Gas Chromatography - Mass Spectroscopic Analysis of Oil Extracted from Freshwater Edible Surmai Fish (*Scomberomorus commerson*) 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 Surmai Fish (Scomberomorus commerson) are analyzed. Surmai Fish oil is extracted by Supercritical fluid extraction method and then analyzed by Gas Chromatography / Mass Spectrometry (GC/MS). A total of 6 compounds are found and quantified in this study.*

Key Words: *Gas Chromatography / Mass Spectrometry, Fish Oil, Surmaifish, (Scomberomorus commerson)*

1. INTRODUCTION:

Surmai fish *(Scomberomorus commerson)* is an economically important fish and found in most parts of the world. Surmai fish is considered as rather a delicacy and superb table fare in most parts of India. Surmai is tasty by itself and does not need any special preparation to improve its natural taste. It contains Omega-3 fatty acids, Surmai fish is a rich source of protein, Omega-3 fatty acids. It is a good source of lean protein which is good for heart. healthy omega-3 fatty acids are found in surmai fish, these fatty acids help decrease inflammation throughout the body and maintain brain health as well as lower triglyceride levels.

Kaymaram *et al* studied Reproduction and spawning patterns of the Scomberomorus commerson in the Iranian coastal waters of the Persian Gulf & Oman Sea [1]. M.R. Claereboudt *et al* performed research work in order to find out Patterns of reproduction and spawning of the kingfish (Scomberomorus commerson, Lacep´ede) in the coastal waters of the Sultanate of Oman[2].

Fakhri, Ali *et al* conducted a study in order to find out ength Composition, Growth, Mortality and Exploitation Rate of King Fish (Scomberomorus commerson) in the Coastal Waters of Boushehr Province [3]. N. Vineesh *et al* identified the genetic stock structure of S. commerson distributed along the Indian waters was using mitochondrial ATPase 6 and 8 genes [4].

Poulose yesudhason *et al* studied effect of potassium sorbate and modified atmosphere packaging on the shelf-life extension of seer fish (scomberomorus commerson) steaks during iced storage [5]. Abolfazl Askary Sary *et al* determined the cincentration of lead and zinc in king mackerel (Scomberomorus guttatus Bloch & Schneider, 1801), Spanish mackerel (Scomberomorus commerson Lacepède, 1800) and Tiger-toothed Croaker (Otolithes Ruber Bloch and Schneider, 1801) from Persian Gulf, Iran in 2001 and 2011 [6]

In recent times, we used supercritical fluid extraction technology [instrument name: SFC L-tex Japan] 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]. There is no work available on the supercritical extraction of Surmai fish. Hence we repeat its extraction.

2. MATERIAL AND METHOD:

The Surmai Fish (*Scomberomorus commerson*) is purchased from local market, at Aurangabad District (Maharashtra) India. The Surmai Fish meat is dried in oven for 8 hours at 50 ^{o}C. After proper drying, the dried Surmai Fish meat is subjected to supercritical fluid extraction process in order to obtain Surmai Fish oil. Extraction is performed using SFC (L-tex, Japan) instrument. Carbon dioxide gas 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 of 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 Surmai Fish (*Scomberomorus commerson*) is used as a sample for gas chromatography/ Mass spectroscopy analysis. After extraction the Surmai Fish oil is subjected to 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:

