



Research Article

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Amino acids and fatty acids in *Hypnea musciformis*

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ABSTRACT

Hypnea musciformis were determined of Amino acids and Fatty acids. Amino acids were estimated by HPLC methods where as fatty acids by gas chromatography. Total 18 amino acids were found in the dried sample; cystine was the major content and followed by aspartic acid, valine, phenylalanine, alanine, serine and lysine. In the case of fatty acids, 10 components were identified. Palmitic acids are found to be the major constituent. I present study results showed that *Hypnea musciformis* in the Kanyakumari could be utilized as functional ingredient for the valuable nutritional properties for seafood industries.

Key words: Seaweeds, *Hypnea musciformis*, Amino acids and Fatty acids.

INTRODUCTION

Marine algae are exploited mainly for the industrial production of phycocolloids such as agar-agar, alginate and carrageenan. Seaweeds have some of the valuable medicinal value components such as antibiotics, laxatives, anticoagulants, anti-ulcer products and suspending agents in radiological preparations. Fresh and dry seaweeds are extensively consumed by people, especially living in the coastal areas.

Seaweeds are regular part of human diet in coastal China since 1850 [1] and even today they are mainly consumed in the orient and pacific islands. The edible seaweeds contain a significant amount of the proteins, vitamins and minerals for human nutrition [2].

The use of algal oils containing Long Chain Polyunsaturated Fatty Acids (LCPUFAs) as nutritional supplements has been recommended [3] and algal sources are being identified for the presence of Docosahexaenoic Acid (DHA) and Eicosapentanoic Acid (EPA). Food value, flavour, colour and texture appear to favour the use of seaweeds as food. Nevertheless, marine algae can serve as a source of minerals, vitamins, free amino acids and polyunsaturated fatty acids.

In general, from the critical review of literature, it has been observed that the most studies on the nutrient contents of seaweeds have concerned fresh plant. Little is known of the effects of processing by drying. The present investigation aims at on the following from *Hypnea musciformis*.

- Qualitative and Quantitative Estimation of Amino acids.
- Estimation of fatty acids.

EXPERIMENTAL SECTION

Sample was collected from the sea coast of Kanyakumari, Tamil Nadu, India in the form of dry sample. Algal sample were cleaned at epiphytes and necrotic parts were removed. Sample was rinsed with sterile water to remove any associated debris. Sample was kept under sunshade for 7 days. After drying the powder was then used the primary estimation of amino acids and fatty acids. This powder was stored in cold conditions in an airtight container and analysis was carried out within three months of processing.

Qualitative and Quantitative Estimation of Amino acids

Free and protein bound amino acids were estimated by O-phthaldialdehyde method described by Rajendra [4].

Estimation of Fatty acids

Fatty acids in the sample were identified and quantified methyl esters in NEON II gas chromatography instrument following the procedure outlined by Niller and Berger [5].

Statistical Analysis

Data were analyzed using expressed in Mean \pm S.E. Statistical analyses were performed using graph pad prism for windows (Graph Pad vision 4, San Deigo, CA).

RESULTS AND DISCUSSION

Amino acids

The dried sample of *Hypnea musciformis* was found to contain 18 amino acids, namely, arginine, alanine aspartic acid, asparagine, cystine, glutamic acid, gultamine, glycine, histidine, iso-leucine, leucine, lysine, methionine, phenylalamine, serine, threonine, tyrosine and valine (Figs.1). In *Hypnea musciformis* the concentration of cystine was (71.50 $\mu\text{g g}^{-1}$ dry wt) followed by aspartic acid (67.28 $\mu\text{g g}^{-1}$ dry wt), valine(52.58 $\mu\text{g g}^{-1}$ dry wt), phenylalnine(49.12 $\mu\text{g g}^{-1}$ dry wt), alanine (48.72 $\mu\text{g g}^{-1}$ dry wt), serine(45.96 $\mu\text{g g}^{-1}$ dry wt) and lysine (44.84 $\mu\text{g g}^{-1}$ dry wt) (Fig. 1).

