Effect of Different Cooking Methods on Antioxidant Properties of Onion (*Allium cepa* L.) Grown in the Jaffna District

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Onion (*Allium cepa* L.) is one of the important condiments widely consumed by Sri Lankans. It is a major source of flavonoids such as quercetin and anthocyanin, which are necessary to maintain good health. However, cooking has impacts on the antioxidant compounds of onion. This study investigated the effect of three cooking methods on the total phenolic content (TPC), total flavonoid content (TFC), total antioxidant capacity (TAC) and antioxidant activity (AA) on local onion cultivar (*Vethalam*). Boiling (100 °C, 4 min), microwave cooking (560W, 2 min) and stir-frying (260 °C, 16 min) were used. Ethanol (70 %, v/v) was used to extract the antioxidants from fresh and cooked onion. The TPC, TFC, TAC and AA [2, 2-Diphenyl-1- picrylhydrazyl (DPPH) radical scavenging activity expresses as IC_{50} value] of extracts were expressed as gallic acid equivalent (GAE), catechin equivalent (CE), ascorbic acid equivalent (AAE) and inhibition concentration (IC_{50}), respectively on dry matter basis. Microwave cooked onion had highest TFC (6.71±0.33 mg CE/g), TAC (98.04±4.13 mg AAE/g) and AA (0.69±0.06 mg/mL). Boiled and stir-fried onions had significantly less TFC (2.27±0.24 and 1.75±0.47 mg CE/g, respectively) and TAC (66.76±2.82 and 49.43±4.79 mg AAE/g, respectively) than fresh (3.54±0.44 mg CE/g, 86.13±6.30 mg AAE/g, respectively) and microwave cooked onions. Microwave cooked onion exhibited highest AA followed by stir-fried and boiled (IC_{50} values; 0.73±0.03 and 0.76±0.05 mg/mL, respectively), whereas, fresh onion had lowest AA (IC_{50} value; 0.81±0.04 mg/mL). TPC was highest in boiled onion (25.36±1.97mg GAE/g) while, lowest in stir- fried onion (12.78±0.92 mg GAE/g). Very high content of antioxidant compounds present in onion outer scales. Thus, higher leaching losses may have occurred in boiled than microwave cooked onion. However, boiling of onion increased the TPC, which could be due to release of free phenolics during boiling. Stir-frying may have degraded the phenolics and flavonoids because of high temperature. Microwave cooked onion showed highest antioxidant compounds due to less oxidation and increase in the bioavailability of antioxidant compounds. In conclusion, cooking of onion has significant effect on antioxidant properties. Among the three cooking methods, microwave cooking found to be the best method to enhance the antioxidant properties of onion.

Keywords: Antioxidant, Cooking, Onion, Total flavonoid, Total phenolic content