Antioxidant Efficacies of Rutin and Rutin Esters in Bulk Oil and Oil-in-Water Emulsion

The use of flavonoids as antioxidants in food formulations is limited due to their solubility and thereby their localization in the food products. However, enzymatic alkylation of flavonoids with lipophilic moieties alters their lipophilicity and thereby partitioning within different phases in a food product. This study aimed to evaluate the antioxidative efficiency of two derivatives of rutin, namely rutin laurate (C12:0) and rutin palmitate (C16:0) compared with their parent compound rutin and with butylated hydroxytoluene (BHT). Their efficiency as antioxidants at two different concentrations (25 and 200 µM) was assessed in bulk oil and in an o/w emulsion system without and with iron addition. All evaluated compounds revealed antioxidant effects. However, rutin and BHT were the most efficient antioxidants in bulk oil followed by rutin palmitate, whereas rutin laurate acted as either an antioxidant or a prooxidant at low and high concentrations (25 and 200 µM), respectively. In emulsions, rutin and BHT in high concentration (200 µM) were more efficient than rutin esters. Thus, alkylation of rutin with medium chain fatty acids did not improve the antioxidant ability, neither in bulk oil nor in o/w emulsion. Interestingly, rutin had stronger antioxidative effect than BHT upon iron addition to the emulsion.

Practical application: According to the antioxidant hypothesis the polar paradox more amphiphilic antioxidants should perform as better antioxidants in emulsions than more polar antioxidants. The finding in this study revealed that lipophilization of rutin did not improve its antioxidant capacity in emulsions compared to untreated rutin. This stresses the importance of evaluating the antioxidant in each emulsion systems before selecting appropriate antioxidants for optimal protection against lipid oxidation.

General information
Publication status: Published
Organisations: National Food Institute, Research group for Bioactives – Analysis and Application, Aarhus University
Contributors: Lue, B., Sørensen, A. M., Jacobsen, C., Guo, Z., Xu, X.
Number of pages: 15
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: European Journal of Lipid Science and Technology
Volume: 119
Issue number: 4
Article number: 1600049
ISSN (Print): 1438-7697
Ratings:
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.22 SJR 0.776 SNIP 1.099
Web of Science (2017): Impact factor 2.2
Web of Science (2017): Indexed yes
Original language: English
Keywords: Lipid oxidation, Flavonoid esters, Partitioning, Rutin laurate, Rutin palmitate
DOIs:
10.1002/ejlt.201600049
Source: FindIt
Source-ID: 2305376454
Research output: Contribution to journal › Journal article – Annual report year: 2017 › Research › peer-review