

ABSTRACT

We conducted a comprehensive evaluation of the antioxidant, anti-obesity, anti-diabetic, and anti-glycation activities associated with the consumption of broccoli, red cabbage, alfalfa, and buckwheat seeds. Additionally, we explored the relationship between these biological activities and the profiles of amino acids, polyphenols, and organic acids identified in the seeds. Our findings demonstrated that red cabbage, broccoli, and buckwheat extracts exhibited significantly higher antioxidant potential compared to the alfalfa extract. Moreover, buckwheat displayed the most significant capacity for inhibiting alpha-glucosidase. Remarkably, broccoli and red cabbage demonstrated substantial anti-glycation and lipase inhibitory potentials. We identified the presence of amino acids, polyphenols, and organic acids in the extracts through untargeted metabolomics analysis. Correlation analysis revealed that pyroglutamic acid positively correlated with all the investigated functional properties. Most polyphenols made positive contributions to the functional properties, with the exception of ferulic acid, which displayed a negative correlation with all tested biological activities. Furthermore, gluconic acid and arabinonic acid among the organic acids identified displayed a positive correlation with all the functional properties. These results strongly support the anti-diabetic, anti-obesity, and anti-glycation potential of red cabbage, broccoli, and buckwheat seeds.