leucyl - d- Leucine were the important compounds recorded. **Conclusion:** This study helps identification of the active compounds of *Volvariella bombycina* will leads to the evaluation as a commercial potential in medicine, food production and the cosmetic industry.

*****

1. INTRODUCTION

Mushroom represent a valuable source of novel chemotheraputic agents. Furthermore, the understanding mechanisms for the antitumor function of bioactive metabolites from mushrooms are far from understood the scientific community. In search for new therapeution alternatives has studied many kinds of mushrooms and has found variable therapeutic activity. Medicinal mushrooms namely *Ganoderma lucidum, Phellinus rimosus, Pleurotus florida* and *P. pulmonarions*, Possessed profound antioxidant and antitumor activities [1, 2]. Species of *Pleurotus* are found to possess significant antioxidant, anti-inflammatory and antitumor activities. [1]. Mushrooms have been reported to reduce the risk of prostate cancer, digestive tract cancer [3]. In addition, they can stimulate the production of pro inflammatory mediators, such as cytokines and chemokines, antioxidative and anti-inflammatory and immunomodulating activities [4&5].

The therapeutic action of mushroom is attributed to the presence of various bioactive compounds in their fruiting bodies. Mushrooms have been shown to accumulate a variety of secondary metabolites including phenolic compounds. Mushroom phenolic have been found to be excellent antioxidants[6] More over Polysaccharides - peptides, Polysaccharides - protein complexes, Lanostame - Type triterpenoids, phenolic and flavanoid have been isolated from the some edible mushroom species [7] Polyphenol and carotenoids abundant in the fruiting bodies of mushrooms are antioxidants efficient in biological systems [8]. Polyphenols have been

reported to interfere with the initiation and progression of cancer anti-ageing, anti-inflammatory [9] and brain protective factors [10].

2. MATERIALS AND METHODS

2.1 Collection and preparation of Sample

The culture of *Volvariella bombycina* (MTCC No: 1345) was purchased from microbial type culture collection centre, Chandigarh. The specific medium of fungi MGYP broth and MGYPA were used and the culture was stored in deep freezer at 4^{0}C for further studies,

2.2 Sample extraction

The powdered fruiting body sample of *V.bombycina* (20g) equilibrated with 200 d / m. The volume of supernatant was later reduced by careful heating to 2 d/m. The concentrated ethanolic extract of the fruiting bodies of *V.bombycina* were analysed using the thermo GC- Trace ultra ver: 5.0, ZB5 -MS capillary standard non - polar columns were used for GC - MS analysis.

2.3 GC - MS analysis

Thermo GC-Trace ultra ver: 5.0, ZB5-MS capillary standard non-polar columns were used for GC-MS analysis. The GC temperature program started at 70 ^{0}C for one minute then ramped up to 6 ^{0}C / min to 260 ^{0}C. Helium was used as the GC carrier gas (1 ml / min flow rate). The attached auto sampler was set to inject 1µl for each sample and standard. EIMS data (70eV) were collected over the mass range 50 - 650 Da.

2.4 Identification of components

Using computer searches on the NIST.Ver.2.1MS data library and comparing the spectrum obtained through GC-MS, the compounds present in the crude sample were identified.

3. RESULT

The bioactive compound present in the mushroom are confirmed by GC-MS. About 30 compounds were present in the sample and the compounds are tabulated (Table-1). The *V,bombycina* showed 9 prominent peaks among them 1,1-Biphenyl, 3-[1,3-buta-dienyl]-indole, Hexadecanoic acid, methylester, Pyrrolo[1,2-a]pyrazine-1,4-dione,hexahydro-3-[2-methylpropyl]and1-Leucyl-d-leucine were the important compounds responsible for curing various diseases (Table2&Fig1).

