

Lipid peroxidation inhibitory effect of *Hizikia fusiformis* methanolic extract on fish oil and linoleic acid

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Introduction

Oils and fats are prone to oxidation and thereby affect flavor, color, texture and nutritive value due to oxidized unsaturated fatty acid moieties, specially aldehydes and ketones. Lipid oxidation products (LOP) can lead dramatic effects in reducing nutritional value and responsible for the production of toxic compounds capable of inducing metabolic disorders. *Hizikia fusiformis* is an edible brown seaweed being widely used in Korea and Japan, which suppose to have a variety of biological activities including reactive oxygen species (ROS) scavenging and lipid peroxidation inhibitory effects. Our previous study (Siriwardhana et al., 2003) on antioxidant activity of *H. fusiformis* on ROS scavenging and lipid peroxidation inhibition showed a potential lipid oxidation inhibitory effect on linoleic acid specially in methanolic extract. Also particular study confirmed the efficacy of antioxidative ability of phenolic compounds in *H. fusiformis*. The objective of this study is to evaluate the antioxidative effect of HME on fish oil and linoleic acid. Moreover, the stability of HME exposed to heat and UV light was investigated in order to provide characteristic information of *H. fusiformis* antioxidants.

Materials and Methods

H. fusiformis was collected from the Jeju Island costal of Korea in April 2003. Oils (fish oil and linoleic acid) were exposed to accelerate oxidation similar to the method used by Abdalla and Roozen (1999). Peroxide value (PV) of oils stored

under accelerated oxidation conditions was determined by the iodometric determination method according to the AOAC (1995) guidelines. Thiobarbituric acid-reactive substances (TBARS) were measured according to the method of Madsen et al. (1998). Conjugated diene hydroperoxides (CDH) content was measured in every two days as described by Roozen et al. (1994).

Weight gaining was conducted according to the modified method described by Wanasundara and Shahidi (1996). Finally, Heat and UV light stability of HME was investigated on the scavenging of 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals by the HME incubated at different temperatures (25°C, 50°C, 75°C and 100°C) for 6 h and under UV light for 12 days. Statistical analysis were conducted in triplicate, Students t-test was used to determine significant differences.

Results and Discussion

Hizikia methanolic extracts (HME) significantly ($p < 0.05$) reduced the lipid peroxidation at different steps of the pathway in a dose-dependent manner. Increasing the level of HME from 0.01% to 0.1% caused the antioxidative effect increment over the effect of BHT (BHT reported the best effect compared to α -tocopherol and BHA). HME could reduce the formation of primary oxidation products from lipid radicals indicating lower CDH values compared to its control counterpart. Also, HME could reduce the addition of oxygen to form lipid peroxy radicals indicating low weight gaining in HME-treated oils. Moreover, it could reduce the formation of lipid peroxide and indicated low PV. Furthermore, it could reduce the total lipid peroxidation resulting low TBARS values. The heat and UV light study showed that *H. fusiformis* contains heat and UV light resistant antioxidants. Total results indicated that the *H. fusiformis* antioxidants could be useful in preventing oxidative damages of food oils.

Reference

- Abdalla A.E. and Roozen J.P. 1999. Effect of plant extracts on the oxidative stability of sunflower oil and emulsion. *Food Chem.* 64, 323-329.
- Siriwardhana S.A.N.S., Lee K.W., Kim S.H., Ha J.W. and Jeon Y.J. 2003. Antioxidant activity of *Hizikia fusiformis* on reactive oxygen species scavenging and lipid peroxidation inhibition. *Food Sci. Tec. Int.* 9(5), 339-346.