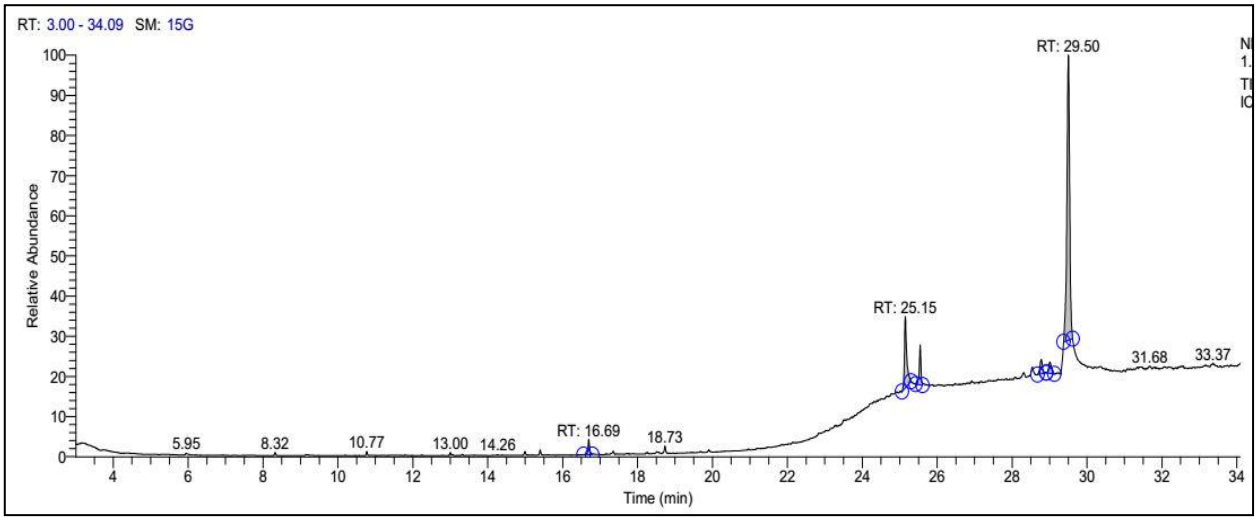
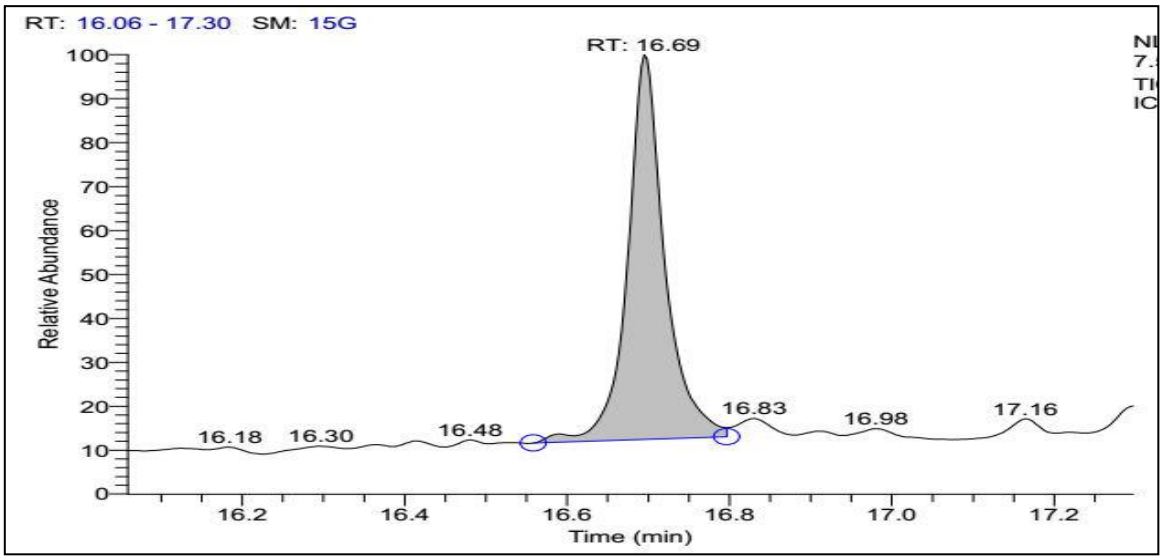