Fig 1. Bioactive compounds of *V. bombycina*

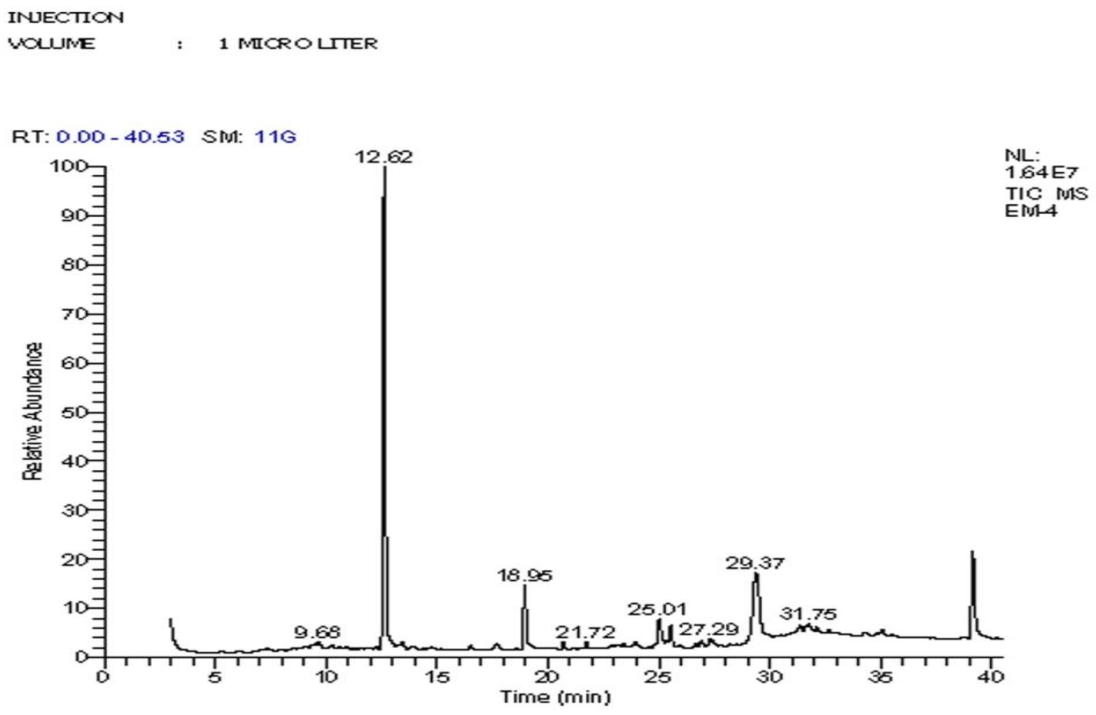

Table 1. GC-MS analysis of *V. bombycina*

S.No	R T	Name of the compound	Molecular formula	Molecular weight	% of Peak area
1	7.06	1-Pentadecanol (CAS)	$C_{15}H_{32}O$	228	0.70
2	7.38	2-Pyrrolidinone, 1-(1-oxo-2-propenyl)-	$C_7H_9NO_2$	139	0.51
3	7.97	Hydrazine carboxylic acid, phenyl methyl ester	$C_8H_{10}N2O_2$	166	0.31
4	9.68	1,2-Dideuterio-4-methyl-2,3-pentadiene	$C_6H_8D_2$	82	1.28
5	10.32	3-Hydroxy-2,7,7-trimethyl-1,8-nonadien-5-one	$C_{12}H_{20}O_2$	196	0.39
6	10.64	Octane, 2-iodo- (CAS)	$C_8H_{17}I$	240	0.33
7	12.62	1,1'-Biphenyl (CAS)	$C_{12}H_{10}$	154	45.84
8	13.43	1-Tridecanol (CAS) 200 0.79	$C_{13}H_{28}O$	200	0.79
9	13.96	2-Allyl-5-t-butylhydroquinone 206 0.52	$C_{13}H_{18}O_2$	206	0.52
10	14.74	3-Oxopropionicacid,3-[1-(4-aminofurazan-3-yl)-5-methyl-1H-[1,2,3] triazol-4-yl]-, ethyl ester	$C_{10}H_{12}N_6O_4$	280	0.36
11	16.53	8-Pentadecanone (CAS)	$C_{15}H_{30}O$	226	0.52
12	17.69	1-Tetradecanol (CAS)	$C_{14}H_{30}O$	214	1.01
13	18.95	3-(1',3'-buta-dienyl)-indole	$C_{12}H_{11}N$	169	6.24
14	20.69	8-Pentadecanone (CAS)	$C_{15}H_{30}O$	226	0.67
15	21.72	Hexadecanoic acid, methyl ester (CAS)	$C_{17}H_{34}O_2$	270	0.74
16	23.21	11-Methoxy-11H-benzofuro-(3,2b) [1]-benzopyran	$C_{16}H_{12}O_3$	252	0.82
17	23.40	3-Methyl-1,4-diazabicyclo [4.3.0] nonan-2,5-dione, N-acetyl-	$C_{10}H_{14}N_2O_3$	210	0.46
18	23.95	1,2-Benzenedicarboxylic acid, dibutyl ester (CAS)	$C_{16}H_{22}O_4$	278	0.84
19	25.01	Phthalic acid, butyl undecyl ester	$C_{23}H_{36}O_4$	376	4.29
20	25.54	2,3-dimethyl-5-propylthiophene 154 2.67	$C_9H_{14}S$	154	2.67
21	26.92	1,4-diaza-2,5-dioxo-3-isobutyl bicyclo[4.3.0]nonane	$C_{11}H_{18}N_2O_2$	210	1.20
22	27.29	Pyrrolo[1,2-a] pyrazine-1,4-dione, hexahydro-3-(2-methylpropyl)-	$C_{11}H_{18}N_2O_2$	210	1.29
23	29.37	5-(2-Phenyl-3-methyloxazol-5-yl)-2-thiophenecarbo xylic Acid	$C_{15}H_{11}NO_3S$	285	13.26
24	31.36	l-Leucyl-d-leucine	$C_{12}H_{24}N_2O_3$	244	1.15
25	31.75	Pyrazino[1,2-a] indole-1,4-dione, 2,3-dihydro-2-methyl-3-methylene-	$C_{13}H_{10}N_2O_2$	226	1.35
26	32.12	4H,7H-Benzo [1,2-c: 4,3-c']-dipyran-4,7-dione	$C_{12}H_6O_4$	214	0.35
27	32.65	2-(2-Bromo-4-phenylbut-1-en-3-ynyl) bicyclo[4.4.1]undeca-1,3,5,7,9-pentaene	$C_{21}H_{15}Br$	346	0.31
28	34.25	cis-11-Eicosenamide	$C_{20}H_{39}NO$	309	0.49
29	35.05	2-acetoxy-3-phenyl-5,6,7,8-tetrahydroindolizine	$C_{16}H_{17}NO_2$	255	1.12
30	39.14	13-Docosenamide, (Z)-	$C_{22}H_{43}NO$	337	10.20

