Comparison of Oxidative Stability and Quality of Bulk Coconut Oil Following Repeated Deep Frying

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This study was conducted to compare the oxidative stability and the quality of bulk coconut oil, followed by repeated deep frying. For this purpose, bulk coconut oil was obtained from five different processing mills and heated at 180^{O}C for 20 minutes without or with food ("*Vade"*), for ten repeated frying cycles. The samples were tested for oxidative stability, physicochemical properties and structural alterations using standard methods. Free fatty acid content and thiobarbituric acid reactive substances (TBARS) increased (p<0.05) while saponification value and iodine value decreased (p<0.05) with increasing number of frying cycles. When oil was heated without food, peroxide value increased (p<0.05) over the frying cycles. However, when oil was heated with food, peroxide value increased (p<0.05) until the sixth cycle and thereafter decreased (p<0.05) as a result of degradation of peroxides into secondary oxidation products. There were no (p>0.05) differences in the peroxide values and TBARS values when the oil was heated with or without food, since water released from the food acts as barrier for oxygen and inhibits formation of peroxides and secondary oxidation products. Only free fatty acid content increased (p<0.05) when oil was heated with food compared to oil heated without food, due to the hydrolysis of triglycerides in the presence of water. Moreover, free fatty acid content, peroxide value and TBARS value were (p<0.05) different in bulk coconut oils tested due to varying processing conditions. These results indicated that repeated heating of bulk coconut oil had a negative effect (p<0.05) on its oxidative stability and physico-chemical properties compared to the accepted limits. However, it can be concluded that bulk coconut oil can be used for maximum of 2-4 repeated deep frying cycles, while maintaining its physico-chemical parameters under the specified limits of CODEX guidelines.

Keywords: Bulk coconut oil, Deep frying, Oxidative stability, Hydrolysis, Polymerization