EFFECT OF DEEP-OIL FRYING ON ANTIOXIDANT PROPERTIES OF WHOLE GRAIN WHEAT DONUTS

Abstract

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May 2013

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Deep-oil frying (DOF) consists of cooking food at a temperature above the boiling point of water in edible oil, where food is immersed. Its high temperature may affect the nutritional quality of foods, including antioxidant capacity. The objective of the present study was to determine the effect of DOF on in vitro antioxidant properties of whole grain donuts. Donuts were formulated and deep-oil fried (DOFd) for different length of times of 1, 2, 3, or 4 min and at different temperatures of 120, 140, 160, or 180°C. Donuts were determined for total phenolic content (TPC) and composition, inhibition capacities of 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical and lipid peroxidation, and iron chelating capacity.

Significant differences (P<0.05) between donuts DOFd for different length of times, and at different temperatures were mainly recorded in TPC in all donuts. Free phenolic content
decreased with DOF time (R²=0.87) and temperature (R²= 0.79), whereas bound and total phenolic contents increased with DOF time up to 3min. TPC increased by 112.2% for hard red whole grain wheat meal donut (HRWGWM), 83.5% for soft white wheat flour donut (SWWFD), and 72.5% for soft white whole grain wheat meal donut (SWWGWM); and decreased with further increase in frying time. TPC increased with DOF temperature from 120°C to 180°C frying (R²=0.94). This increase was 73.7% for HRWGWM, 59.4% for SWWFD, and 36.1% for SWWGWM.

Ferulic acid was the most predominant phenolic acid in all donuts, followed mainly by coumaric, vanillic, p-hydroxybenzoic, chlorogenic, catechuic, and caffeic acids.

DPPH and 2, 2'-bipyridyl radicals scavenging capacity of DOF donuts increased with time (from one to 3 min) at 190°C, and temperature (from 120°C to 180°C. Lipid peroxidation inhibition capacity of donuts increased up to 3 min frying at 190°C, and decreased with extended frying in all three types of donuts. On the other hand, DOF at 120°C initially lowered lipid peroxidation inhibition capacity of all three types of donuts. Consistent increase in lipid peroxidation inhibition capacity was observed with increase in frying temperature from 120°C to 180°C.

In conclusion, appropriate DOF time and temperature can improve the availability and activity of antioxidants of food products.