Dave and Chauhan [6] have reported high levels of lysine (169.8 $\mu\text{g g}^{-1}$ dry wt) in the tissues of *Caulerpa sp.* The observed level of lysine in *Padina* is more than that reported from the fresh water alga *Spirulina* [7-8]. In general, the amino acid profile is important for evaluating the nutritional value of algae proteins, but the digestibility of algae protein was not analysed. Giuseppe Impellizzeri *et al.* [9] quantitatively determined free protein amino acids in 30 red algae. In most of the species, aspartic acid, asparagine, glutamic acid, glutamine, alanine, glycine and serine were abundant, while massive accumulation of proline (up to 80.5%) was observed in six species, of the family Rhodomelaceae. Christine Dawczynski *et al.* [10] examined different seaweed products for Analysis of Amino Acids (AAs), protein and dietary fibre. All essential AAs were detected in the seaweed species tested and red algae species featured uniquely high concentrations of taurine when compared to brown algae varieties. Rajasulochana *et al.*, [11] reported the dried sample of *Kappaphycus alvarezii* was found to contain 18 amino acids. The lysine was the major constituent followed by phenylalanine, glutamic acid, isoleucine, histidine, tryptophan, methonine and asparagine. Further, it can be noted that glycine is much less quantity compared to all other components available in *Kappaphycus sp.*

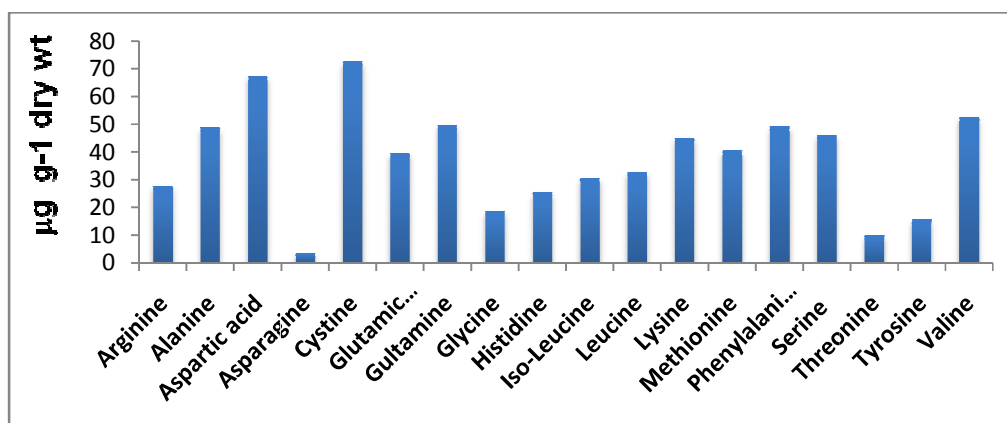
Fatty Acids

The shade dried powdered sample of *Hypnea musciformis* was found to contain 10 fatty acids namely, linolenic acid, heptadecanoic acid, myristic acid, myristoleic acid, palmitic acid, palmitoleic acid, pentadecanoic acid, oleic acid, stearic acid and tridecanoic acid (Figs.2). In *Hypnea musciformis* the concentration of palmitic acid (78.54 $\mu\text{g g}^{-1}$ dry wt) followed by pentadecanoic acid (65.32 $\mu\text{g g}^{-1}$ dry wt) (Fig.2).

