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Research Article

ANALYSIS OF BIOACTIVE COMPONENTS FROM CHLOROFORM EXTRACT OF *LYCOPERDON* SP. (*APIOPERDON*)

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ABSTRACT

Objective: The present work was done to find out various bioactive compounds present in the chloroform extract of *Lycoperdon pyriforme* using gas chromatography-mass spectrometry (GC-MS).

Methods: *L. pyriforme* was collected cleaned to remove any dirt and oven dried at 60°C. The sample was then finely powdered and extracted with chloroform using Soxhlet apparatus. The chemical composition of chloroform extract was then analyzed using QP2010S-Shimadzu GC-MS instrument.

Results: Chloroform extract resulted in the presence of 33 compounds with 1-Heneicosanol (11.17%) and E-15-Heptadecenal (11.08%) forming major compounds and 1-Tetradecanol (0.16%), Dichloroacetic acid, and decyl ester (0.15%) forming least.

Conclusion: The results indicated the presence of a variety of compounds thus providing the information about various bioactive compounds present in *Lycoperdon* sp. and its further application in the field of pharmacology.

Keywords: *Lycoperdon pyriforme*, Chloroform extract, Gas chromatography-mass spectrometry.

INTRODUCTION

Fungi besides being pathogens are also known to possess medicinal values. Since ancient times mushrooms, visually distinctive compared with other class of fungi with naked fruiting bodies, have been used in traditional medicines as "the ultimate health food" [1]. Their medicinal characteristics have led them to be used in the field of drug development. A number of mushrooms have been screened for their antimicrobial potential for their use in pharmacology [2-5].

Lycoperdon otherwise "puffballs" a saprobe belongs to the family Agaricaceae. They are widely distributed in tropics growing on various habitats, on tree stumps, on decaying logs, and on ground among fallen leaves [6]. A number *Lycoperdon* species have been tested for their antimicrobial potentiality [7]. The present work has been carried out to understand various bioactive compounds present in *Lycoperdon pyriforme* In the present study, chloroform extract has been used and various compounds are detected using gas chromatography-mass spectrometry (GC-MS) technique.

MATERIALS AND METHODS

Fungal specimen and extraction

L. pyriforme (Schaeff.) Vizzini (*Apioperdon pyriforme*) (Fig. 1) was collected from in and around the Kerala Forest Research Institute campus. The specimen was identified and confirmed by referring standard manual [8]. The specimen was cleaned to remove any dirt and was then oven dried at 60°C. The dried specimen was then pulverized to fine powder in a mechanical grinder. The powder was weighed and then subjected to Soxhlet extraction using chloroform. The extract was concentrated using rotary evaporator. Thus obtained final residue was subjected to GC-MS analysis.

GC-MS analysis

GC-MS analysis was carried out using QP2010S-Shimadzu GC-MS instrument (30 m × 0.25 mm × 0.25 µm, Rxi-5Sil MS). One microliter of the chloroform extract was injected into the GC-MS instrument. Initially, the column temperature was maintained at 80°C for 2 min, followed by a temperature gradient from 80°C to 260°C and held constant for 10 min and finally raised temperature to 280°C and held constant for 6 min. The instrument operated in a split mode and libraries used for analysis was NIST 11 and WILEY 8.

RESULTS AND DISCUSSION

GC-MS analysis of chloroform extract of *L. pyriforme* showed the presence of 33 different compounds. The active compounds with their retention time, area, area percentage, height, height percentage, base m/z, and their names are presented in Table 1. The GC-MS chromatogram of the chloroform extract is shown in Fig. 2. About 33 compounds have been found in which 1-Heneicosanol (11.17%) and E-15-Heptadecenal (11.08%) are the major compounds and Dichloroacetic acid, decyl ester (0.15%), and 1-Tetradecanol (0.16%) formed minor compounds in the chloroform extract. Besides, a number of compounds such as E-14-Hexadecenal, Phenol, 2,4-bis(1,1-Dimethylethyl)-, n-Tetracosanol-1, Ergosterol, Ergosta-7,22-Dien-3-ol, and (3.Beta.,22E)- are also present in fairly large amounts which gives *Lycoperdon* sp. its antibacterial

