

DISSERTATION



IMPROVEMENT OF THE NUTRITIONAL QUALITY AND SHELF LIFE OF
SELECTED FOOD SYSTEMS BY COCONUT BASED
NATURAL ANTIOXIDANTS

Submitted by

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ABSTRACT

Due to the health concerns associated with the synthetic antioxidants, consumers have a preference towards natural antioxidants. In this study, the possibility of using coconut oil cake extract (COCE) to improve the oxidative stability of food systems and the effect of dietary fatty acids on the intestinal absorption of caffeic acid (CA) and vanillic acid (VA) in Wistar rats was evaluated.

Antioxidant activity of COCE was assayed and compared with that of synthetic antioxidants using chemical assays and food model systems. The heat stability of COCE was evaluated after subjecting COCE to heat treatments at 100 °C and 180 °C. The composition of the phenolic extracts of coconut oil cake was evaluated using the HPLC methods. According to the results of 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) assays the antioxidant activity of COCE was higher than that of the butylated hydroxy toluene (BHT). In the beta-carotene-linoleate emulsion, egg yolk homogenate, stripped and non-stripped sunflower oil in water emulsions, stripped sunflower oil, pork model system and cookies, COCE has exhibited concentration-dependent antioxidant activities which are comparable with those of BHT. Heat-treated COCE at 100 °C and 180 °C showed higher antioxidant activity compared with synthetic antioxidants as evaluated using DPPH assay, Rancimat test and egg yolk homogenate.

In the intestinal absorption study, the soybean oil (SO), coconut oil (CO) and olive oil (OO) were selected as different oils. There was no significant increase in the serum antioxidant activity of rats fed with different oils supplemented with CA and VA as evaluated by DPPH and Trolox equivalent antioxidant capacity assays. SO and CO were more effective than OO in the absorption of caffeic acid as indicated in the LC-MS analysis of serum metabolites of caffeic acid and the excretion of caffeic acid through the feces as indicated by HPLC analysis. Incorporation of CA and VA has had no effect on the lipid profile of rats fed with different oils. There is no toxicity associated with the added level of caffeic and vanillic acids to the diets which is 3mg/g diet.

Key words: Antioxidant activity, Coconut oil cake, Dietary fatty acids, Intestinal absorption, Oxidative stability