

## **Effects of hydrolysis conditions on recovery of antioxidants from methanolic extracts of Nigella Sativa seeds.**

### **Abstract**

Nigella sativa (NS) has health promoting beneficial properties including antioxidant activity. In this study, the impact of acid and alkaline hydrolysis conditions on phenolic (TPC), flavonoid (TFC) contents and antioxidant activity of methanolic extracts from N. sativa (NS) seeds powder is evaluated. Total phenolic and flavonoid contents were evaluated according to Folin-Ciocalteu procedure and aluminium chloride colorimetric assays, respectively. The TPC extracts varied from 67 to 73 mg/100 g NS powder, expressed as Gallic acid equivalents (GAE), while TFC concentrations varied from 96 to 113 mg rutin equivalents (RE)/100 g NS powder. Positive correlations were found between TPC and TFC in NS hydrolyzates and their 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity ( $r^2 = 0.975$  and  $0.978$ , respectively). The alkaline hydrolyzed extract (BHE) showed the highest TPC and TFC (730  $\mu\text{g}$  GAE and 1130  $\mu\text{g}$  RE/g NS powder, respectively) as well as the highest antioxidant activity (DPPH $\bullet$  =  $167 \pm 0.133$  mg TEAC /100 g dry NS, ABTS $\bullet+$  =  $112 \pm 0.023$  mg TEAC /100 g dry NS and FRAP =  $28 \pm 0.159$  mg GAE/100 g dry NS) compared to acid hydrolyzed (AHE) and non-hydrolyzed extracts (NHE). Non-hydrolyzed extracts showed the lowest TPC and TFC content (670  $\mu\text{g}$  GAE and 960  $\mu\text{g}$  RE/g NS powder, respectively) through the assays ( $p < 0.05$ ). Findings of the study reveal that hydrolysis has profound effects on recovery of antioxidants from NS extracts. Overall, BHE has the highest antioxidant activity compared to AHE or NHE.

**Keyword:** Nigella sativa; Methanolic extracts; Hydrolysis; Total phenolic content; Total flavonoid contents; Antioxidant activity.