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FATTY ACID PROFILE OF OIL FROM MARINE MICROALGAE *CHLORELLA VULGARIS* FROM VELLAR ESTUARY

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ABSTRACT

The present study was aimed to investigate the fatty acids profile of oil extracted from marine microalgae C. vulgaris. The C. vulgaris was collected from the Vellar Estuary and it was identified through morphological key characters by microscopic observations and the mother culture was maintained in laboratory. The microalgae were mass cultured with optimized conditions in laboratory by Conway medium. The fatty acids methyl ester was prepared according to the standard method. In GC-MS analysis totally 15 known fatty acids were recorded. From the results, Hexadecanoic acid was found to be higher as 27.23 % and Dimethylacetyl acetone was recorded as lowest amount as 1.24 % and rest of the 13 fatty acids were showed moderate amount. The C. vulgaris oil having more saturated fatty acids and it is an additional fatty acids source. It could be considered for pharmaceutical and aquaculture industry for growth enhancements.

KEY WORDS

microalgae, C. vulgaris, fatty acids, Vellar estuary.

1. INTRODUCTION

Marine microalgae are the blue green algae commonly found in fresh and marine water bodies. Microalgae are the major distributor of organic substances and energy to the marine ecosystems [1]. The microalgae and its derived products have extensive applications in pharmaceutical, cosmetics, food and aquaculture industry and also effluent treatment plants, due to their high bioactive secondary metabolites such as antibacterial, antioxidant, anticancer, antiviral, etc [2, 3]. Fatty acids are the important component of the living cells, which is involved in several cellular functions in human and its essential component for human brain development. Marine microalgae are the great reservoir of fatty acids; hence the present investigation was aimed to evaluate the fatty acids composition of *C. vulgaris* collected from the Vellar Estuary.

2. MATERIALS AND METHODS

The marine microalgae *C. vulgaris* was collected from the Vellar Estuary, Parangipettai, Tamil Nadu, as described by the Dineshkumar et al [4]. The *C. vulgaris* was plated in Conway medium and identified through morphological key characters by microscopic observations and it was mass cultured in laboratory conditions with optimum conditions.

The oil was extracted from the *C. vulgaris* biomass by following the method of Folch [5]. FAME was prepared according to the method of Lang et al. [6]. The algal oil was extracted by methanol/toluol 2:1 ratio (v/v) after homogenation for 30 sec and 10 µg tripentadecanoate was added for tranesterification process and then added 150µl sodium methoxide. The matrix was extracted with 500µl of n-hexane and 500µl 1 M NaCl and the hexane layer was transferred to the new clean

tube with addition of 10µl acetonitrile and the analysis was carried out in GC-MS (SHIMADZU-QP 2010) and connected with mass selective detector at 70EV (m/z 50-500: sources at 230°C and quadrupole at 150°C) in electron impact mode with a capillary column (BPX70 column 60m). The temperature of oven was programmed at 2 min for 160°C and increased to 300°C for 1 min. Helium gas was used as carrier gas at the flow rate of 1.0 ml/min. The fatty acids profile analyzed based on the interpretation of mass spectrometric fragmentation and conformed by comparison of retention time and fragmentation patterns of standard fatty acids.

3. RESULTS AND DISCUSSION

The fatty acids composition of the *C. vulgaris* extracted oil was assessed in fatty acids methyl esters (FAME) and the results were expressed in Table 1. In the present study, totally 15 fatty acids were detected at different retention time and area such as Triacontanoic acid, Octadecanoic acid, Nonadecanoic acid, Pentadecanoic acid, Hexadecanoic acid, Hexadecanoic acid, 15-methyl, Octadecanoic acid, 2-Formylamino-3-Phenyl-Propionic aicd, Acetamide, Oxazepam, Tetracosanoic acid, Pentacosanoic acid, Dimethylacetylacetone and Germacycloundecan. From the results, the Hexadecanoic acid was found to be higher as 27.23 % followed by Octadecanoic acid 26.80 % and the Dimethylacetylacetone was recorded as lowest amount as 1.24 % followed by Germacycloundecan 1.31 % and Tetracosanoic acid. Rests of the 10 fatty acids were recorded as moderate level. The fatty acids content of the microalgae and other organisms are based on the media composition and environmental factors and season and also it differs from species to species [6]. Natalia et al. [7] investigated the fatty acids composition of 15 marine microalgal species and reported, 36 fatty acids respectively and the fatty acids amount were differed from species to species. Patil et al. [8] described the fatty acids content 12 microalgal species for the aquaculture feed formulation and reported the moderate amount of ω-3, ω-6 and ω-9 fatty acids in 12 species, especially it was recorded high level in *Nannochloropsis oceanica, Chroococcus* sp., *Synechococcus* sp. and *Tribonema* sp. respectively. Similarly, Menezes et al. [9] recorded the 25 fatty acids in different growth stages of *Choricystis* microalgae and suggested that the fatty acids content was changed during all the growing stages of the microalgae and revealed the matured culture having high amount of PUFA, MUFA and HUFA and the early stages the composition was found to be low. In the present study an agreement with the study of Shamsudin [10], who reported the similar saturated fatty acid content, mainly the ω-3 and ω-6 fatty acid were recorded higher.

Table 1. Fatty acids profile of *C. vulgaris* oil

Peak	R. Time	I. Time	F. Time	Area	Area (%)	Name
1	6.479	6.451	6.539	91605	2.14	Triacontanoic acid, methyl ester
2	8.569	8.505	8.872	1251664	26.80	Octadecanoic acid, methyl ester
3	9.228	9.204	9.294	94993	2.04	Nonadecanoic acid, ethyl ester
4	9.458	9.430	9.528	90316	1.94	Pentadecanoic acid, methyl ester
5	10.412	10.360	10.481	1278857	27.23	Hexadecanoic acid, methyl ester
6	10.741	10.711	10.801	161035	3.40	Hexadecanoic acid, ethyl ester
7	11.429	11.399	11.495	110115	2.54	Hexadecanoic acid, 15-methyl-, methyl ester
8	12.523	12.472	12.594	1031253	22.20	Octadecanoic acid, methyl ester
9	12.815	12.795	12.873	70593	1.82	2-Formylamino-3-Phenyl-Propionic acid
10	12.883	12.858	12.932	108286	2.30	Acetamide, 2,2,2-trifluoro-N-[2-(4-hydroxy-2-piperidinyl)-2-oxoethyl]
11	14.456	14.323	14.539	67977	1.46	Oxazepam
12	15.080	15.037	15.112	64386	1.39	Tetracosanoic acid, trimethylsilyl ester
13	17.063	17.021	17.164	106150	2.29	Pentacosanoic acid, methyl ester
14	17.330	17.319	17.399	57575	1.24	Dimethylacetylacetone
15	17.964	17.890	17.992	60660	1.31	Germacycloundecan
				4645491	100.00	

4. CONCLUSION

From the results of the present study, the microalgae *C. vulgaris* was collected and identified by the morphological observation and it was cultured in mass scale with optimized condition in laboratory. The commercially important fatty acids were recorded high level than the other algae. In conclusion, the *C. vulgaris* oil having more saturated fatty acids and it could be used for pharmaceutical industry and aquaculture industry growth form enhancement of the growth.

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