Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2014, 6(1):611-613

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Antioxidant properties of natural dietary common seafoods from Pulicat coast

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ABSTRACT

Antioxidants are chemical substances, which can scavenge free radicals and are implicated in the prevention of heart diseases, cancer, ageing etc. Scientists and nutritionist stress the importance of antioxidants and a vast body of literature exit on natural antioxidants from plants. Works relating to the studies on antioxidants in seafoods are limited and this work focuses on the presence of natural antioxidants (Vitamins C, E and Selenium) in few common seafood from Pulikat area. In the present study, the highest value for vitamin C was obtained in Crassostrea madrasensis (5.678 mg/100g) followed by the crab, Portunus sanguinolentus (2.9932 mg/100g). The vitamin E content of the fishes Mugil cephalus and Sardinella longiceps were found to be 10.31mg/100g, 9.01mg/100g and the highest amount of selenium in the present study was found in the crab (56.7 mcg/100g).

Keywords: antioxidants, seafood, crabs, oysters, fish, Vitamins C & E, Selenium

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INTRODUCTION

Oxygen is a highly reactive atom that is capable of becoming part of potentially damaging molecules commonly called ”free radicals”. Free radicals are capable of attacking the healthy cells of the body, causing them to lose their structure and function[1]. Fortunately, free radical formation is controlled naturally by various beneficial compounds known as antioxidants. Antioxidants are our first line of defense against free radical damage, and are critical for maintaining optimum health and well being. The need for antioxidants becomes even more critical with increased exposure to free radicals.

Seaweeds are known to contain antioxidative compounds and some of the active compounds have been identified as compounds related to chlorophyll a and bromophenols. Fish and marine animals feeding directly or indirectly on algae may also contain these antioxidants. The edible part of short necked clam was thus found to contain several antioxidative compounds related to chlorophyll a, pyropheophorbide a, and purpurin[2-6]. Scallop, oyster and abalone have also been shown to contain compounds related to chlorophyll a Gastropods like *Pleuroplaca trapezium* meat have also been reported to contain antioxidants[7-9]

The aim of the study was to determine the natural dietary antioxidants in common seafoods of Pulicat, namey two fishes (*Mugil cephalus, Sardinella longiceps*), one crab (*P. sanguinolentus*), one shrimp (Penaeus monodon) and the edibe oyster (*Crassostrea madrasensis*).The main reason for selecting these five species is because these species are the most common and abundant fishery in Pulicat. In general, natural antioxidants like vitamin E, vitamin C and beta-carotene are widely studied from plants, but their occurrence and abundance in seafoods have not been studied widely. Hence the objective of the present work was to study their content in some common seafoods of Pulicat in order to understand the potential of seafoods as source of natural antioxidants.

EXPERIMENTAL SECTION

The samples (fishes, shrimp, crab and oyster) were collected from the local dealer of Pulicat area, kept in ice and transported immediately to the laboratory. The fish samples (*Mugil cephalus, Sardinella longiceps*) were immediately filleted and washed. The shrimp samples (*Penaeus monodon*) were peeled and their heads were removed and washed. The shells of the crab samples (*Portunus sanguinolentus*) were removed, and wet tissue was separated and washed. The foot and adductor muscle of the edible oyster, *Crassostrea madrasensis*, were removed by breaking the shell, washed and cut into small pieces. All the samples were dried over night in a hot air oven at 60º C.

The well-dried meat samples were powdered in a warring blender separately and were used for the analysis of antioxidants. The analysis for the presence of Vitamin E, C and Selenium were carried out following the methods outlined in AOAC (1990)[10].

RESULTS AND DISCUSSION

Vitamin C:

In the present study, the highest value for vitamin C was obtained in *Crassostrea madrasensis* (5.678 mg/100g) followed by the crab, *Portunus sanguinolentus* (2.9932 mg/100g) (Table.1). This is similar to the reported values for eastern oyster (3.1 mg/100g by Nettleton and Exler (1992)[11] and 6 mg/100g by USDA National Nutrient Database for Standard Reference. The vitamin C content in the fishes *Mugil cephalus* and *Sardinella longiceps* were slightly higher than in shellfish (9.532mg and 8.275mg/100g, respectively. This is in accordance with previous reported by Sidwell *et al* (1978)[12]. Levels of ascorbic acid in the edible portion of fish and fish products have also been reported by Gordon and Martin (1982)[13]. But the values were lower than in the present study. The ascorbic acid found in white fish muscle averaged 0.33-19 mg/100. The vitamin C content in the shrimp *Penaeus monodon* was found to be 15.80 mg/100 g. This is higher than the reported value of 2.2 mg/100g for shrimp and 1.5-0.6mg/100g in shrimp and prawns [14].

Vitamin E*:*

The vitamin E content of the fishes *Mugil cephalus* and *Sardinella longiceps* were found to be 10.31mg/100g, 9.01mg/100g, respectively (Table 2). This is very similar to the value of α-tocopherol content of 11 mg/100 g reported by Storozhok (1985)[14] in freshly caught whitefish. In marine animals α-tocopherol has been found to be the principal tocopherol[15]. Considerable differences in α-tocopherol concentration have been reported between light and dark fish muscle. Ackman and Cormier (1967)[16] found α-tocopherol values for the light and dark cod muscle 0.24 and 1.16 mg/100 g, respectively. In the present study, the vitamin E content in shrimp was 5.671mg/100g, the US RDA for vitamin E is 10 mg/100g. Thus from the present study, it was found that 100g of the shrimp can meet 50% of the RDA. In crab, the content was 1.26 mg/100g, which is a considerable amount for seafoods. In the oyster, the value obtained was 0.5 mg/100g, which is similar to the value obtained by Holland et al. (1993)[17] (0.85 mg/100g) in edible oysters.