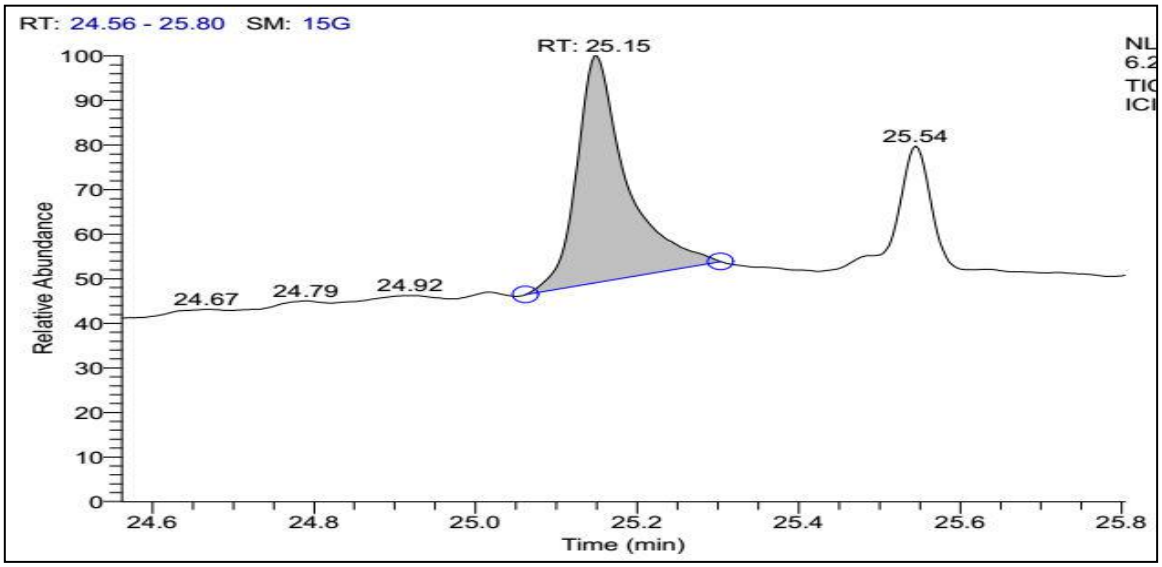
Table 2: Probable compounds present in Surmai Fish oil

Sr. No.	Retention Time	Peak area %	Area %	Compound Names
1	16.69	21233900.25	2.32	Hexadecanal
				Octadecanal
				Oxirane, tetradecyl-
2	25.15	136510820.73	14.94	13-Docosenamide, (Z)-
				trans-13-Docosenamide
				9-Octadecenamide, (Z)-
3	25.54	54351812.68	5.95	Squalene
				Supraene
				6,10,14,18,22-Tetracosapentaen-2-ol, 3-bromo-2,6,10,15,19,23-hexamethyl-, (all-E)-
4	28.78	30461712.66	3.33	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)-
5	29.01	24647450.63	2.70	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)-
6	29.50	646579833.84	70.76	Cholesterol
				17-(1,5-Dimethylhexyl)-10,13-dimethyl-2,3,4,7,8,9, 10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclope nta[a]phenanthren-3-ol
				26-Nor-5-cholesten-3á-ol-25-one

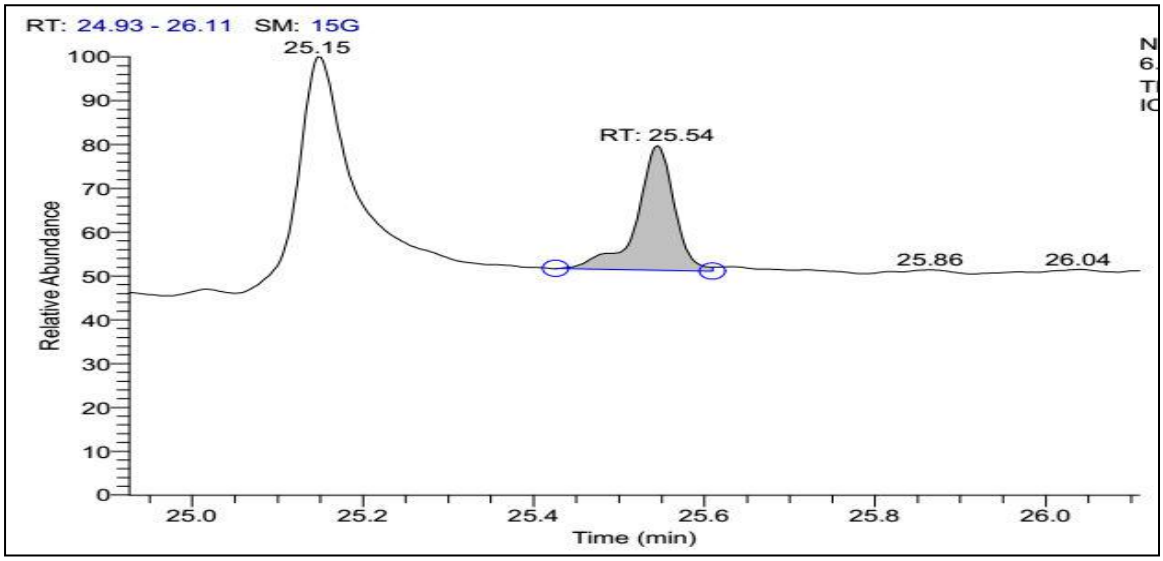
Spectrums:



