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Research Article

GAS CHROMATOGRAPHY- MASS SPECTRUM ANALYSIS OF BIOACTIVE COMPONENTS OF *AGARICUS BISPORUS*

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ABSTRACT

Agaricus bisporus is traditionally used for curing different aliments. The present investigation was carried out to determine the possible chemical components from *A. bisporus* by GC-MS Technique. This analysis revealed that the extract contains 2-Norbornanone(35.32%), 1,4-Methanobenzocyclodecene,tetradecahydro-(26.07%),6-Oxabicyclo[3.1.0]hexane-3-carbonitrile(8.94%), Methanamine, N-pentylidene-(8.49%), Hexane-2,6-di(isonitrile), 1-(formyloxymethyl)-(8.34%) .

Key words: *Agaricus bisporus,* white button mushroom, GC-MS analysis, Butanal oxime.

INTRODUCTION

Apart from plants, bacteria and fungi are the most important producers of compounds which serve as therapeutic agents[1]. Mushrooms represent a major untapped source of potential pharmaceutical products. They have been used as traditional foods and medicines in different parts of the world, including Asia, Africa and America. Mushrooms in the genus *Agaricus* have worldwide distribution and include the economically important species *A. bisporus* with up to 90 species recorded in Europe. The genus includes the most economically important and commercially cultivated mushroom in the world, *A. bisporus* (commonly known as button mushroom or portabella) as well as many other edible species [2]. They have nutritional relevance due to their high fiber, minerals and protein content, as well as low fat content [3]. Moreover, in the last few years, an increasing interest in the consumption of mushrooms has arisen, due to their elevated polyphenol concentration, which correlates with an elevated antioxidant activity. Several studies analyzing the total phenols and antioxidant activity of fresh and cooked wild and commercial mushrooms have been published [4-10]. White mushrooms are potential chemo protective agents as they suppress aromatase activity and estrogen biosynthesis[11]. It also possess anti hyperglycemic and hypocholesterolemic activity [12]. In this article, we report the results of the GC-MS analyses of volatile compounds present in the hydro alcoholic extract of *A. bisporus.*

MATERIALS AND METHODS

Preparation of powder and extract

Commercial mushroom *Agaricus bisporus* white strain was purchased at a local supermarket in Chennai, Tamil Nadu, India. The fresh mushrooms were cut, air dried (25 °C for 3 days in absence of sun light) and made into a coarse powder. The powered material (20g) was soaked in 50ml of 80% alcohol for 12 hours and then filtered through Whatmann filter paper No.41 along with 2g sodium sulphate to remove the sediments and traces of water in the filtrate. Before filtering the filter paper along with sodium sulphate was wetted with absolute alcohol. The filtrate was then concentrated by bubbling nitrogen gas into the solution and concentrated to 1 ml.

Gas Chromatography- Mass Spectrum Analysis (GC-MS)

GC-MS technique was used in this study to identify the components present in the extract. GC-MS technique was carried out at Indian Institute of Crop Processing Technology (IICPT) Thanjavor, Tamil Nadu. GC-MS analysis of this extract was performed using a Perkin Elmer GC Claurus 500 system and gas chromatograph interfaced to a Mass Spectrometer (GC-MS) equipped with Elite-1 fused silica capillary column (30 m x 1µ Mdf. Composed of 100% Dimethyl poly siloxane). For GC-MS detection, an electron ionization energy system with ionization energy of 70eV was used. Helium gas (99.999%) was used as the carrier gas at a constant flow rate of 1ml/min. and an injection volume of 2µl was employed (split ratio of 10:1). Injector temperature was 250°C; Ion-source temperature was 280°C. The oven temperature was programmed from 110°C (isothermal for2 min.), with an increase of 10°C /min, to200°C ,then 5°C/ min. to 280°C, ending with a 9min. isothermal at 280°C. Mass spectra were taken at 70eV; a scan interval of 0.5 seconds and fragments from 45 to450 Da. Total GC running time was 36min. The relative percentage amount of each component was calculated by comparing its average peak area to the total areas. Software adopted to handle mass spectra and chromatograms was a TurboMass Ver5.2.0.

Identification of components

Interpretation of mass spectrum GC-MS was conducted using the database of National Institute Standard and Technique (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The Name, Molecular weight, Structure of the component of the test material was ascertained.

RESULTS

The compounds present in the hydro alcoholic extract of *Agaricus bisporus* were identified by GC-MS analysis presented in Figure 1. The active principle Molecular Weight (MW), Concentration (%), Molecular Formula (MF), and Retention Time (RT) is presented in Table1. Ten compounds were identified in the extract. The prevailing compounds were 2-Norbornanone (35.32%), 1,4-Methanobenzocyclodecene,tetradecahydro-(26.07%),

6-Oxabicyclo[3.1.0]hexane-3-carbonitrile(8.94%), Methanamine, N-pentylidene-(8.49%),Hexane-2,6-di(isonitrile),1-(formyloxymethyl) -(8.34%).