Selenium:

The highest amount of selenium in the present study was found in the crab (56.7 mcg/100g) (Table 3). This value is higher than that reported for crabs by the USDA (41 mcg/100g). Thus a 100g serving of the crab meat offers selenium content of well over half of the daily required intake. The oyster and shrimp in the present study contained 21.1 and 13.2 mcg/100g of selenium, respectively. This is comparable to the value reported by Holland et al. (1993)[17], which was 23 and 16 mcg/100g in edible oysters and shrimps, respectively. The fishes had a selenium content of 14 and 10 mcg/100g, which lower than that reported by Holland et al. (1993)[17]

Antioxidants, which can scavenge free radicals, have an important role in biological system and their use is implicated in the prevention of cancer, heart diseases, aging etc [18]. Antioxidants act at several different stages in an oxidative sequence. They act as (a) scavengers, imitating free radicals such as hydroxyl, aloxyl and paroxyl species, (b) breaking the chain of initiated sequence, (c) quenching or scavenging singlet oxygen. This study highlights the importance of seafood as an important source of antioxidants, which adds up to the already proven nutritive value of seafood.

Table 1. Content of vitamin-C in samples

Seafood Samples	Vitamin-C mg/100g dry wt.
Mugil cephalus	9.532
Sardinella longiceps	8.275
Portunus sanguinolentus	29.932
Penaeus monodon	15.80
Crassostrea madrasensis	56.78

Table 2. Content of vitamin-E in samples

Seafood Samples	Vitamin-E mg/100g dry wt.
Mugil cephalus	10.31
Sardinella longiceps	9.01
Portunus sanguinolentus	12.67
Penaeus monodon	56.71
Crassostrea madrasensis	5.98

Table 3. Content of Selenium in samples

Seafood Samples	Selenium mcg/100g dry wt.
Mugil cephalus	0.1411
Sardinella longiceps	0.1099
Portunus sanguinolentus	56.7
Penaeus monodon	1.32
Crassostrea madrasensis	2.112

Acknowledgments
Authors thank sincerely the Dr Patterson Edward, Director, Suganthi Devadason Marine Research Institute, Tuticorin, for the sample collection and laboratory support and extend our thanks to FIST-DST Program (No. SR/FST/College-189/2013) Govt. of India for laboratory facilities support

REFERENCES

[1] C Chellaram; NR Shailaja; T Prem Anand; M Chandrika; C Gladis Rajamalar. *International Journal of Pharma and Biosciences*, **2012**. 3(3), B173-B178.
[2] C Chellaram; P Raja; K Karnakaran; T Prem Anand; A Alex John; G Kuberan. *Global Journal of Pharmacology*, **2002**, 6 (3). 231-235.
[3] C Chellaram; JK. Patterson Edward, *International Journal of Pharmacology*. **2009,** 5 (3), 236-239.
[4] N Ramarathnam; T Osawa; H Ochi; S Kawakishi. *Trends Food Science and Technology* **1995**, 6, 75-82.
[5] C Chellaram; T Prem Anand; S Kumaran; RS Sreenivasan. *Pakistan Journal of Pharmaceutical Sciences*, **2011**, 24 (2), 153-158.
[6] K Sakata; K Yamamoto; N Watanabe. American Chemical Society, Washington DC, **1994**, pp 164-182.
[7] T Prem Anand; C Chellaram; T Prem Anand; A Nafiza Parveen; C Felicia Shanthini. *Journal of Chemical and Pharmaceutical Research*, **2013**, 5 (4), 16-21.
[8] C Chelllaram**;** T Prem Anand; C Felicia Shanthini; B Arvind Kumar; Sidharth P Sarma. *APCBEE Procedia*, **2012**, 2, 37-42.
[9] S Anbuselvi; C Chellaram; R Jeyanthi; S Jonesh; JKP Edward. *Journal of Medical Sciences*, **2009**, 9 (5), 240-244.
[10] AOAC. Association of official Analytical Chemists, Washington,D.C, **1990**, pp 1-112
[11] JA Nettleton, J Exler. *J. Food Sci.* **1992**, 57, 257-260.
[12] VD Sidwell; AL Loomis, PR Foncannon; DH Buzzell. *Mar. Fish. Rev.* **1978**, 40, 1-16.
[13] DT Gordon; RE Martin. AVI Publishing Company, Westport, Connecticut, **1982**, pp 429-445.
[14] NM Storozhok. *Voprosy Pitaniya*, **1985**, 1, 73-74.
[15] EL Syvaojaa; K Salminen. *Fish and fish products JAOCS* , **1985**, 62, 1245-1248.
[16] RG Ackman; MG Cormier. *J. Fish. Res. Bd. Can.* **1967**, 24 (2), 357-373.
[17] B Holland; J Brown; DH Buss. The third supplement to McCance & Widdowson's The Composition of Foods (5th Edition), HMSO, London. **1993**, pp 1-211.
[18] RL Wilson. Academic Press, New York, **1988,** pp 1-123.