New alternatives to milk from pulses: digestibility and bioactivity

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Abstract

There is a high demand for milk substitutes other than soy beverages for different reasons, from health to ethic grounds. However, plant based current market offers are essentially poor in protein content (less than 1.5% against the 3.5% in milk). The obvious choice is the use of pulses with high total protein on seeds, but a major issue hampers their production - a beany flavour. This is mitigated by the right processing technology, which also enhances the beverage nutritional quality. Beverages produced from chickpea, lupin and its (50/50) mixture were submitted to *in vitro* gastrointestinal digestion static method (Brodkorb et al., 2019). Results on bioaccessibility of protein, carbohydrates, starch, minerals and phytate, as well as glycaemic index and bioactivity (anti-cancer and anti-inflammatory) were determined.

Grain legumes contain slow-release carbohydrates like starch, present on the chickpea, but only residual on the lupin seeds. This was used to enhance flavour as the addition of enzymes, such as α-amylase and amyloglucosidase, during beverage fabrication process, which increases the pulse beverage´s digestibility, enhancing the sweeter mouthfeel by starch hydrolysis, releasing glucose rapidly to the bloodstream and leading to a higher GI. This was evidenced in chickpea based beverages with both enzymes (85.3), with only amyloglucosidase (78.9) and with only α-amylase (64.8), when compared to the lower glycaemic index of chickpea beverage (56.9).

As known, the presence of phytates may reduce bioavailability of minerals as a mineral complex which is insoluble at the physiological pH of the intestine, nevertheless, even all beverage´s digesta showed twice as much its beverage phytic acid content, the lupin beverage digesta evidenced significantly the higher levels on Na, Mg, P and Mn contents.

In what bioactivity is concerned, the lupin-based beverage evidenced the inhibition of colon cells migration and the efficient inhibition of the metalloproteinases (MMP´s), which are implicated in colorectal cancer metastatic progression, earlier attributed to the lupin peptides activity (Lima et al., 2016). One of the main conclusions, is the considerable increment on bioactivity of the produced peptides during protein digestion in the gut, which has been evidenced and can be used as an argument for the marketing of these pulse beverages.

Brodkorb et al. (2019). INFOGEST static in vitro simulation of gastrointestinal food digestion. Nature Protocols, 14: 991–1014. https://doi.org/10.1038/s41596-018-0119-1

Lima et al. (2016). Legume seeds and colorectal cancer revisited. *Food Chemistry*. 197, (A): 30-38. https://doi.org/10.1016/j.foodchem.2015.10.063

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