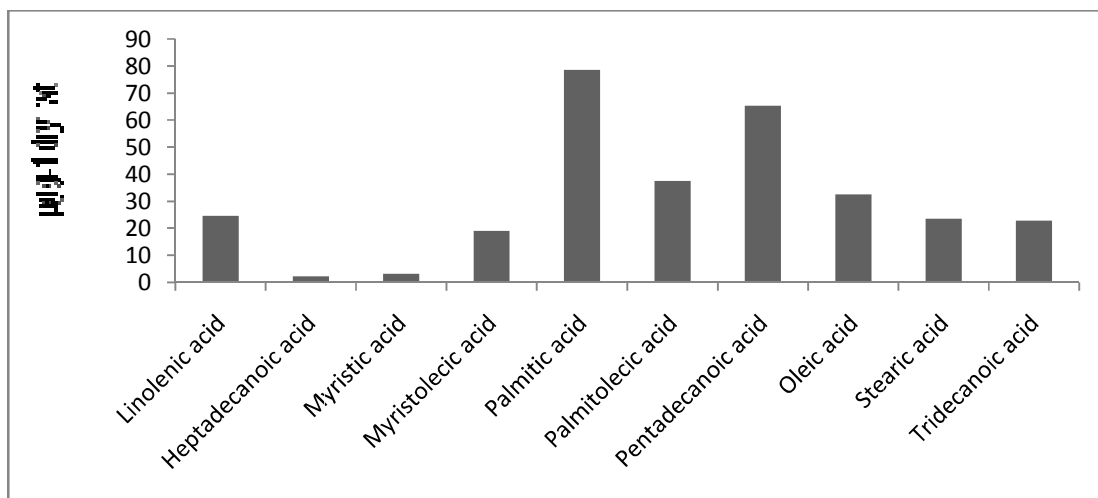
An investigation on the fatty acid content of *Padina gymnospora* from Indian coast has shown the presence of only nine fatty acids with palmitic acid as the major constituent and the absence of lauric acid in the alga is notable and distinct [12]. Rajasulochana *et al.* [11] analysed eight fatty acids components in *Kappaphycus alvarezii*. Dembitsky *et al.* [13] have examined the fatty acid content of the brown algae of black sea and found 16:0, 18:1, 18:3, 18:4 and 20:5 fatty acids were found to be predominant.

Analysis of the dry powdered samples of the algae by HPLC revealed the presence of 18 amino acids in *Hypnea musciformis*. Among all the amino acids cystine was the major content and followed by aspartic acid, valine, phenylalanine, alanine, serine and lysine. Gas chromatographic analysis of the fatty acids composition revealed the presence of 10 fatty acids. In *Hypnea musciformis*, palmitic acid was the major constituent. Therefore, the result of the study has demonstrated that marine plant in the Kanyakumari could be used as ingredient in functional foods for human consumption.

Fig. 1: Relative levels of amino acids in *Hypnea musciformis*



Amino acids	(µg g ⁻¹ dry wt) (Mean ± S.E.)
Arginine	27.65 ± 0.250
Alanine	48.72 ± 0.339
Aspartic acid	67.28 ± 0.140
Asparagine	3.453 ± 1.274
Cystine	72.50 ± 1.237
Glutamic Acid	39.57 ± 2.054
Gultamine	49.46 ± 1.241
Glycine	18.69 ± 0.738
Histidine	25.41 ± 0.690
Iso-Leucine	30.43 ± 0.534
Leucine	32.56 ± 0.895
Lysine	44.84 ± 0.605
Methionine	40.50 ± 0.099
Phenylalanine	49.12 ± 0.214
Serine	45.96 ± 1.126
Threonine	9.84 ± 0.433
Tyrosine	15.60 ± 0.401
Valine	52.58 ± 0.240

Fig. 2: Relative levels of fatty acids in *Hypnea musciformis*

Fatty acids	($\mu\text{g g}^{-1}$ dry wt) (Mean \pm S.E.)
Linolenic acid	24.6 \pm 0.345
Heptadecanoic acid	2.2 \pm 0.589
Myristic acid	3.1 \pm 0.057
Myristoleic acid	19.0 \pm 1.140
Palmitic acid	78.54 \pm 1.544
Palmitoleic acid	37.5 \pm 2.885
Pentadecanoic acid	65.32 \pm 1.148
Oleic acid	32.49 \pm 0.863
Stearic acid	23.51 \pm 1.154
Tridecanoic acid	22.78 \pm 2.304

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