

## Effect of Elevated Temperatures on Trans Fat Content and Oxidative Parameters of Groundnut Oil

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**Abstract :** Heating/frying at elevated temperatures cause numerous physiochemical reactions including oxidative deterioration and trans fatty acid (TFA) formation; however Indian data on these parameters are scanty. The present study was designed to assess the effect of constant heating/frying on formation of TFAs and oxidative stability in groundnut oil. 750 mL of the oil was heated in a large iron karahi (utensil similar to a wok) and freshly cut potato strips were fried constantly at varying temperatures (160°C, 180°C, 200°C, 220°C, 230°C). In each case, the oil sample was drawn after one hour and stored at -20°C until analysed. While TFA was estimated using gas chromatography with flame ionisation detector (AOCS official method Ce 1h-05), other chemical parameters were assessed by AOCS official methods. Oil samples subjected to heating/frying at varying temperatures demonstrated a significant increase in TFAs ( $p < 0.01$ ) and saturated fatty acids ( $p < 0.01$ ) while there was a corresponding decrease in cis-unsaturated fatty acids ( $p < 0.01$ ). Frying process demonstrated greater TFA formation (mean TFA at 160°C being  $0.11 \pm 0.01$ g/100g; at 230°C it being  $2.33 \pm 0.05$ g/100g) as compared to heating alone (mean TFA at 160°C being  $0.07 \pm 0.01$ g/100g; at 230°C it being  $0.47 \pm 0.02$ g/100g), indicating that there was a significant difference in the generation of TFAs during the two thermal treatments (heating vs. frying;  $p=0.05$ ). With increasing temperatures, acid value, p-anisidine value and total oxidation (TOTOX) value registered a significant increase ( $p < 0.01$ ); however, peroxide value was found to be inconsistent. Thus, the formation of TFA and various oxidative parameters (except peroxide value) is directly influenced by the temperature of heating/frying. Since TFA formation and poor oxidative stability of oils can pose serious health concerns, food safety agencies/organizations need to devise appropriate policies, stringent food laws/standards and impose necessary safety regulations to curb oil abuse during the process of heating and frying. There is a dire need to raise consumer awareness regarding deleterious health effects of TFA and oxidative deterioration of oils at elevated temperatures employed during heating/frying procedures.

**Keywords :** cis-unsaturated fatty acid, oxidative stability, saturated fatty acid, trans fatty acid

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