Abstract:

Title: Air-frying enhances Phytosterol availability in *Brassica* vegetables

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Introduction:

Brassica vegetables are well-regarded for their extensive health benefits, largely attributed to their bioactive compounds, including phenolic compounds, phytosterols, and fatty acids. However, these beneficial molecules are tending to degrade during gastronomic operations, highlighting the need for sustainable processing methods to enhance their availability. Thermal processing has shown to increase the bioactive content, specifically enhancing phenolic compounds and antioxidant properties in *Brassica* vegetables. However, the impact of these processing techniques on phytosterols and fatty acids have not been tested.

Methods:

Five *Brassica* varieties (Kale, Broccoli Sprouts, Brussels Sprouts, Red Cabbage, Green Cabbage) were subjected to three thermal processing methods: freeze-drying, steam treatment (100°C, 10.2

psi for 5 min), and air-frying (160°C for 10 min). Phytosterols and fatty acids were analyzed using gas chromatography-mass spectrometry (GC-MS), while phenolic compounds were identified using high-performance liquid chromatography (HPLC).

Results:

Among tested methods, Air-frying yielded the highest phytosterol concentrations including major phytosterols; β-Sitosterol, Campesterol and Stigmasterol. Broccoli sprouts has shown the highest levels of phytosterols with air-frying. Quercetin was the most abundant phenolic bioactive compound detected in tested *brassica* vegetables. Further, highest levels of palmitic acid has shown in Kale when using steam as the steam treatment and Linolenic acid has shown highest levels in kale when air-fried.

Conclusion:

This study demonstrates that the choice of thermal processing method significantly impacts the phytosterol content and associated bioactive compound profiles in *Brassica* vegetables. Air-frying appears to be a better thermal processing method to enhance phytosterol content in *brassica* vegetables. Additionally, each vegetable exhibits a unique fatty acid profile, even under the same thermal treatment. Future studies should investigate additional factors and the long-term effects of these thermal processing techniques on nutrient availability.

Key words: *Brassica* vegetables, Thermal processing, Phytosterol, Air-frying,Quercetin