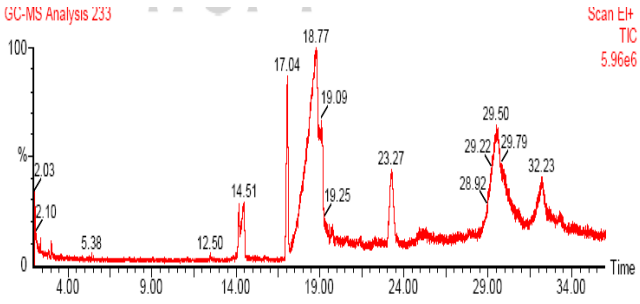

Fig 1: Chromatogram obtained from the GC-MS with the hydro alcoholic extract of *Agaricus bisporus.*

CONCLUSION

This investigation has helped to identify the compounds present in the fruiting body of *A. bisporus*. Evaluation of pharmacological activity in the extract is in progress.

Table 1: Total ionic chromatogram (GC-MS) of *Agaricus bisporus* obtained with 70eV using an Elite -1 fused silica capillary column with He gas as the carrier.

No	RT	Name of the compound	Molecular formula	MW	Peak Area %
1	3.01	1,3,2-Dioxaborolan-4-one, 2-ethyl-5-Methyl-	$C_5H_9BO_3$	128	0.45
2	12.50	Butyl aldoxime, 3-methyl-, anti	$C_5H_{11}NO$	101	0.11
3	14.19	Pentanal, oxime	$C_5H_{11}NO$	101	1.97
4	14.51	Butanal, oxime	C_4H_9NO	87	5.00
5	17.04	Hexane-2,6-di(isonitrile), 1-(formyloxymethyl)-	$C_9H_{12}N_2O_2$	180	8.34
6	18.77	2-Norbornanone	$C_7H_{10}O$	110	35.32
7	19.09	6-Oxabicyclo[3.1.0]hexane-3-carbonitrile	C_6H_7NO	109	8.94
8	23.27	Methanamine, N-pentylidene-	$C_6H_{13}N$	99	8.49
9	29.50	1,4-Methanobenzocyclodecene, tetradecahydro-	$C_{15}H_{26}$	206	26.07
10	32.23	1H-Purine-2,6-dione, 3,7-dihydro-1,3-dimethyl-7-[2-[(1-methyl-2-phenylethyl)amino]ethyl]-[Fenethylline]	$C_{18}H_{23}N_5O_2$	341	5.31

REFERENCES

1. Harvey, AL. Natural products in drug discovery. Drug Discov. Today 2008; 13: 894–901.
2. Calvo-Bado LC, Noble R, Challen M, Dobrovin-Pennington A, Elliott T. Sexuality and Genetic Identity in the *Agaricus* Section *Arvenses*. Appl Environl Microbiology 2000; 66:728-734.
3. León-Guzmán MF, Silva I, López MG. Proximate chemical composition, free amino acid contents, and free fatty acids contents of some wild edible mushrooms from Queretaro, México. Journal of Agricultural and Food Chemistry 1997; 45: 4329-4332.
4. Mau JL, Chao GR, Wu KT. Antioxidant properties of methanolic extracts from several ear mushrooms. Journal of Agricultural and Food Chemistry2001; 49: 5461-5467.
5. Mau JL, Lin HC, Song SF. Antioxidant properties of several specialty mushrooms. Food Research International 2002; 35: 519-526.
6. Yang JH, Lin HC, Mau JL. Antioxidant properties of several commercial mushrooms. Food Chemistry 2002; 77: 229-235.
7. Lakshmi B, Tilak JC, Adhikari S, Decasagayam TPA, Janardhanan KK. Evaluation of antioxidant activity of selected Indian mushrooms. Pharmaceutical Biology 2004; 42: 179-185.
8. Lo KM, Cheung PCK. Antioxidant activity of extracts from the fruiting bodies of *Agrocybeaegerita* var. Alba. Food Chemistry 2005; 89: 533-539.
9. Ferreira I CFR, Baptista P, Vilas-Boas M, Barros L. Free-radical scavenging capacity and reducing power of wild edible mushrooms from northeast Portugal: Individual cap and stipe activity. Food Chemistry 2007; 100: 1511-1516.
10. Choi Y, Lee SM, Chun J, Lee HB, Lee J. Influence of heat treatment on the antioxidant activities and polyphenolic compounds of Shiitake (*Lentinus edodes*) mushroom. Food Chemistry 2006; 99: 381-387.
11. Shiuan C, Sei-Ryang Oh, Sheryl P, Gene H, Jing JE, Sum LK, et al., Anti-aromatase activity of phytochemicals in White button mushroom (*Agaricus bisporus*). Cancer Research 2006; 66: 12026-12034.
12. Jeong SC, Jeong YT, Yang BK, Islam R, Koyyalamudi SR, Pang G, et al. White button mushroom (*Agaricus bisporus*) lowers blood glucose and cholesterol levels in diabetic and hypocholesterolemic rats. Nutr Res. 2010 Jan; 30(1):49-56