

Effect of simulated digestion using synthetic and natural gastrointestinal enzymes on the total phenol, total flavonoid and antioxidant capacity of commonly consumed raw and boiled legumes in Sri Lanka

Afka D.F.^{1,2}, Saritha W.³, Rizliya V.¹, Kaushalya S.^{1,2}, Asini P.¹, Isuri R.¹, Barana J.³
and Ruvini L.^{1*}

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

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

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

Different processing methods and gastrointestinal digestion is known to modulate the bio-accessibility and bioavailability of bioactive compounds in food. This study focuses on the effect of processing and simulated digestion on antioxidant capacity, phenolic and flavonoid content of chickpea, mung (mi6), cowpea (Waruni), cowpea (Dawala) and horse gram (kollu). The raw and boiled legume samples were digested by using synthetic and natural (Swine) gastrointestinal enzymes. The total phenol (TP) content in experimental legume samples were assessed using Folin-ciocalteu method. The antioxidant capacity in experimental legume samples were determined using DPPH (2,2-diphenyl-1-picrylhydrazyl), ABTS (3-ethylbenzothiazoline-6-sulphonic acid) and FRAP (Ferric reducing power) methods. All the experiments were carried out in triplicate and three factor factorial model was used to analyze the data. According to the results it shows that boiling and simulated digestion modulate the bio-accessibility of antioxidants and their capacity. Simulated digestion with both synthetic and natural gastrointestinal enzymes increased ($p \leq 0.05$) TP and antioxidant capacity in legume samples. digested horse gram (kollu) showed the highest ($p \leq 0.05$) amount of phenolics (20.66 ± 1.58 mgGAE/g/ 19.33 ± 2.73 mgGAE/FDg) while undigested cowpea (Dawala) and chickpea showed lower phenolics compared to the rest. However, boiling showed a reduction ($p \leq 0.05$) in TP and antioxidant capacity of selected legumes. Boiled cowpea (Dawala) showed the lowest TP (13.59 ± 0.18 mgGAE/g/ 7.71 ± 0.18 mgGAE/FDg) and antioxidant capacity. A similar trend to TPC results was observed in FRAP and ABTS assays which reveals a positive correlation with total phenolic content. Overall results reveal that the processing and simulated digestion modulates the bioavailability of TP and the antioxidant capacity of above five selected legumes.

Keywords: antioxidant activity, bioavailability, flavonoids, simulated digestion and phenol

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*Corresponding author: Ruvini.li@nifs.ac.lk