4. DISCUSSION

The above-mentioned compounds were present in various edible mushrooms, which are all play an important role in curing or preventing the tumor and cancer diseases. But in contrast to the above study, compounds like 3-(1,3-buta-dienyl)-indole; pyrrolo [1,2-a] pyrazine-1,4-dione,hexahydro-; hexadecanoic acid, methyl ester; etc., were present in *Volvariella bombycina* mushroom and may play an important role in the anticancer activity. However, the chemical constituents of methanol extracts from *V.bombycina* are very efficient against cancer and further studies are needed to confirm their role and possible mechanism. Identification of the active compounds of these mushroom species will lead to their evaluation as a commercial potential in medicine, food production and the cosmetic industry.

The prediction of the biological activities by applying the Duke`s databases was confirmed with previous observation and supplemented the traditional usage of the *A. cathartica* [11-19]. By interpreting these compounds, it is found that the bioactive compounds possess various therapeutic application. Hence, the result of the GC-MS profile can be used as

pharmacognostical tool for the identification of the bioactive compounds of *V.bombycina.*

The present study helps to predict the formula and structure of biomolecules, which can be used as drugs. This also enhances the traditional usage of *V.bombycina*, which possess several known and unknown bioactive compounds. Further investigation may lead to the development of drug formulation.

ACKNOWLEDGEMENT

The authors are grateful to the UGC, SERO, Hyderabad for the financial support (MRP) and thank the Secretary and Correspondent, Principal AVVM Sri Pushpam College (Autonomous), Poondi - 613503, Thanjavur District, Tamilnadu, India for the laboratory facility.

REFERENCES

[1] Jose, N., Ajith, T. A. and Janardhanan, K. K., Antioxidant, anti-inflammatory and antitumor activities of culinary medicinal mushroom *Pleurotus pulmonarius* (Fr.) Quel. (Agaricomycetideae). *International Journal Medicinal Mushrooms*, 2002; 4:329-335.

[2] Ajith, T. A. and Janardhanan, K. K., Indian medicinal mushrooms as a source of antioxidant and antitumor agents. *Journal of Clinical Biochemistry and Nutrition, 2007*; 40: 157-162.

