

EFFECT OF PROCESSING ON BIOAVAILABILITY OF TOTAL PHENOL, TOTAL FLAVANOID AND ANTIOXIDANT CAPACITY OF COMMONLY CONSUMED LEGUMES IN SRI LANKA

A. Deen^{1,2}, R. Visvanathan¹, S. Kaushalya^{1,2}, I. Rathanayaka¹, B.C. Jayawardane³ and R. Liyanage^{1*}

¹Laboratory of Nutritional Biochemistry, National Institute of Fundamental Studies, Kandy, Sri Lanka

²Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka

³Department of Animal Science and Fisheries, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka

*ruvini.li@nifs.ac.lk

Different processing methods and gastrointestinal digestion are known to modulate the bio-accessibility and bioavailability of bioactive compounds in food. Even though legumes are consumed all over the world, data related to effects of processing and *in-vitro* digestion on bioavailability of bioactive compounds are limited. The aim of this study is to investigate the effect of boiling and *in-vitro* digestion on total phenol (TP), total flavonoid (TF) and antioxidant capacity of chickpea, mung (MI6), cowpea (Waruni), cowpea (Dawala) and horse gram (Kollu). Raw and boiled legume samples were digested using dialysis and synthetic enzymes (pepsin, pancreatin and bile extract). TP and TF contents were assessed using Folin-ciocalteu method and Aluminium chloride colorimetric method, respectively. The antioxidant capacities were determined using ABTS (3-ethylbenzothiazoline-6-sulphonic acid) and FRAP (Ferric reducing power) methods. All the experiments were carried out in triplicate, and one-way ANOVA model was used to analyze the data. According to results, TP and TF contents of tested legumes have reduced ($p < 0.05$) upon boiling. However, *in-vitro* digestion has increased ($p < 0.05$) the TP and TF contents of both raw and boiled legumes. TP bioavailability ranged from 5.20 - 20.66%, and TF bioavailability ranged from 0.32 - 1.34%. Cowpea (Waruni), horse gram (Kollu) and chickpea showed an increase ($p < 0.05$) in TP bioavailability upon boiling in the range of 9.60 - 30.00%, while mung (MI6) and cowpea (Dawala) showed a decrease in the range of 3.70 - 32.17%. However, TF bioavailability of tested legumes reduced ($p < 0.05$) in the range of 17.82 - 77.0% upon boiling. Further *in-vitro* digestion has increased ($p < 0.05$) the antioxidant capacity of legumes. ABTS radical scavenging capacity has increased between 1.8-11.6 folds, and ferric iron reducing ability has increased between 3.7-44.7 folds after digestion. The highest increase of ferric iron reducing ability and ABTS radical scavenging capacity in dialysate was observed for boiled chickpea which correlated with the increase in TP bioavailability of chickpea after boiling. Hence, the overall results reveal that processing and simulated digestion modulate the bioavailability of TF, TP and the antioxidant capacity of above five selected legumes.

Financial assistance provided by the National Institute of Fundamental Studies is acknowledged.

Keywords: Antioxidant capacity, Bioavailability, Flavonoids, *In-vitro* digestion, Phenol