

Assessment of Oxidative Stability and Fatty Acid Composition of Gamma Irradiated Edible Oils

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The safety and shelf-life of food products can be enhanced by modern food processing techniques such as irradiation. This study was carried out to investigate effects of gamma irradiation on fatty acid composition and oxidative stability of nine edible oils including Coconut oil, Corn oil, Sunflower oil, Soybean oil, Vegetable oil, Cod liver oil, Commercial fish oil, Tuna oil and Thilapia oil. The irradiation was applied at 15, 30, 45, 60 and 75 kGy levels using Cobalt-60 radiation source at Sri Lanka Gamma Center. The oxidative rancidity of oil samples was tested by Peroxide value (PV) and Thiobarbituric acid value (TBA) tests. The fatty acid profiles were determined by capillary column gas chromatography with flame ionization detector. The lowest and the highest PV were shown in Coconut oil (0 meq/kg) and Vegetable oil (10.54 meq/kg). All the samples showed their highest PV at 15 kGy dose while the lowest PV at 75 kGy dose. The TBA values of fish oils were significantly ($p < 0.05$) higher than plant and vegetable oils. The highest TBA value (270.37 nmol/g) was shown in Thilapia oil irradiated at 15 kGy. The lowest TBA value (2.41 nmol/g) was reported in control sample of Coconut oil. The fatty acid profiles of treated oils showed substantial stability during irradiation. Oleic acid (C18:1 ω -9) was the most abundant fatty acid in vegetable oils (43.78%) followed by in Tuna oil (24.84%) and Thilapia oil (30.79%). Linoleic acid (C18:2 ω -6) was the highest abundant fatty acid in Corn oil (50.00%), Sunflower oil (48.75%) and Soybean oil (52.79%). Lauric acid (C12:0) was the highest abundant fatty acid in Coconut oil (43.55%). Higher amount of Docosahexaenoic acid (C22:6 ω -3) was recorded in Tuna oil (18.89%), fish oil (10.06%) and Cod liver oil (10.22%). However, gamma irradiation at 15-75 kGy doses did not show any significant ($p < 0.05$) effect on the fatty acid composition of any edible oil where they showed a good stability during irradiation processing.

Keywords: Gamma irradiation, Edible oils, Fatty acid profile, Peroxide value, Thiobarbituric assay