Gas Chromatography- Mass Spectroscopic Analysis of Oil Extracted From Freshwater Edible Magur Fish (*Clarias Batrachus*) From Marathwada Region

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Abstract: *Gas Chromatography Mass Spectrometry (GC-MS) is only one of its kind method for the study and measuring quantity of organic volatile and semi-volatile compounds. Gas chromatography is utilized to separates mixtures into individual components employing a temperature-controlled capillary column. Mass spectrometry is applied to recognize a variety of components from their mass spectra. In the present study volatile/ semi-volatile compounds present in Oil extracted from Magur Fish (Clarias Batrachus) are analyzed. Magur Fish oil is extracted by Supercritical fluid extraction method and then analyzed by Gas Chromatography / Mass Spectrometry (GC/MS). A total of 30 compounds are found and quantified in this study.*

Key Words: *Gas Chromatography / Mass Spectrometry, Fish Oil, Magur Fish, (Clarias Batrachus).*

1. INTRODUCTION:

The Asian catfish Clarias batrachus is an air-breathing indigenous catfish, in India it is popularly known as magur fish [1].In india Magur fish is commonly found in fresh water and brackish waters. It is a commercially important in India, Bangladesh, Thailand, Philippines, Myanmar and China because of its good taste, high protein amount and iron content. It also has therapeutic application [2].

Sinha M *et al* conducted comprehensive study of breeding and larval rearing of C. batrachus with some improvised modifications for production of magur seed in large scale at farm level in respect of brood fish management, larval feeding, water quality management and disease prevention [1]. Kishore Dhara and Nimai Chandra Saha conducted study on Controlled Breeding of Asian Catfish Clarias batrachus using Pituitary Gland Extracts and Ovaprim at different Temperatures, Latency Periods and their Early Development [2]. S. P. Singh *et al* performed experimental work in order to find out the effect of water temperature on physiological responses of Asian catfish clarias Batrachus [3]. K. Taslima & F. Ahmed conducted study on seed production technique of indigenous magur (clarias Batrachus), Shing (Heteropneustes fossilis) and Pabda (Ompok Pabda) through induced breeding [4]. T. Asha *et al* performed study on " Field trials on culture of clarias batrachus[5]. Nimmy Jousy *et al* performed investigational work in order to find out Genetic Variation in the Natural Populations of Clarias batrachus from India Using Microsatellite Markers [6] in recent times, we used supercritical fluid extraction technology in order to extract compounds from various biological material such as plants and animals, performed GC-MS analysis of oil extracted for fresh water crab and also analyzed fatty acid composition of some animals [7-13].

2. MATERIAL AND METHOD:

The Magur Fish (*Clarias Batrachus*) is purchased from local market, at Aurangabad District (Maharashtra) India. The Magur Fish meat is dried in oven for 8 hours at 50 ^{o} C. After proper drying, the dried Magur Fish meat is subjected to supercritical fluid extraction process in order to obtain Magur Fish oil. Extraction is performed using SFC (L-tex, Japan) instrument. Carbon dioxide is used as supercritical fluid; Hexane is used as a modifier (co-solvent). Extraction is performed at constant flow rate, Constant temperature and constant pressure. Extraction Conditions: flow rate ofsupercritical carbon dioxide = 1 ml/min, flow rate of hexane = 1 ml/min, temperature = 40^{0} C and pressure = 25 Mpa. Extracted oil from the freshwater Magur Fish is used as a sample for gas chromatography/ Mass spectroscopy analysis.

Table 1: Specification of GC/ MS

Conditions During gas chromatography/ Mass spectroscopy analysis	
Run Time(min):	54.09
Injection Volume(µl):	1.00
Scans:	6439
Low Mass(m/z):	40
High Mass(m/z):	400

