Plant Sterols Stability in Enriched Fruit-milk Beverages

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Plant sterols (PS) are added to functional foods by their potential to reduce cholesterol-induced cardiovascular diseases. PS are susceptible to oxidation forming phytosterol oxidation products (POPs), whose negative biological effects remain still unclear. It is important to evaluate the stability of PS to ensure the functional effect of these compounds. Fruit-skimmed milk beverages are appropriate low-fat matrixes for meeting the nutritional recommendations and are good sources of bioactive compounds.

The aim of this study is the determination of PS and POPs in fruit and milk beverages with (FbM) or without (Fb'M) tangerine, enriched with the same sterol source (tall oil), during storage (0, 2, 4 months). The method used (1) involved extraction of lipids with chloroform:methanol. After saponification (65ºC, 1h) extraction of unsaponifiable with ether and derivatization in trimethylsilylethers (TMS), PS has been determined. For POPs determination, a saponification (room temperature, 18h), purification by SPE, and derivatization to TMS was performed. Both compounds were analyzed by GC-FID.

PS contents in FbM, Fb'M are similar (β-sitosterol > sitostanol > campesterol > stigmasterol > campestanol). There are not statistically significant difference ($p>0.05$) between total (607.07 – 631.55 mg/100g beverage) or individual PS at times analyzed, which demonstrated the stability of PS in these matrixes. In both samples, total POPs content significantly increased with time storage (91.02-152.33 µg POPs/100g FbM, 91.07-167.21 µg POPs/100g Fb'M), The following POPs were quantified: 7α-hydroxysitosterol, 7β-hyroxysitosterol, β-epoxysitosterol, α-epoxysitosterol, sitostanetriol and 7-ketositosterol. The percentage of the different POPs depends on time considered and the sample analyzed, although 7-ketositosterol is the highest POPquantified, being the lowest one 7α-hydroxysitosterol. The oxidation rate of PS in these beverages ranged from 0.019 to 0.034 for β-sitosterol, which is a low percentage of oxidation. No detectable levels of POPs from campesterol or stigmasterol were found.

References

(1): González-Larena et al., 2011 *J Agr Food Chem*, 59, 3624–3631