

## EFFECT OF REPEATED HEATING ON ANTIOXIDANT CAPACITY AND POLYPHENOLIC CONTENT OF EDIBLE OILS

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Edible oils are used at unheated, heated and reheated stages. Consumption of repeatedly heated oil could be hazardous to health due to formation of free radicals. The aim of the present study was to estimate the antioxidant capacity and total phenolic content of seven types of edible oil samples collected from local market: [coconut oil 1 (loosely packed, sold in retail markets), coconut oil 2 (pure, sold in bottles), olive oil, soya oil, sunflower oil, palm oil and *mee* oil (*Madhuca longifolia*)] at unheated, heated (boiled for 5 mins) and reheated (re-boiled for 5 mins) stages. The antioxidant capacity and total polyphenolic content were determined by 2,2-azinobis-(3-ethylbenzothiazoline-6-sulphonate) radical scavenging assay (expressed as Trolox equivalent antioxidant capacity-TEAC per g of oil) and Folin-ciocalteu method respectively. At unheated stage, all the oils tested showed significantly different ( $p < 0.05$ ) antioxidant capacities where the highest antioxidant capacity was observed in *mee* oil ( $220.71 \pm 5.45$  TEAC  $\mu\text{g/g}$ ) followed by olive oil ( $22.10 \pm 2.77$  TEAC  $\mu\text{g/g}$ ) and coconut oil 1 ( $13.02 \pm 2.77$  TEAC  $\mu\text{g/g}$ ). Other unheated oils showed negligible antioxidant capacities. Antioxidant capacities of all oils significantly decreased ( $p < 0.05$ ) with heating and the highest antioxidant capacity was observed in *mee* oil ( $124.43 \pm 4.81$  TEAC  $\mu\text{g/g}$ ) followed by coconut oil 1 ( $7.57 \pm 2.10$  TEAC  $\mu\text{g/g}$ ) among the heated oil types. After reheating, all oils showed negligible antioxidant capacities except for *mee* oil ( $86.89 \pm 2.77$  TEAC  $\mu\text{g/g}$ ). Olive oil showed the highest percentage reduction (290%) in antioxidant capacity from unheated to re-heated stage. Moreover, significantly different ( $p < 0.05$ ) phenolic contents were observed among the unheated oil types. Unheated, heated and reheated *mee* oil had the highest phenolic content ( $12610.6 \pm 28.8$ ,  $8471.70 \pm 68.0$  and  $7345.91 \pm 78.6$  Gallic Acid Equivalent /100 g of oil respectively). In all oil types, significant changes ( $p < 0.05$ ) were observed in the phenolic content between unheated and re-heated stages. In addition, there was a significant positive correlation ( $p < 0.05$ ) between the total phenolic content and antioxidant capacity of oils at all stages ( $r^2 > 0.9$ ). In conclusion, based on antioxidant capacity and percentage antioxidant reduction, *mee* oil and coconut oil 1 were comparatively safe for re-use. Heating and reheating make deleterious effects on antioxidant capacity of all oil types.

**Keywords:** Antioxidant capacity, Heated, re-heated oil, Total phenolic content, Unheated