Fig. 1: *Lycoperdon pyriforme (Apioperdon pyriforme)*

Table 1: Compounds detected in the chloroform extract of *Lycoperdon pyriforme*

Peak#	R.Time	Area	Area%	Height	Height%	Name	Base m/z
1	5.532	392251	0.80	146463	0.57	2-Pyrrolidinone	85.05
2	7.413	109389	0.22	73947	0.29	1-Dodecene	55.05
3	8.313	2183095	4.43	477122	1.86	Benzeneacetic acid	91.10
4	10.276	2427813	4.92	1730368	6.74	1-Tetradecene	55.05
5	10.383	219369	0.44	164541	0.64	Tetradecane	57.05
6	10.876	112748	0.23	75686	0.29	4'-(2-Methylpropyl)acetophenone	161.15
7	11.786	3780013	7.67	2414673	9.40	Phenol, 2,4-bis(1,1-Dimethylethyl)-	191.20
8	12.824	4738489	9.61	3279911	12.77	E-14-Hexadecenal	55.00
9	12.909	304523	0.62	222487	0.87	Hexadecane	57.05
10	14.853	72346	0.15	51891	0.20	Dichloroacetic acid, decyl ester	57.10
11	15.042	78152	0.16	55184	0.21	1-Tetradecanol	55.00
12	15.098	5465560	11.08	3638303	14.17	E-15-Heptadecenal	55.05
13	15.167	358390	0.73	251796	0.98	Nonadecane	57.10
14	15.233	121518	0.25	58454	0.23	1-Dodecene, 2-Ethyl-	70.10
15	16.825	1774683	3.60	799656	3.11	Hexadecanoic acid	73.05
16	17.154	5508171	11.17	3234728	12.60	1-Heneicosanol	57.05
17	17.211	272640	0.55	188335	0.73	Nonadecane	57.05
18	18.490	2148503	4.36	899849	3.50	Methyl octadeca-9,12-Dienoate	67.05
19	18.533	639984	1.30	284065	1.11	22-Tricosenoic acid	55.05
20	18.583	435018	0.88	159227	0.62	Tetraethylene glycol, monobutyl ether	57.05
21	18.730	274213	0.56	158768	0.62	Octadecanoic acid	73.05
22	19.029	4633592	9.40	2745804	10.69	1-Heneicosanol	57.05
23	19.075	218168	0.44	158471	0.62	Hexadecane	57.05
24	20.367	510095	1.03	334653	1.30	O O'-Biphenol, 4,4',6,6'-Tetra-T-Butyl-	57.05
25	20.463	198896	0.40	109773	0.43	Cyclopropaneoctanoic acid, 2-[[2-[(2-ethylcyclopropyl) methyl]cyclopropyl]methyl]-, methyl ester	67.05
26	20.812	3446566	6.99	1825058	7.11	n-Tetracosanol-1	57.05
27	20.858	157311	0.32	113330	0.44	Pentadecane	57.05
28	22.053	238723	0.48	106657	0.42	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester	57.05
29	23.117	1923043	3.90	829324	3.23	Eicosyl trifluoroacetate	57.05
30	31.844	205298	0.42	80125	0.31	Docosyl trifluoroacetate	57.05
31	35.321	941280	1.91	218643	0.85	Dehydroergosterol 3,5-dinitrobenzoate	69.10
32	36.267	2766652	5.61	260549	1.01	Ergosterol	69.10
33	36.667	2650584	5.38	534458	2.08	Ergosta-7,22-Dien-3-ol, (3.Beta.,22E)-	69.10

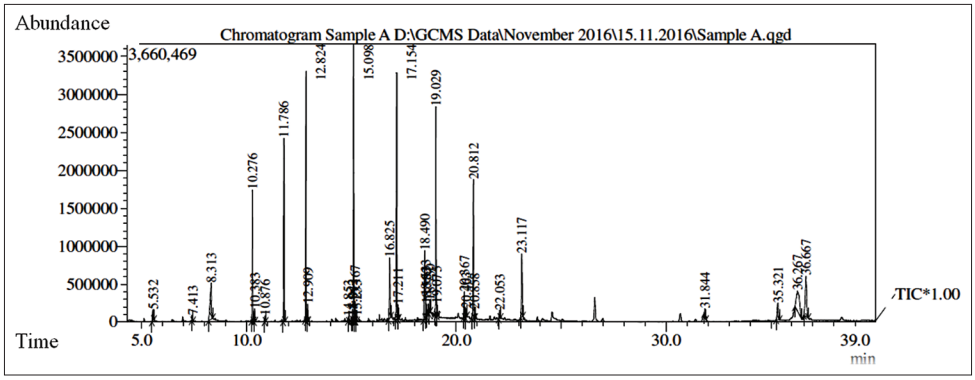

Fig. 2: Gas chromatography-mass spectrometry chromatogram of chloroform extract of *Lycoperdon pyriforme*

potentiality. Chemicals compounds such as sterol derivatives (*S*)-23-hydroxylanostrol, ergo-sterol α-endoperoxide, ergosterol 9,11-dehydroendoperoxide and ((23*E*)-lanosta-8,23-dien-3β,25-diol), volatile compounds (3-octanone, 1-octen-3-ol and (*Z*)-3-octen-1-ol), and an unusual amino acid such as lycoperdic acid have been identified from *Lycoperdon perlatum* fruit bodies [9,10]. The study represents a primary account of various bioactive compounds in the chloroform extract and a detailed study can be carried out for the isolation and purification of specific compounds for further application in the chemical industry.

CONCLUSION

Wild mushrooms growing naturally produce a large number of secondary metabolites which impart lots of medicinal values to them. The present work was carried to understand various bioactive compounds present in the chloroform extract of *L. pyriforme*. A total of 33 compounds have been identified by GC-MS analysis and most of the compounds obtained were those with antimicrobial potentiality. This suggests their importance and potential application in the field of pharmaceutical research.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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