[3] Liu, C. and Russell, R.M., Nutrition and gastric cancer risk - An update.*Nutritional Review,* 2008; 66: 237-249.

[4] Dore, C.M.P.G., Azevedo, T.C.G., Souza, M.C.R., Rego, L.A., Dantas, J.C.M., Silva,F.R.F., Rocha, H.A.O., Baseia, I. G. and Leite, E.L. Anti-inflammatory, antioxidant and cytotoxic actions of β-glucan rich extractfrom *Geastrum saccatum* mushroom. *International Immunopharmacology,* 2007; 7: 1160-1169.

[5] Zhang, M., Cui, S.W., Cheung, P.C.K. and Wang, Q., Antitumor polysaccharides from mushrooms: A review on their isolation process, structural characteristics antitumor activity. *Trends Food Science and Technol*og, .2007; 18: 4-19.

[6] Li, L., Ng, T.B., Gao, W., Li, W., Fu, M., Niu, S.M., Zhao, L., Chen, R.R., Liu,F., Antioxidant activity of garlic acid from rose flowers in senescence accelerated mice. *Life Science*.2005; 77: 230-240.

[7] Tong, H., Xia, F., Feng, K., Sun, G., Gao, X., Sun, L., Jiang, R., Tian, D. and Sun, X., Structural characterization and *in vitro* antitumor activity of a novel polysaccharide isolated from the fruiting bodies of *Pleurotus ostreatus Bioresearch and Technoogy*, 2009;100: 1682-1686.

[8] Barros, L., Ferreira, M.J., Queiros, B., Ferreira, I.C.F.R. and Baptista, P., Total phenols, ascorbic acid, β-carotene and lycopene in Portuguese wild edible mushrooms and their antioxidant activities. *Food Chemistry,* 2007; 103:413-419.

[9] Rahman, I., Biswas, S.K. and Kirkham, P.A., Regulation of inflammation of redox signalling by dietary polyphenols. *Biochemistry and Pharmacology*. 2006; 72:1439-1442.

[10] Rossi, S., De Chiara, V., Musella, A., Kusayanagi, H., Mataluni, G., Bernardi, G.,Usiello, A. and Centonze, D.,Chronic psycho emotional stress impairs can arabinoid - receptor mediated control of GABA transmission in the striatum. *Journal Neuro science*. 2008; 28: 7284-7292.

[11] Hema R Kumaravel S, Alagusundaram K. GC/MS determination of bioactive compouds of *Murraya koenigii, J Am.Sci* 2011;7(1) 80-83.

[12] PraveenKumar P, Kumaravel S, Lalitha C, Screening of antioxidant activity, total phenolics and GC-MS study of *Vitex negundo. Afr J Bioche Res* 2010 4(7); 191-195.

[13] Maruthupandian A, Mohan VR, GC-MS analysis of some bioactive constituents of *Pleurocarpus marsupium Roxb. Int J Chem Tech Res* 2011; 3(3):1652-1657.

[14] Purabi Roy, Sarika Amdekar, Kumar A, Singh V. Preliminary study of the antioxidant properties of flowers and roots of *Pyrostegia venusta* (Ker Gawl) Miers.BMC *Compl Alt Med* 2011;11:11-69.

[15] Ezhilan B, Neelamegam R, GC - MS Determination of some bioactive compounds of *Polygonum glabrum* (Wild). *J Phytol* 2011; 3(9):23-25.

[16] Hemalatha RG, Padmini E, Studies with the latex of the milk weed-*Calotropis procera* (Ait) R.Br. for spermicidal effect in human. *J Pharm Res* 2011; 4 (2):304-307.

[17] Senthilkumar G, Madhanraj P,Panneerselvam.A. Studies on the compounds and its antifungal potentiality of fungi isolated from paddy field soils of Jenbagapuram Village, Thanjavur District and South India. *Asian J Pharm Res* 2011; 1(1):19-21.

[18] Hema R, Kumaravel S, Alagusundaram K. GC-MS study on the bioactive components and anti - cancer activities of *Solanum surattense. Cancer Biol*2011; 1(1):13-17.

[19] Prabhadevi.V, Sahaya Sathish.S, Johnson.M, Venkatramani.B, Janakiraman.N. Phytochemical studies on *Allamanda cathartica* L. using GC-MS. *Asian Pacific Journal of Tropical Biomedicine* (2012) S550 - S554.