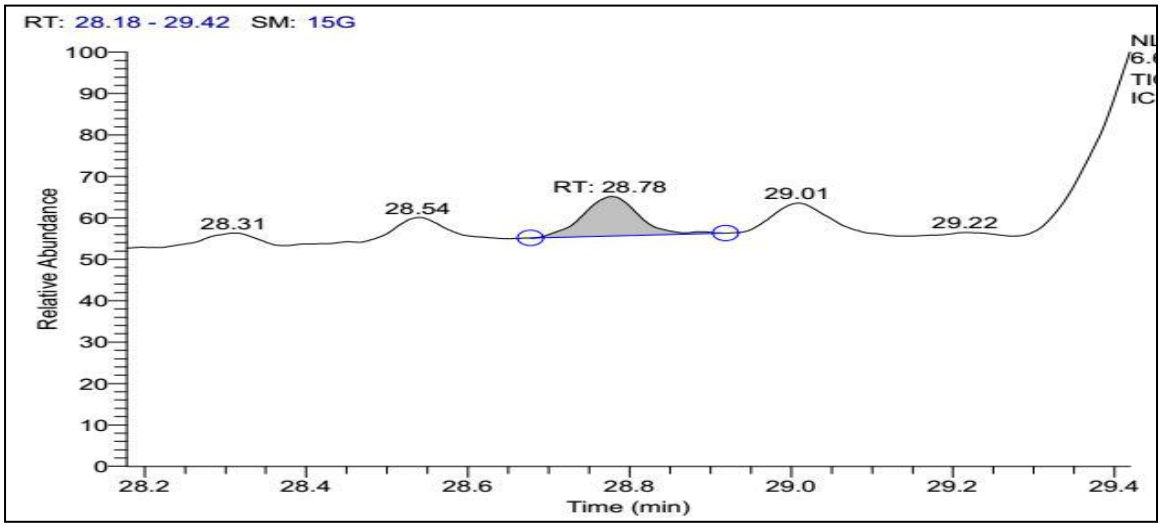
Spectrum with Retention Time = 16.69



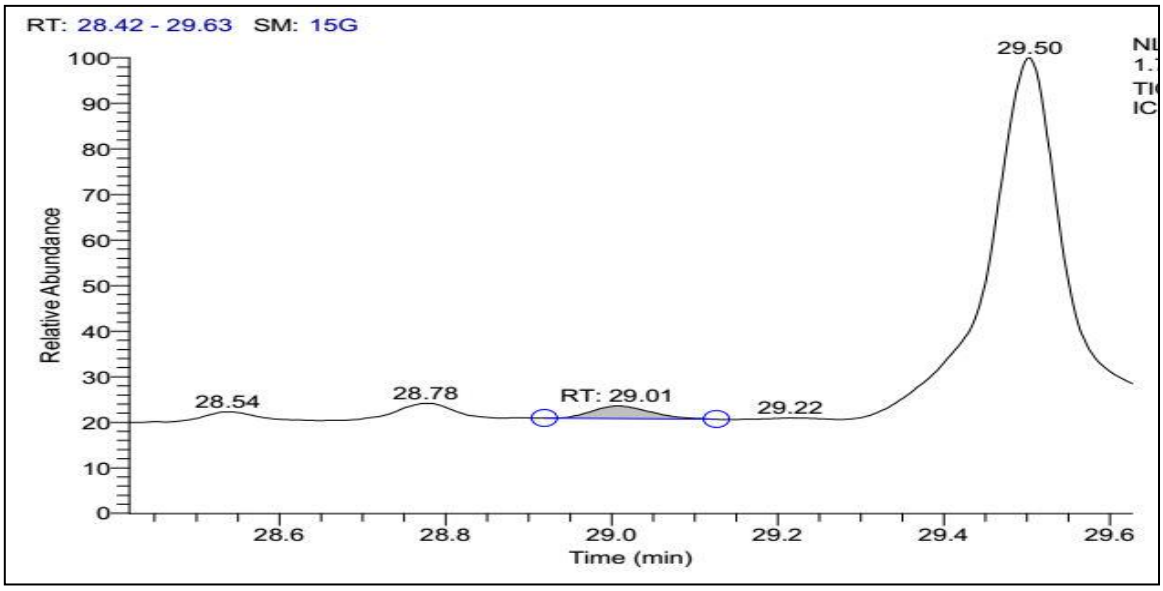
Spectrum with Retention Time = 25.15



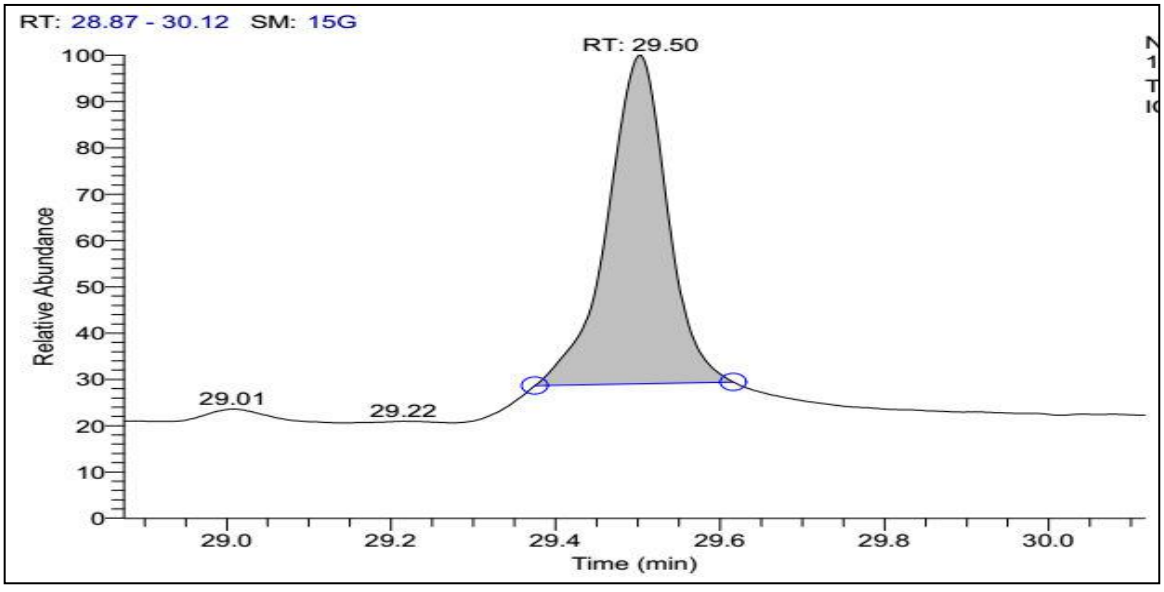
Spectrum with Retention Time = 25.54



Spectrum with Retention Time = 28.78



Spectrum with Retention Time = 29.01



Spectrum with Retention Time = 29.50

3. CONCLUSION:

Gas chromatography / Mass spectroscopy analysis of Surmai Fish oil reveals that the oil contains 6 different compounds. From table 2, we find that among all compounds, compound with retention time 29.50 shows highest concentration (70.76 %) followed by compound with retention time 25.15 (14.94 %), compound with retention time 25.54(5.95 %), compound with retention time 28.78 (3.33 %), compound with retention time 29.01 (2.70 %), compound with retention time 16.69 (2.32 %) .

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