Oxidants and Antioxidants in Medical Science, 2023
VOL 12, NO. 9, PAGES 01-02

OPINION ARTICLE

Open Access

The Bioactive Potential of Glucosinolates: A Comprehensive Insight into their Health Effects

Lidian Mantero*
Department of Biochemistry, Autonomous University of Madrid, Madrid, Spain

ARTICLE HISTORY
Received: 04-Aug-2023, Manuscript No. EJMOAMS-23-121875; Editor assigned: 08-Aug-2023, PreQC No. EJMOAMS-23-121875 (PQ); Reviewed: 22-Aug-2023, QC No. EJMOAMS-23-121875; Revised: 29-Aug-2023, Manuscript No. EJMOAMS-23-121875 (R); Published: 05-Sep-2023

Description

Glucosinolates, a class of natural compounds found in cruciferous vegetables such as broccoli, cabbage, kale, and brussels sprouts, have gained significant attention in recent years due to their potential health-promoting properties. These sulfur-containing compounds are known for their role in plant defense mechanisms and have been the subject of extensive research to understand their impact on human health.

Chemical structure and sources

Glucosinolates are secondary metabolites with a characteristic structure containing a β-thioglucose moiety, a sulfate group, and a side chain derived from an amino acid. The enzyme myrosinase, present in these vegetables, is responsible for breaking down glucosinolates into biologically active compounds upon chewing or chopping [1].

Cruciferous vegetables are rich sources of glucosinolates, with different vegetables containing varying types and amounts of these compounds. For example, broccoli is abundant in glucoraphanin, while Brussels sprouts contain gluconasturtiin [2].

Health effects

Anti-cancer properties: Numerous studies suggest that glucosinolates may have anti-cancer effects. When broken down, they give rise to bioactive compounds like isothiocyanates, which have demonstrated anti-carcinogenic properties in preclinical studies. These compounds are believed to inhibit the growth of cancer cells, induce apoptosis (programmed cell death), and interfere with the formation of blood vessels that supply tumors [3].

Detoxification and antioxidant activity: Glucosinolates and their breakdown products contribute to the body's detoxification processes. They activate phase II detoxification enzymes, supporting the elimination of harmful substances [4]. Additionally, isothiocyanates derived from glucosinolates exhibit antioxidant properties, helping to neutralize free radicals and reduce oxidative stress, which is implicated in various chronic diseases [5].

Cardiometabolic health: Some studies suggest that glucosinolates may play a role in promoting cardiovascular health. The anti-inflammatory and antioxidant effects of these compounds may contribute to improved blood vessel function and a reduction in the risk of cardiovascular diseases [6]. Furthermore, glucosinolates might have beneficial effects on lipid metabolism and blood pressure regulation [7].

Anti-inflammatory effects: Chronic inflammation is associated with many health conditions, including cardiovascular diseases, diabetes, and certain cancers. Glucosinolates may help modulate inflammation through various mechanisms, including the regulation of inflammatory signaling pathways [8].

Joint and bone health: Preliminary research suggests a potential link between glucosinolates and joint health. These compounds may exert anti-inflammatory effects that could be beneficial for conditions like osteoarthritis [9]. Additionally, some studies indicate a positive influence on bone health, potentially reducing the risk of osteoporosis [10].

While research on the health effects of glucosinolates is ongoing, the evidence so far suggests promising benefits, especially in terms of cancer prevention, detoxification, cardiovascular health, and anti-inflammatory effects. Including a variety of cruciferous vegetables in the diet can be a practical way to harness the potential advantages of glucosinolates. However, it's essential to note that individual responses to these compounds may

Contact: Lidian Mantero, E-mail: li.dian@mantero08.edu

vary, and more research is needed to fully understand their mechanisms of action and long-term effects. As part of a balanced and diverse diet, glucosinolates contribute to the array of bioactive compounds that support overall health and well-being

References

[1] Ishida M, Hara M, Fukino N, Kakizaki T, Morimitsu Y. Glucosinolate metabolism, functionality and breeding for the improvement of Brassicaceae vegetables. Breed Sci 2014; 64(1):48-59.

[2] Burow M, Bergner A, Gershenzon J, Wittstock U. Glucosinolate hydrolysis in *Lepidium sativum* identification of the thiocyanate-forming protein. Plant Mol Biol 2006; 63:49-61.

[3] Badenes-Pérez FR, Reichelt M, Gershenzon J, Heckel DG. Phylloplane location of glucosinolates in Barbarea spp.(Brassicaceae) and misleading assessment of host suitability by a specialist herbivore. New Phytol 2011; 189(2):549-56.

[4] Wheat CW, Vogel H, Wittstock U, Braby MF, Underwood D, Mitchell-Olds T, et al. The genetic basis of a plant–insect coevolutionary key innovation. Proc Natl Acad Sci USA 2007; 104(51):20427-20431.

[5] Blažević I, Montaut S, Burčul F, Olsen CE, Burow M, Rollin P, et al. Glucosinolate structural diversity, identification, chemical synthesis and metabolism in plants. Phytochem 2020; 169:112100

[6] Petersen A, Crocoll C, Halkier BA. *de novo* production of benzyl glucosinolate in *Escherichia coli*. Metab Eng 2019; 54:24-34.

[7] Müller C, Agerbirk N, Olsen CE, Boevé JL, Schaffner U, Brakefield PM. Sequestration of host plant glucosinolates in the defensive hemolymph of the sawfly Athalia rosae. J Chem Ecol 2001; 27:2505-2516.

[8] Fahey JW, Zalcmann AT, Talalay P. The chemical diversity and distribution of glucosinolates and isothiocyanates among plants. Phytochem 2001; 56(1):5-51.

[9] Waser J, Watson WH. Crystal structure of sinigrin. Nature 1963; 198(4887):1297-1298.

[10] Bongoni R, Verkerk R, Steenbekkers B, Dekker M, Stieger M. Evaluation of different cooking conditions on *broccoli (Brassica oleracea var. italica)* to improve the nutritional value and consumer acceptance. Plant Foods Hum Nutr 2014; 69:228-234.