Gas	Helium
Solvent	Hexane

3. RESULT:

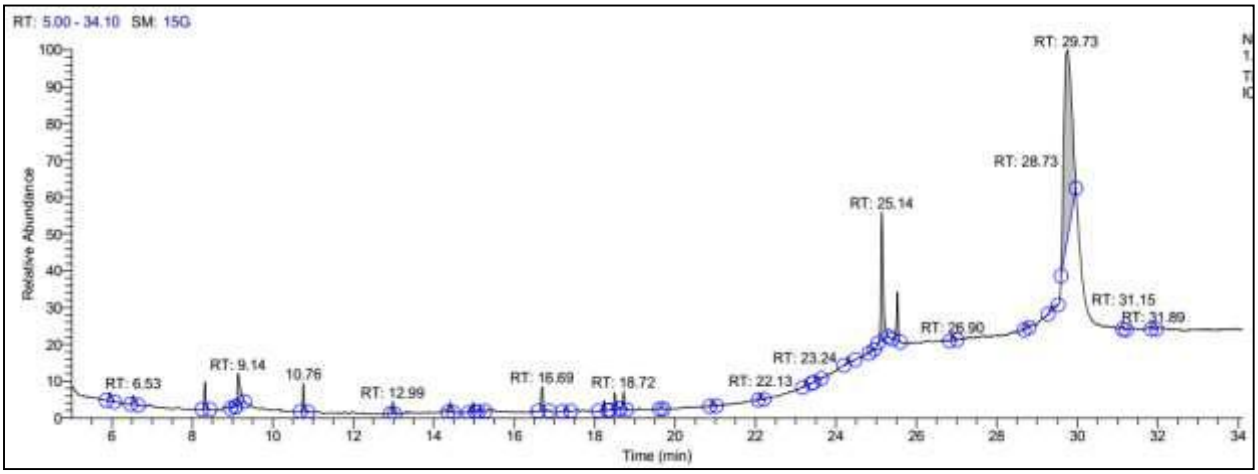

Table 2: Probable compounds present in Magur Fish oil

Sr. No.	Retention Time	Peak area	Area %	Compound Names
1	5.94	15912390.54	1.07	Cyclotetrasiloxane, octamethyl
				2',6'-Dihydroxyacetophenone, bis(trimethylsilyl) ether
				1,1,3,3,5,5,7,7-Octamethyl-7-(2-methylpropoxy)tetra siloxan-1-ol
2	6.53	17834805.09	1.20	Cyclohexene, 1-methyl-5-(1-methylethenyl)-, (R)-
				Limonene
				D-Limonene
3	8.31	28145995.74	1.89	Cyclopentasiloxane, decamethyl-
				Benzoic acid, 2,6-bis[(trimethylsilyl)oxy]-, trimethylsilyl ester
				1,1,3,3,5,5,7,7,9,9-Decamethyl-9-(2-methylpropoxy) pentasiloxan-1-ol
4	9.01	5392725.09	0.36	1,7-Octanediol, 3,7-dimethyl-
				1,8-Nonanediol, 8-methyl-
				3-Heptanol, 5-methyl-
5	9.14	61385965.74	4.13	Estragole
				Anethole
				5-Methoxyindane
6	10.76	23080585.81	1.55	Cyclohexasiloxane, dodecamethyl-, Silane
				dimethyl(dimethyl(dimethyl(2-isopropylphenoxy)silyloxy)silyloxy)(2-isopropylphenoxy)-, Heptasiloxane
				1,1,3,3,5,5,7,7,9,9,11,11,13,13-tetradecamethyl-
7	12.99	9638975.77	0.65	Cycloheptasiloxane, tetradecamethyl-, 6
				3-Isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris(trim ethylsiloxy)tetrasiloxane
				3-Butoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris(trimethy lsiloxy)tetrasiloxane
8	14.41	10954439.03	0.74	Globulol,
				Epiglobulol
				Humulane-1,6-dien-3-ol
9	14.98	12987888.18	0.87	Cyclooctasiloxane, hexadecamethyl-
				Hexasiloxane, tetradecamethyl-

				Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl-
10	15.15	5166946.00	0.35	8-Heptadecene 1-Hexadecanol, 2-methyl- cis-13-Eicosenoic acid
11	16.69	32354555.66	2.17	Hexadecanal, Octadecanal Oxirane, tetradecyl-
12	17.28	4116353.69	0.28	Phthalic acid, hex-3-yl isobutyl ester Phthalic acid, hept-4-yl isobutyl ester Phthalic acid, hept-3-yl isobutyl ester
13	18.24	11894537.83	0.80	Dibutyl phthalate Phthalic acid, butyl hex-3-yl ester Phthalic acid, butyl isohexyl ester
14	18.50	22831376.68	1.53	9-Octadecenal, (Z)- 13-Octadecenal, (Z)- cis-11-Hexadecenal
15	18.72	17894981.10	1.20	Octadecanal Oxirane, heptadecyl- Z-2-Octadecen-1-ol
16	19.66	3525288.86	0.24	Cyclodecasiloxane, eicosamethyl- Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl- Cyclooctasiloxane, hexadecamethyl-
17	20.94	4426904.69	0.30	Tetracosamethyl-cyclododecasiloxane Cyclononasiloxane, octadecamethyl- Heptasiloxane, hexadecamethyl-
18	22.13	4206272.46	0.28	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl- 1-Monolinoleoylglycerol trimethylsilyl ether, 9,12,15-Octadecatrienoic acid 2,3-bis[(trimethylsilyl)oxy]propyl ester, (Z,Z,Z)-
19	23.24	7892810.87	0.53	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl- 1-Monolinoleoylglycerol trimethylsilyl ether Heptasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13-tetradecamethyl-
20	23.50	10452049.46	0.70	cis-11-Eicosenamide 13-Docosenamide, (Z)- trans-11-Icosenamide
21	24.29	9879254.79	0.66	Cyclodecasiloxane, eicosamethyl- Tetracosamethyl-cyclododecasiloxane Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl-
22	24.88	4605129.89	0.31	1-Monolinoleoylglycerol trimethylsilyl ether 9,12,15-Octadecatrienoic acid, 2,3-bis[(trimethylsilyl)oxy]propyl ester, (Z,Z,Z)- Glycine, N-[(3à,5á,7à,12à)-24-oxo-3,7,12-tris[(trimethylsilyl)oxy]cholan-24-yl]-, methyl ester
23	25.14	181485488.34	12.20	13-Docosenamide, (Z)- trans-13-Docosenamide Bis(cis-13-docosenamido)methane
24	25.53	54306740.04	3.65	Squalene 2,6,10,14,18-Pentamethyl-2,6,10,14,18-eicosapentaene

				6,10,14,18,22-Tetracosapentaen-2-ol, 3-bromo-2,6,10,15,19,23-hexamethyl-, (all-E)-
25	26.90	8555677.55	0.58	Cyclodecasiloxane, eicosamethyl-
				Cyclononasiloxane, octadecamethyl-, Octasiloxane
				1,1,3,3,5,5,7,7,9,9,11,11,13,13, 15,15-hexadecamethyl-
26	28.73	6990584.43	0.47	3,9á:14,15-Diepoxypregn-16-en-20-one, 3,11á,18-triacetoxy-
				Cyclodecasiloxane, eicosamethyl-, Prosta-5,13-dien-1-oic acid
				9,11,15-tris[(trimethylsilyl)oxy]-, trimethylsilyl ester, (5Z,9à,11à,13E,15S)-
27	29.36	11921015.43	0.80	17-(1,5-Dimethylhexyl)-10,13-dimethyl-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phenanthren-3-ol
				Cholesterol
				Cholestane-3,5-diol, 5-acetate, (3á,5à)-
28	29.73	889760961.48	59.81	Cholesterol
				, 17-(1,5-Dimethylhexyl)-10,13-dimethyl-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phenanthren-3-ol
				26-Nor-5-cholesten-3á-ol-25-one
29	31.15	2939387.06	0.20	1-Monolinoleoylglycerol trimethylsilyl ether, Glycine
				N-[(3à,5á,7à,12à)-24-oxo-3,7,12-tris[(trimethylsilyl)oxy]cholan-24-yl]-, methyl ester, 9,12,15-Octadecatrienoic acid
				2,3-bis[(trimethylsilyl)oxy]propyl ester, (Z,Z,Z)-
30	31.89	7064672.71	0.47	1-Monolinoleoylglycerol trimethylsilyl ether, Glycine,
				N-[(3à,5á,7à,12à)-24-oxo-3,7,12-tris[(trimethylsilyl)oxy]cholan-24-yl]-, methyl ester,
				9,12,15-Octadecatrienoic acid, 2,3-bis[(trimethylsilyl)oxy]propyl ester, (Z,Z,Z)-

4. CONCLUSION:

Gas chromatography / Mass spectroscopy analysis of Magur Fish oil reveals that the oil contains 30 different compounds. When we see the analysis table we find that among all compounds, compound with retention time 29.73 shows highest concentration (59.81 %) followed by compound with retention time 25.14 (12.20 %), compound with retention time 9.14 (4.13 %), compound with retention time 25.53 (3.65 %), compound with retention time 16.69 (2.17 %), compound with retention time 8.31 (1.89 %), compound with retention time 10.76 (1.55 %), compound with retention time 18.50 (1.53 %), compound with retention time 6.53 (1.20 %), compound with retention time 18.72 (1.20 %), compound with retention time 5.94 (1.07%) and the concentrations of remaining compounds are less than 1 %.

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