Phenolic Compounds in Potato Skin: Source of Variation and Prebiotic Property

Background

Potatoes technically belong to the genus *Solanum* having a great diversity of up to thousand species.[1] Potatoes are produced across continents ranking from Asia and Europe to the Americas, Africa and Oceania.[2]

In raw potato skin[3], they contain significance amount of carbohydrate, dietary fibre and protein, as well as some minerals and vitamins. Phytochemicals, such as phenolic compounds and dietary fibre, are also found.[2]

Phenolic compounds are characterized by the presence of aromatic ring attached by one or more hydroxyl groups. Phenolic compounds have diverse structures but normally conjugated to sugars and organic acids. A well-known large group of phenolic compounds, flavonoids, are composed of fifteen carbons with two aromatic rings connected by a three-carbon bridge. This group includes flavonols, flavones, flavan-3-ols, anthocyanidins, flavonones and isoflavones. There are also non-flavonoids including phenolic acids, hydroxycinnamates and stilbenes.[4]

Phenolic compounds have been well reported for the antioxidant[5] and anticancer[6] properties. They have also been evidenced to lower the risk of metabolic syndrome, which increases the prevalence of obesity and insulin resistance.[7] Moreover, it has been reported that while inhibiting pathogenic bacterial (*E. coli*, *S. Typhimurium*) growth in modest concentration, phenolic compounds are favourable for probiotic (*L. acidophilus*, *L. rhamnosus*) growth.[8]

In potato, studies have found that phenolic compounds are mostly concentrated in the skin. Flavonoids are less abundant than phenolic acids, in which chlorogenic, protocatechuic and caffeic acids are the most significant.[2] On the other hand, eriodictyol, naringenin and quercetin are the flavonoids identified in the skin.[9] In a study, significant amounts of chlorogenic, caffeic and gallic acids, with little amounts of quercetin, rutin and ferulic acid, were detected in extracts of potato skin.[10]

Research Questions

Two research questions are put forward in this proposal.

1. How do phenolic compound content and profile in potato skin vary among species and origins of produce?
2. Do phenolic compounds in potato skin bear prebiotic property?

Hypotheses

It is proposed that phenolic compound content in potato skin differs among samples due to genetic variations and growing conditions, and the compounds have positive prebiotic effect similar to previous study[8].

Methodology

The whole research aims firstly to compare phenolic compound content in potato skin of various types, and secondly to evaluate prebiotic property of phenolic compound from potato skin.

Key techniques involve but not limited to high performance liquid chromatography[11], Folin-Ciocalteu colorimetric assay[12] and proliferation of probiotics such as *Lactobacillus* and *Bifidobacterium*[13].

Outcomes

Through the research, potato skin from different countries can be distinguished by the specific phenolic compounds determined. Potatoes with phenotypic phenolic contents may be correlated with prebiotic effects. With the potential outcome, certain potatoes can be recommended to the food industry for its possible heath benefiting effects especially for the gastrointestinal gut.

Interdisciplinary and/or International Focus

Potato being the third most consumed crop in the world[9] is an important agricultural commodity of interest.

Despite its origin, potato is produced in numerous species across the world.[2] Under the influence of globalization, potatoes from different regions with unique traits are supplied in the market, rendering a wide set of choices for customers. In this research, variations between species and origins of produce of potatoes will be evaluated.

To different culinary cultures on potatoes across continents, potato skin may be reserved or removed. Investigation on prebiotic property of potato skin in this research may prompt reviews and comparisons on the diverse existing culinary cultures. This can also stimulate the awareness of the relationship between food processing and nutrition.

References

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