

TITLE: Anti-inflammatory properties of water extracts of different fruit by-products and their effect on the adhesion of *Streptococcus thermophilus* TH-4 and the probiotic *Lactobacillus rhamnosus* LGG to Caco-2 cells

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ABSTRACT:

Fruit by-products (especially peels and seeds) contain several bioactive compounds which may have a positive impact on the composition and activity of beneficial gut microorganisms and, consequently, to the host's health. However, most of these fruit by-products are discarded by the fruit industries either as animal feed or to the environment as garbage. Among the bioactive compounds present in fruit by-products, soluble fibres (such as pectins) and other soluble carbohydrates may be fermented by the gut microbiota leading to the production of beneficial metabolites that may be used not only by the gut microbial ecosystem but also by the host. In this sense, the aim of this study was to investigate the anti-inflammatory effect of four fruit by-product water extracts (from passion fruit, orange, acerola, and mango) using an *in vitro* model with RAW macrophage cells stimulated with lipopolysaccharide (LPS) from *Salmonella* Typhimurium and evaluate the impact of each fruit by-product water extracts (FWE) on the adhesion of the starter culture *Streptococcus thermophilus* TH-4 and the probiotic *Lactobacillus rhamnosus* LGG to Caco-2 cells. All FWE were prepared using a hot water extraction (100°C/1h) of a mixture of fruit by-product powder and distilled water (1:12). The anti-inflammatory activity was determined by nitric oxide (NO) measurement using Griess assay and the adhesion of each strain (as pure culture and in co-culture) was expressed as adhesion %. Regarding anti-inflammatory effect, orange and mango extracts inhibited NO production in LPS-stimulated RAW cells while passion fruit extract did not have any effect on NO production. All FWE improved the adhesion of LGG to Caco-2 cells and only mango extract did not improve the adhesion of TH-4. When in co-culture, TH-4 did not interfere with LGG adhesion; however, this strain negatively affected TH-4 adhesion. Therefore, our results suggest that FWE rich in soluble carbohydrates have a great potential to be used as functional ingredients, improving not only gut microbiota activity but also decreasing the production of proinflammatory mediators such as NO.

Keywords: probiotic, caco-2 cells, raw cells, anti-inflammatory activity, fruit by-products

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